AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 **Director of the U.S. Patent and Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313-1450**	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the District of Delaware on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	11/23/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
FOREST LABORATORIES, LLC, et al.	INVAGEN PHARMACEUTICALS INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
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3		
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,673,921 B2
APPLICATION NO. : 14/032183
DATED : March 18, 2014
INVENTOR(S) : Andreas Bathe et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page, under "**Foreign Application Priority Data**," item (30), left column, replace

"Jun. 19, 2001 (EP) ..... 01113674" with

--Jun. 19, 2001 (EP) 01113647--

Signed and Sealed this
First Day of March, 2016

Michelle K. Lee

Michelle K. Lee
Director of the United States Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.: 8673921

DATED: March 18, 2014

INVENTOR(S): Andreas Bathe et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 1, under "Foreign Application Priority Data," item (30), left column, replace

"Jun. 19, 2001 (EP).....01113674" with
-- Jun. 19, 2001 (EP).....01113647--

/Joseph K. McKane/
Supervisory Patent Examiner, Art Unit 1626

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: November 24, 2015
Electronic Signature for Jin Wang, Esq., J.D.: /Jin Wang/

Docket No.: 120140-00110
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Andreas Bathe et al.

Confirmation No.: 2870

U.S. Patent No.: 8,673,921

Art Unit: 1626

Issued: March 18, 2014

Application No.: 14/032,183

Examiner: Samantha L. Shterengarts

Filing Date: September 19, 2013

For: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Attention: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION
PURSUANT TO 37 C.F.R. § 1.323

Dear Sir:

Upon reviewing the above-identified patent, Patentee noted a typographical error on the patent which should be corrected.

On the cover page of the patent, in the left-hand column under item (30) "Foreign Application Priority Data," the foreign priority is incorrectly shown as "Jun. 19, 2001 (EP) 01113674."

The foreign priority should be corrected to show:

-- Jun. 19, 2001 (EP) 01113647 --

Transmitted herewith is a proposed Certificate of Correction effecting such amendment. Patentees respectfully solicit the granting of the requested Certificate of Correction.

Please charge the fee of $100.00 as required under 37 C.F.R § 1.20(a) from our Deposit Account No. **50-4876**, under Order No. **120140-00110** from which the undersigned is authorized to draw.

Dated: November 24, 2015

Respectfully submitted,

Electronic signature: / Jin Wang /

Jin Wang, Esq.
Registration No.: 66,467
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Attorney for Patentee

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4).

Dated: November 24, 2015
Electronic Signature for Jin Wang, Esq., J.D.: /Jin Wang/

Docket No.: 120140-00110
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Andreas Bathe et al.		Confirmation No.:	2870
U.S. Patent No.:	8,673,921	Art Unit:	1626
Issued:	March 18, 2014		
Application No.:	14/032,183	Examiner:	Samantha L. Shterengarts
Filing Date:	September 19, 2013		

For: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

MS Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION TO ACCEPT UNINTENTIONALLY DELAYED CLAIM FOR FOREIGN PRIORITY PURSUANT TO 37 C.F.R. § 1.55(e)

Dear Sir:

Patentee requests correction of the foreign priority, as stated on the above-identified patent. The foreign priority, as shown on the cover page of the patent, in the left-hand column under item (30) "Foreign Application Priority Data," is incorrectly shown as "Jun. 19, 2001 (EP) 01113674."

The foreign priority should be corrected to show:

-- Jun. 19, 2001 (EP) 01113647 --

Patentee submits that the entire delay between the date the priority claim was due under 37 C.F.R. § 1.55(d) and the date the priority claim was filed was unintentional. Specifically, the Applicant Data Sheet filed in this patent contains an inadvertent typographical error of the

foreign priority application number, *i.e.* (EP) 01113674, which should be (EP) 01113647. However, Patentee notes that the correct priority information is shown on page 2 of the Preliminary Amendment under "Related Applications" submitted on September 19, 2013 during prosecution of this patent. In addition, it is indicated on the Notice of Allowability mailed on December 13, 2013 that "***[a]cknowledgement is made of a claim for foreign priority*** under 35 U.S.C. §119(a)-(d) or (f)" and that "***[a]ll certified copies of the priority documents have been received*** [by the Patent Office]." Furthermore, Patentee submits that all parent patents, US 8,318,744 issued on November 27, 2012 , US 7,981,894 issued on July 19, 2011, US 7,834,020 issued on November 16, 2010, and US 7,381,726 issued on June 3, 2008, which are relied upon in this patent for an earlier filing date under 35 U.S.C. 120, 121, 365(c), or 386(c), have all claimed the correct foreign priority application number European Patent Office (EPO) 01113647.0. Therefore, the priority claim was unintentionally delayed.

A certified copy of the foreign application EP 01113647.0 was filed in the prior-filed nonprovisional application 10/481,270, now U.S. Patent No. 7,381,726, which the instant patent claims a benefit under 35 U.S.C. 120, 121, 365(c), or 386(c). However, for the convenience of the Office, Patentee enclose herewith a certified copy of the foreign priority application EP 01113647.0

Applicant additionally requests that all pertinent U.S. Patent and Trademark Office records relating to the subject application be changed to reflect this correction.

Please charge the fee of $1,700.00 as required under 37 C.F.R § 1.17(m) from our Deposit Account No. **50-4876**, under Order No. **120140-00110** from which the undersigned is authorized to draw.

Dated: November 24, 2015

Respectfully submitted,

Electronic signature: / Jin Wang /
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Registration No.: 66,467
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Attorney for Patentee

PTO/SB/44 (09-07)
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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.	:	8,673,921
APPLICATION NO.	:	14/032,183
ISSUE DATE	:	March 18, 2014
INVENTOR(S)	:	Andreas Bathe et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On page 1, under "**Foreign Application Priority Data**," item (30), left column, replace

"Jun. 19, 2001 (EP) ..... 01113674" with

-- Jun. 19, 2001 (EP) 01113647--

MAILING ADDRESS OF SENDER (Please do not use customer number below):
Jin Wang
MCCARTER & ENGLISH, LLP
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1

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Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

01113647.0

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

DEN HAAG, DEN
THE HAGUE,
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Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation

Anmeldung Nr.:
Application no.: 01113647.0
Demande n°:

Anmeldetag:
Date of filing: 19/06/01
Date de dépôt:

Anmelder:
Applicant(s):
Demandeur(s):
Merck Patent GmbH
64293 Darmstadt
GERMANY

Bezeichnung der Erfindung:
Title of the invention:
Titre de l'invention:
Polymorphic forms of 1-(4-(5-cyanoindol-3-yl)butyl)-4-(2-carbamoylbenzofuran-5-yl)piperazine hydrochloride

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s) revendiquée(s)

Staat: State: Pays:	Tag: Date: Date:	Aktenzeichen: File no. Numéro de dépôt:

Internationale Patentklassifikation:
International Patent classification:
Classification internationale des brevets:
/

Am Anmeldetag benannte Vertragstaaten:
Contracting states designated at date of filing: AT/BE/CH/CY/DE/DK/ES/FI/FR/GB/GR/IE/IT/LI/LU/MC/NL/PT/SE/TR
Etats contractants désignés lors du depôt:

Bemerkungen:
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Merck Patent Gesellschaft
mit beschränkter Haftung

64271 D a r m s t a d t

Polymorphic forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoylbenzofuran-5-yl)piperazine hydrochloride

Druckdatum: 18.06.2001
Speicherdatum: 13.06.2001

Polymorphic forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoylbenzofuran-5-yl)piperazine hydrochloride

FIELD OF THE INVENTION

The present invention relates to novel compounds, to processes for preparing them and to their use in treating medical disorders.

BACKGROUND OF THE INVENTION

1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine, its physiologically acceptable salts thereof (US 5,532,241, column 7, lines 30 to 58), a process (US 5,532,241, Example 4) by which it/they can be prepared and their use in treating certain medical disorders are known from U.S. Patent US 5,532,241 and WO 00/72832.

Example 4 of US 5,532,241 describes the preparation of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride by reacting 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carboxybenzofuran-5-yl)piperazine at first with 2-chloro-1-methylpyridinium methanesulfonate in N-methylpyrrolidine and then with dried NH_3. Customary working up gives the free base 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carboxybenzofuran-5-yl)piperazine. 700 mg of the base are dissolved in 30 ml 2-propanol under heating and then treated with 0.1n 2-propanolic HCL-solution (Merck-Art. No. 1.00326) until precipitation of hydrochloride is complete. The precipitate was filtered off and washed with diethylether and dried at room temperature to yield 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride having a melting point of 269-272°C. There is no clear teaching elsewhere in the document of any alternative route or modification to the process which would generate new crystal modifications of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride or new solvates or hydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in different crystal modifications.

Former 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride having a melting point of 269-272°C was a mixture of amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, crystallized 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and the free base 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine.

Methods for preparing pure crystals of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride has now been found. Furthermore, surprinsingly, 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride, five (four + dihydrochloride XIII) new forms of 1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, three new forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate, six new forms of solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and pure amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride have been found as have processes for their preparation. These forms are hereinafter referred to as I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV and XVI respectively.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psypsychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention furthermore provides 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrates in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psypsychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention also provides 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrates in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psypsychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention relates additionally to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in its crystalline modification and its use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psypsychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention relates additionally to amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and its use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psypsychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

BRIEF DESCRIPTION OF THE FIGURES

Fig. 1 is a IR absorption spectra of Form I

Fig. 2 is a IR absorption spectra of Form II

Fig. 3 is a IR absorption spectra of Form XV

Fig. 4 is a IR absorption spectra of Form XI

Fig. 5 is a IR absorption spectra of Form XIV

Fig. 6 is a IR absorption spectra of Form V

Fig. 7 is a IR absorption spectra of Form VI

Fig. 8 is a IR absorption spectra of Form VIII

Fig. 9 is a IR absorption spectra of Form IV

Fig. 10 is a IR absorption spectra of Form III

Fig. 11 is a IR absorption spectra of Form VII

Fig. 12 is an x-ray diffractogram for Form I

Fig. 13 is an x-ray diffractogram for Form II

Fig. 14 is an x-ray diffractogram for Form XV

Fig. 15 is an x-ray diffractogram for Form X

Fig. 16 is an x-ray diffractogram for Form XI

Fig. 17 is an x-ray diffractogram for Form XIV

Fig. 18 is an x-ray diffractogram for Form V

Fig. 19 is an x-ray diffractogram for Form VI

Fig. 20 is an x-ray diffractogram for Form VIII

Fig. 21 is an x-ray diffractogram for Form IV

Fig. 22 is an x-ray diffractogram for Form III

Fig. 23 is an x-ray diffractogram for Form VII

Fig. 24 is an x-ray diffractogram for Form IX

Fig. 25 is an x-ray diffractogram for Form XIII

Fig. 26 is an x-ray diffractogram for amorphous hydrochloride (Form XVI)

Fig. 27 is an energy/temperature diagram

Fig. 28 is a diagram of thermal analysis from Form I

Fig. 29 is a diagram of thermal analysis from Form II

Fig. 30 is a diagram of thermal analysis from Form III

Fig. 31 is a diagram of thermal analysis from Form IV

Fig. 32 is a diagram of thermal analysis from Form V

Fig. 33 is a diagram of thermal analysis from Form VI

Fig. 34 is a diagram of thermal analysis from Form VII

Fig. 35 is a diagram of thermal analysis from Form VIII

Fig. 36 is a diagram of thermal analysis from Form IX

Fig. 37 is a diagram of thermal analysis from Form XI

Fig. 38 is a diagram of thermal analysis from Form XIV

Fig. 39 is a diagram of thermal analysis from Form XV

DETAILED DESCRIPTION OF THE INVENTION

It has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is able to form solvates in crystalline modifications. Examples of such solvates include solvates from alcohols such as methanol, ethanol, propan-1-ol or propan-2-ol; solvates from organic esters such as ethyl acetate; solvates from nitriles such as acetonitrile; solvates from ketones such as acetone and butanone; solvates from ethers such as tetrahydrofuran and solvates from chlorinated hydrocarbons such as chloroform and solvates of hydrocarbons such as n-heptane or toluene.

Preferably, 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride forms solvates with acetone, tetrahydrofuran, methanol, ethyl acetate or n-heptane in crystalline modifications that means the bound solvent together with 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride build the crystal structure. The ratio of the solvent to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride could vary as known for skilled persons in the art. Preferably, the ratio is between 0,25:1 to 2,5:1, more preferably between 0,5:1 to 1:1, most preferably 1:1. (n-heptan solvate 1/15 : 1)

It should be understood that the present solvates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:

a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with acetone in Form I; (as hereinafter defined)

b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form II; (as hereinafter defined)

c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form XV; (as hereinafter defined)

d) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form X; (as hereinafter defined)

e) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with methanol in Form XI; (as hereinafter defined)

f) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with n-heptane in Form XIV; (as hereinafter defined).

Form I according to the invention has the characteristic IR absorption spectra as shown in Fig. 1 and the charasteristic X-ray diffraction pattern as shown in Fig. 12. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission. Sample preparation was performed generally as KBr disk. The spectra contains additionally a specific acetone absoption band at 1709cm^{-1}.

Form I can be further characterized with the aid of thermal analysis measured in the range of 30° to 350 °C. Fig. 28 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form I shows a desolvation process between 50°C and 180°C. Analysis by thermogravimetry showed the presence of 10 % to 11 % of acetone (theory of 1 : 1 solvate 10.82 %). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C. The ratio of acetone to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form I is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monoacetonate.

The invention also provides a process for preparing the above Form I according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in acetone

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid

into the hydrochloride salt at temperatures between 30°C and the boiling point of acetone, preferably between 40° C and 50°C

(3) precipitation of Form I at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

Alternatively, Form I can be prepared according to a process which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in acetone

(2) stirring at room temperature between a few hours or days, preferably 10 to 20 days,

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Form II according to the invention has the charasteristic IR absorption spectra as shown in Fig. 2 and the charasteristic X-ray diffraction pattern as shown in Fig. 13. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form II can be further characterized with the aid of thermal analysis measured in the range of 30° to 350°C. Fig. 29 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form II shows a desolvation process between 120°C and 180°C. Analysis by thermogravimetry showed the presence of 13 % to 14 % of THF (theory of 1 : 1 solvate 13.11 %). The DSC measurement gives a

phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 292°C. The ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form II is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form II according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 60°C, preferably between 20° C and 30°C

(3) precipitation of Form II between -10°C and 10°C

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Alternatively, Form II can be prepared according to a process which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in tetrahydrofuran

(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

Form XV according to the invention has the charasteristic IR absorption spectra as shown in Fig. 3 and the charasteristic X-ray diffraction pattern as shown in Fig. 14. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XV can be further characterized with the aid of thermal analysis measured in the range of 30° to 350 °C. Fig. 39 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form XV shows a desolvation process between 75°C and 180°C. Analysis by thermogravimetry showed the presence of 13 % to 14 % of THF (theory of 1 : 1 solvate 13.11 %). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C. The ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form XV is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form XV according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between -10°C and 10°C, preferably between -5° C and +5°C

(3) precipitation of Form XV at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Form X according to the invention has the charasteristic X-ray diffraction pattern as shown in Fig. 15. XRD pattern were recorded using a x-ray powder.diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

The ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 0,5:1, that means the compound of the invention in crystal modification of Form II is a hemisolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form X according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 40°C, preferably between 20° C and 30°C

(3) precipitation of Form II at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying at temperatures up to 80°C maximum.

Form XI according to the invention has the charasteristic IR absorption spectra as shown in Fig. 4 and the charasteristic X-ray diffraction pattern as

shown in Fig. 16. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XI can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 37 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form XI shows a desolvation process between 75°C and 150°C. Analysis by thermogravimetry showed the presence of 6 % to 7 % of methanol (theory of 1 : 1 solvate 6.28 %). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C

The ratio of methanol to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form II is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with methanol.

The invention also provides a process for preparing the above Form XI according to the invention, which comprises:

(1) suspending Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in methanol at temperatures between 55°C and the boiling point of methanol

(2) cooling down the reaction mixture to temperatures between -40° and -10°C, preferably to -30°C

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate by filtration at room temperature, and drying in vacuo at room temperature.

Form XIV according to the invention has the charasteristic IR absorption spectra as shown in Fig. 5 and the charasteristic X-ray diffraction pattern as shown in Fig. 17. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XIV can be further characterized with the aid of a thermal analysis measured in the range of 30°C and 350°C. Fig. 38 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Analysis by thermogravimetry showed the presence of 1 % to 3 % of n-heptane (theory of 15 : 1 solvate 1.37 %, theory of 10 : 1 solvate 2.05 %).

The ratio of n-heptane to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is between 1:10 and 1:15, that means the compound of the invention in crystal modification of Form XIV is a solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane. The DSC measurement gives phase transitions between 80°C and 120°C and between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C

The invention also provides a process for preparing the above Form XIV according to the invention, which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in n-heptane

(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,

(3) recovering the precipitated solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane by filtration, and drying in vacuo at room temperature.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is able to form hydrates in crystalline modifications. Preferably, the ratio of water to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is between 0,25:1 to 2,5:1, more preferably between 0,5:1 to 1:1, most preferably 1:1.

It should be understood that the present hydrates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of hydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:
a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in Form V; (as hereinafter defined)
b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride 1.75 hydrate in Form VI; (as hereinafter defined)
c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate in Form VIII; (as hereinafter defined)

Form V according to the invention has the charasteristic IR absorption spectra as shown in Fig. 6 and the charasteristic X-ray diffraction pattern as shown in Fig. 18. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in

the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form V can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 32 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form V shows a dehydration process between 25°C and 100°C. Analysis by thermogravimetry showed the presence of 3 % to 4 % of water (theory of 1 : 1 solvate 3.63 %). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C. Form V of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate according to the invention has surprising advantages with regard to its stability under conditions of high humidity. Form V according to the invention is obtained as colorless solid substance with forms good crystals.

The invention also provides a process for preparing the above Form V according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt
(3) precipitation of Form V at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

Alternatively, Form V can be prepared according to a process which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in water with an amount of 5 to 10 times more relating to Form IV

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature untill the forming of the monohydrate of Form V without excess of water.

Alternatively, Form V can be prepared according to a process which comprises:

(1) stirring of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride, which will be described later in detail, in water

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

Form VI according to the invention has the charasteristic IR absorption spectra as shown in Fig. 7 and the charasteristic X-ray diffraction pattern as shown in Fig. 19. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form VI can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 33 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form VI shows a dehydration process between 25°C and

100°C. Analysis by thermogravimetry showed the presence of 6 % to 7 % of water (theory of 1 : 1.75 solvate 6.19 %). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The invention also provides a process for preparing the above Form VI according to the invention, which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in water in which the relative proportions of salt to water are between 1:5 and 1:10

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature

Alternatively, Form VI can be prepared according to a process which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, in water for one hour

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

Form VIII according to the invention has the charasteristic IR absorption spectra as shown in Fig. 8 and the charasteristic X-ray diffraction pattern as shown in Fig. 20. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in

the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form VIII can be further characterized with the aid of a thermal analysis measured in the range of 30°C to 350°C. Fig. 35 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form VIII shows a dehydration process between 25°C and 125°C. Analysis by thermogravimetry showed the presence of 1 % to 2 % of water (theory of 1 : 0.5 solvate 1.85 %). The DSC measurement gives a melting of resulted form IX around 268°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The invention also provides a process for preparing the above Form VIII according to the invention, which comprises:

(1) stirring of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride 1.75 hydrate, as described above, in water for more than 12 hours

(2) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

Alternatively, Form VIII can be prepared according to a process which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, in water for 12 hours

(2) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride form crystalline modifications as anhydrates.

It should be understood that the present anhydrates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of anhydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:

a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form IV; (as hereinafter defined)

b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form III; (as hereinafter defined)

c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form VII; (as hereinafter defined)

d) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form IX; (as hereinafter defined)

Form IV according to the invention has the charasteristic IR absorption spectra as shown in Fig. 9 and the charasteristic X-ray diffraction pattern as shown in Fig. 21. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form IV can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 31 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives a phase transition to form VII

between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

Owing to its crystalline properties, Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention has surprising advantages with regard to its solubility and for its pharmaceutical processing into solid dosage forms. The solubility of Form IV in water is 0,328 µg/ml. Form IV according to the invention is obtained as colorless solid substance with forms good crystals.
As shown in Figure 27, Form IV is the most stable form at higher temperatures, e.g. > 100°C.

The invention also provides a process for preparing the above Form IV according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C
(3) precipitation of Form V at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate Form V by filtration
(5) drying of Form V in vacuo at temperatures of 85° to 90°C to give Form IV.

Alternatively, Form IV can be prepared according to a process which comprises:

(1) drying of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate, as described above, at temperatures between 55° and 65°C to give Form IV.

Form III according to the invention has the charasteristic IR absorption spectra as shown in Fig. 10 and the charasteristic X-ray diffraction pattern as shown in Fig. 22. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form III can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 30 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°.

Owing to its crystalline properties, Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention is the most stable form at room temperature, that means the thermodynamically stable form at room temperature (Fig. 27). Form III according to the invention is obtained as colorless solid substance with forms good crystals.

The invention also provides a process for preparing the above Form III according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid

into the hydrochloride salt at temperatures between 10°C and 40°C, preferably between 20° C and 30°C

(3) precipitation of Form II at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration

(5) drying of Form II in vacuo at temperatures of at least 100°C to give Form III.

Form VII according to the invention has the charasteristic IR absorption spectra as shown in Fig. 11 and the charasteristic X-ray diffraction pattern as shown in Fig. 23. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission. Sample preparation was performed generally as KBr disk.

Form VII can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 34 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives the melting point of form VII at 288°C.

Form VII is the high temperature form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention. Form VII according to the invention is obtained as colorless solid substance with forms good crystals.

The invention also provides a process for preparing the above Form VII according to the invention, which comprises:

(1) tempering Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, at temperatures of at least 200°C, preferably at 250°C, for 30 minutes.

Form IX according to the invention has the charasteristic X-ray diffraction pattern as shown in Fig. 24. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

Form IX can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C Fig. 36 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives of the melting of form IX at 267°C followed by a recrystallisation to form VII. The thermoanalytically resulting form VII melts between 280°C and 290°C.

Form IX according to the invention is obtained as colorless solid substance with forms good crystals.

The invention also provides a process for preparing the above Form IX according to the invention, which comprises:

(1) drying of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, at temperatures between 90°C and 110°C to give Form IX.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride form crystalline modifications.

It should be understood that the present dihydrochlorides of the invention may contain unbound water that is to say water which is other than water of crystallization.

A preferred form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in Form XIII; (as hereinafter defined).

Form XIII (dihydrochloride) according to the invention has the charasteristic X-ray diffraction pattern as shown in Fig. 25. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

Form XIII according to the invention is obtained as colorless solid substance with forms good crystals.

The invention also provides a process for preparing the above Form XIII according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in an organic solvent chosen from the group consisting of tetrahydrofuran, ethanol, isopropanol or mixtures thereof with water
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 2N or concentrated hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C
(3) precipitation of Form XIII at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII by filtration
(5) drying of Form XIII in vacuo at room temperature.

Additionally, the pure amorphous form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride has been found which is called Form XVI.

Form XVI according to the invention has the charasteristic X-ray diffraction pattern as shown in Fig. 26. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

The invention also provides a process for preparing the above Form XVI according to the invention, which comprises:

(1) dissolving 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in acetonitrile and water in the ratio 1:1

(2) freeze-drying or spray-driying overnight to give an amorphous powder of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

Similarly the freeze-dry process can be performed in other mixtures of water miscible organic solvent (tetrahydrofuran, alcohols, N-methylpyrrolidon) with water.

These Forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride or dihydrochloride, as referred to as Forms I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV and XVI respectively and all of which are hereinafter referred to as the "products of the invention" can be used to treat and prevent the disorders:
depressive disorders, including the sub-type disorders major depressive disorder and dysthymic disorder, adolescent depression, anxiety disorders, including the sub-type anxiety disorders chosen from the sub-types panic disorder with and/or without agoraphobia, agoraphobia, obsessive-compulsive spectrum disorders, social phobia, specific phobia including neophobia, posttraumatic stress disorder, acute stress indication or generalized-anxiety disorder, bipolar disorders, mania, dementia, including Alzheimer's disease and multi-infarct, substance-related disorders, sexual dysfunctions including premature ejaculation, eating disorders including anorexia nervosa and bulimia nervosa and/or obesity, fibromyalgia, chronic

pain, sleeping disorders including dyssomnias and narcolepsy, psychiatric disorders like psychoses, schizophrenia or schizoaffective disorder, cerebral infarct like stroke and cerebral ischemia, CNS disorders such as tension.

They are also useful for the therapy of side-effects in the treatment of hypertension (e.g. with α-methyldopa) and for the prophylaxis and therapy of cerebral disorders, in endocrinology and gynecology, e.g. for the treatment of acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome or undesired puerperal lactation.

These disorders are herein after referred to as "the Disorders".

The present invention further provides pharmaceutical compositions or medicaments comprising a Product of the Invention. The pharmaceutical composition may comprise additionally one or more conventional auxiliary substances and/or carriers.

thus, the Products of the Invention can be formulated into the conventional forms of administration, including peroral and parenteral forms of administration. Tablets or capsules are preferred formulations. They can be produced by conventional mixing processes and with the use of conventional auxiliary substances and carriers, as well as binders, disintegrants, flavorings and the like. The dose corresponds to that mentioned in US 5,532,241.

Additionally, the invention relates to the use of a pharmaceutical composition containing at least one product of the invention for the treatment of the Disorders.

Furthermore, the present invention relates to the use of Products of the Invention for the manufacture of a medicament for the treatment of and prevention of the Disorders, such as depressive disorders, adolescent

depression, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, chronic pain, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention further provides a method for treating and/or preventing any one or more of the Disorders by administering an effective and/or prophylactic amount of the Products of the Invention to a patient in need thereof.

Preferably, the Disorders which are treated are depression, anxiety disorders, more preferably social anxiety disorder, panic disorder generalised anxiety disorder, posttraumatic stress disorder and/or obsessive compulsive disorder.

Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilize the present invention to its fullest extent. The preferred specific embodiments and examples are, therefore, to be construed as merely illustrative, and not limitative to the remainder of the disclosure in any way whatsoever.
The entire disclosures of all applications, patents, and publications cited above and below, are hereby incorporated by reference.

Examples

Example 1:

Production of Form I of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 80 ml of acetone. The temperature of the solution is allowed to come to 50°C and 0,5 ml of 1N hydrochloric acid is added to the reaction mixture. After stirring for 2 to 3 minutes the reaction mixture is cooled to room temperature and precipitation occurs. Suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate Form I.

Method 2:
2,25 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 200 ml of acetone. After stirring for 14 days the precipitated crystals are recovered by filtration, and drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate Form I which present the IR absorption spectra of Fig. 1 and the x-ray diffraction spectrum of Fig. 12.

Example 2:

Production of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:
1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 46,6 g tetrahydrofuran and 2,2 g 1N hydrochloric acid is added to the reaction mixture. After precipitation and stiring for 30 minutes suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to the monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form II which present the IR absorption spectra of Fig. 2 and the x-ray diffraction spectrum of Fig. 13.

Method 2:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 400 ml of tetrahydrofuran. After stirring for 20 days the precipitated crystals are recovered by filtration. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form II.

Example 3:

Production of Form XV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

10 ml of 1N hydrochlorid acid are added to a solution of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in tetrahydrofuran [200 ml] (ratio base to tetrahydrofuran = 1:48) at 0°C. After stirring for 30 min the precipitated crystals are recovered by filtration. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form XV which present the IR absorption spectra of Fig. 3 and the x-ray diffraction spectrum of Fig. 14.

Example 4:

Production of Form X of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

8,6 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in tetrahydrofuran and 19,4 ml 1N hydrochloric acid and 7,4 ml water are added within 30 minutes to this solution at 35-37°C. After stirring of five hours, precipitation occurs and suction filtration is effected. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-

yl)-piperazine hydrochloride with tetrahydrofuran of Form X which present the x-ray diffraction spectrum of Fig. 15.

Example 5:

Production of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form IV are dispersed in 500 ml of methanol at 60°C. The reaction mixture is cooled to -30°C and precipitation occurs. Suction filtration of the prepcipitated crystals is effected at room temperature. Drying in vacuo to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate of Form XI which present the IR absorption spectra of Fig. 4 and the x-ray diffraction spectrum of Fig. 16.

Example 6:

Production of Form XIV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

3,6 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 75 ml of n-heptane. After stirring for three weeks suction filtration of the prepcipitated crystals is effected at room temperature. Drying in vacuo to constant weight at room temperature leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane of Form XIV which present the IR absorption spectra of Fig. 5 and the x-ray diffraction spectrum of Fig. 17.

Example 7:

Production of Form V of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

To a solution of 1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in 32,6 g tetrahydrofuran 2,1 g hydrochloric acid (37%) are added. After stirring suction filtration of the precipitated crystals is effected. Drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V which present the IR absorption spectra of Fig. 6 and the x-ray diffraction spectrum of Fig. 18.

Method 2:

2,25 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form IV are dispersed in 10 bis 20 g water. After stirring for 24 to 48 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V.

Method 3:

10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII are dispersed in 1 l water. After stirring for 48 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V.

Example 8:

Production of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 2:

10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form II are dispersed in 100 ml water. After stirring for 1 hour the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VI.

Example 9:

Production of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form VI are dispersed in 10 ml water. After stirring for 12 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VIII which present the IR absorption spectra of Fig. 8 and the x-ray diffraction spectrum of Fig. 20.

Method 2:

10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form II are dispersed in 10 to 20 g water. After stirring for more than 1 hour the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VIII. (After stirring for about 1 hour Form VI ocurrs as an intermediate which is subsequently converted into Form VIII)

Example 10:

Production of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

Drying of Form V prepared according to example 7 in vacuo to constant weight at 85° to 90°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV which present the IR absorption spectra of Fig. 9 and the x-ray diffraction spectrum of Fig. 21.

Method 2:

Drying of Form XI prepared according to example 5 in vacuo to constant weight at 60°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV.

Example 11:

Production of Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Drying of Form II prepared according to example 2 in vacuo to constant weight at 100° to 110°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form III which present the IR absorption spectra of Fig. 10 and the x-ray diffraction spectrum of Fig. 22.

Example 12:

Production of Form VII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Tempering of Form IV prepared according to example 10 for 10 minutes at 250°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form VII which present the IR absorption spectra of Fig. 11 and the x-ray diffraction spectrum of Fig. 23.

Example 13:

Production of Form IX of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Drying of Form VIII prepared according to example 9 in vacuo to constant weight at 100° to 110°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IX which present the x-ray diffraction spectrum of Fig. 24:

Example 14:

Production of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 100 ml of tetrahydrofuran and 10 ml of 2N or concentrated hydrochloric acid. After stirring for 2 to 3 minutes suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride of Form XIII which present the characteristic x-ray diffraction spectrum of Fig. 25.

Example 15:

Production of amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride (Form XVI):

Method 1: Freeze-dry

500 mg of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, III, VII or IX are dissolved in a mixture of 100 ml acetonitril and 100 ml water. The solution is freeze-dried over night to yield 500 mg of a white amorphous powder which present the characteristic x-ray diffraction spectrum of Fig. 26.

Advantage: 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is better soluble in the solvent mixture than in each solvent alone. Similarly the freeze-dry process can be performed in other mixtures of water miscible organic solvent (tetrahydrofuran, alcohols, N-methylpyrrolidon) with water.

Method 2:

b) Spray-dry

500 mg 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, III, VII or IX are dissolved in a mixture of 100 ml acetonitril and 100 ml water. The solution is spray-dried to yield a white amorphous powder.

Example 16:

Solubility data of Forms II, III, IV, V, VI and VIII are measured according to Alex Avdeef et al, Pharm. Pharmacol. Commun. 1998, 4, 165-178 and Alex Avdeef et al, Pharmaceutical Research 2000, 17, 85-89 via potentiometric titration.

The pSOLTM solubility profiler, automatically collects potentiometric data, calculates the pH-solubility profiles, and prints the values at 0.1 pH unit intervals. Intrinsic solubilities in the milli-, micro- and nanogram levels can be determined. Also presented are two new concepts, the Flux Factor Profile and Dose Limit Profile. Both concepts follow the guidelines consistent with the BioPharmaceutics Classification Scheme.

Table I:

Solubility data in µg/ml

Form I	Form II	Form III	Form IV	Form V	Form VI	Form VIII
0.08	0,03	0,12	0,33	0,18	0,23	0,10

Claims

1. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate in its crystalline modification.

2. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monoacetonate in crystalline modification I.

3. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride as monosolvate with tetrahydrofuran in crystalline modification II.

4. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monosolvate with tetrahydrofuran in crystalline modification XV.

5. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemisolvate with tetrahydrofuran in crystalline modification X.

6. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate in crystalline modification XI.

7. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monosolvate with n-heptane in crystalline modification XIV.

8. A pharmaceutical composition comprising a compound according to any one of claims 1 to 7.

9. Use of compounds according to any one of claims 1 to 7 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

10. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate in its crystalline modification.

11. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in crystalline modification V.

12. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate in crystalline modification VI.

13. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate in crystalline modification VIII.

14. A pharmaceutical composition comprising a compound according to any one of claims 10 to 13.

15. Use of compounds according to any one of claims 10 to 13 for the manufacture of a medicament for the treatment of and prevention of

depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

16. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrate in its crystalline modification.

17. A compound according to claim 16 in crystalline modification IV.

18. A compound according to claim 16 in crystalline modification III.

19. A compound according to claim 16 in crystalline modification VII.

20. A compound according to claim 16 in crystalline modification IX.

21. A pharmaceutical composition comprising a compound according to any one of claims 16 to 20.

22. Use of compounds according to any one of claims 16 to 20 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

23. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in its crystalline modification.

24. A dihydrochloride according to claim 23 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in crystalline modification XIII.

25. A pharmaceutical composition comprising a compound according to claim 23 or 24.

26. Use of compounds according to claims 23 or 24 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

27. A compound which is amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

28. A pharmaceutical composition comprising a compound according to claim 27.

29. Use of compounds according to claim 27 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the

therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

30. Process for preparing Form I according to claim 2, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in acetone

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 30°C and the boiling point of acetone, preferably between 40° C and 50°C

(3) precipitation of Form I at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

31. Process for preparing Form I according to claim 2 which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 18 in acetone

(2) stirring at room temperature between a few hours or days, preferably 10 to 20 days,

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

32. Process for preparing Form II according to claim 3, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 60°C

(3) precipitation of Form II at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

33. Process for preparing Form II according to claim 3 which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 18 in tetrahydrofuran

(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

34. Process for preparing Form XV according to claim 4, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between -10°C and 10°C

(3) precipitation of Form XV at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

35. Process for preparing Form X according to claim 5, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 40°C

(3) precipitation of Form II at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying at temperatures up to 80°C maximum.

36. Process for preparing Form XI according to claim 6, which comprises:

(1) suspending Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 12 in methanol methanol at temperatures between 55°C and the boiling point of methanol

(2) cooling down the reaction mixture to temperatures between -40° and -10°C

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate by filtration at room temperature, and drying in vacuo at room temperature.

37. Process for preparing Form V according to claim 11, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt

(3) precipitation of Form V at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

38. Process for preparing Form V according to claim 11, which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 in water with an amount of 5 to 10 times more relating to Form IV

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature untill the forming of the monohydrate of Form V without excess of water.

39. Process for preparing Form V according to claim11, which comprises:

(1) stirring of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride according to claim 24 in water

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

40. Process for preparing VI according to claim 12, which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 in water in which the relative proportions of salt to water are between 1:5 and 1:10

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

41. Process for preparing Form VI according to claim 12, which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 2 in water for at least one hour

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

42. Process for preparing Form VIII according to claim 13, which comprises:

(1) stirring of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate according to claim 12 in water for more than 12 hours

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

43. Process for preparing Form VIII according to claim 13, which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 2 in water for 12 hours

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

44. Process for preparing Form IV according to claim 17, which comprises:

(1) drying of Form V according to claim 11 in vacuo at temperatures of 85° to 90°C.

45. Process for preparing Form IV according to claim 17, which comprises:

(1) drying of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate according to claim 6 at temperatures between 55° and 65°C.

45. Process for preparing Form III according to claim 18, which comprises:

(1) drying of Form II according to claim 3 in vacuo at temperatures of at least 100°C.

46. Process for preparing Form VII according to claim 19, which comprises:

(1) tempering Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 at temperatures of at least 200°C.

47. Process for preparing Form IX according to claim 20, which comprises:

(1) drying of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 13 at temperatures between 90°C and 110°C.

48. Process for preparing Form XIII according to claim 24, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in an organic solvent chosen from the group consisting of tetrahydrofuran, ethanol, isopropanol or mixtures thereof with water

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 2N or concentrated hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C

(3) precipitation of Form XIII at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII by filtration

(5) drying of Form XIII in vacuo at room temperature.

49. Process for preparing Form XVI according to claim 27, which comprises:

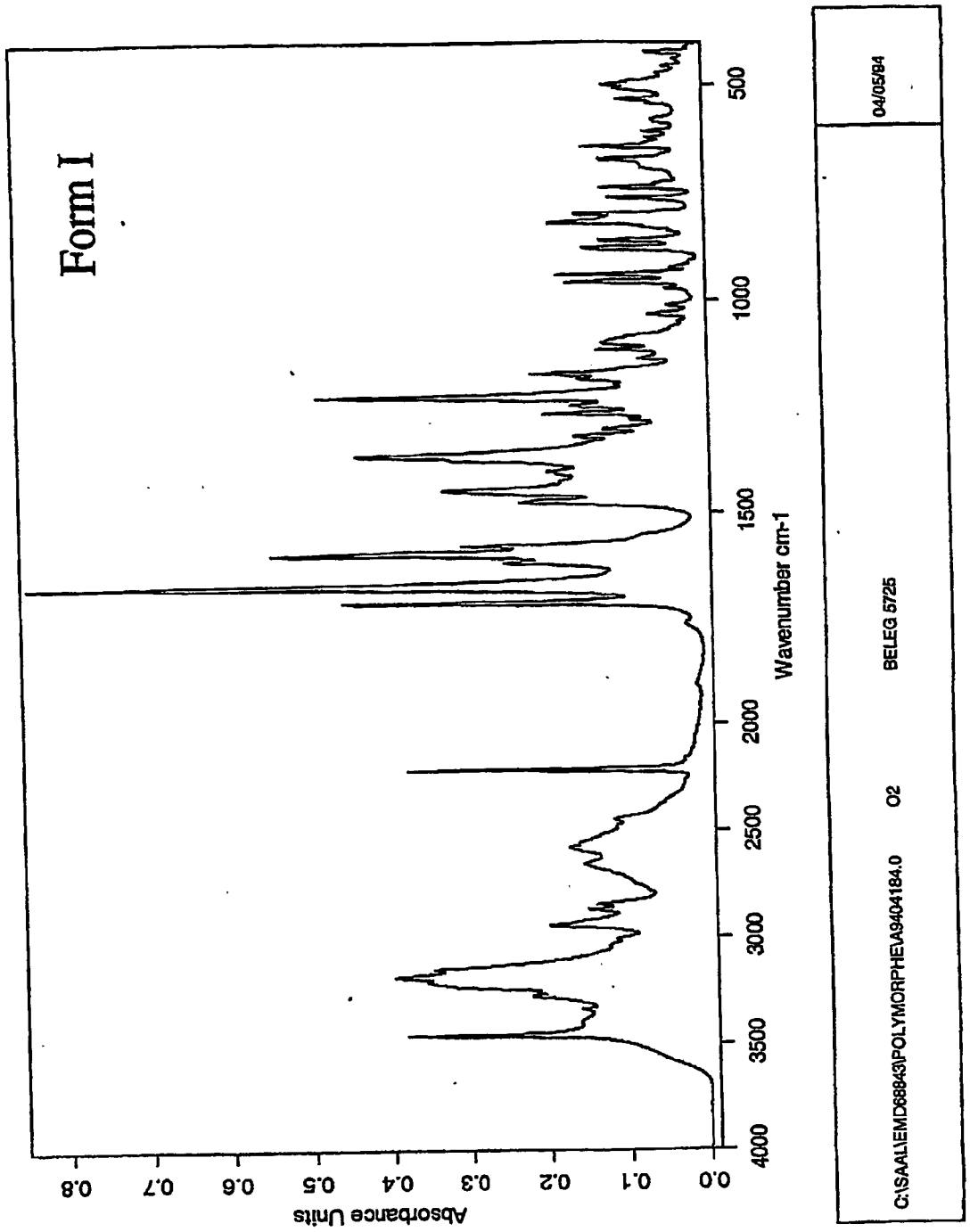
(1) dissolving 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, II, VII or IX in acetonitrile and water in the ratio 1:1

(2) freeze-drying or spray-driying overnight to give an amorphous powder of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

Abstract

The invention relates to new crystalline modifications of the hydrochloride of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine, crystalline modification of the dihydrochloride of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine and amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride which are suitable in particular for the preparation of solid medicaments for the treatment or prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

Fig. 1


Form I
Absorbance Units
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
4000
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAAL\EMD68843\POLYMORPHE\A9404184.0
O2
BELEG 5725
04/05/94

1/39

Fig. 2

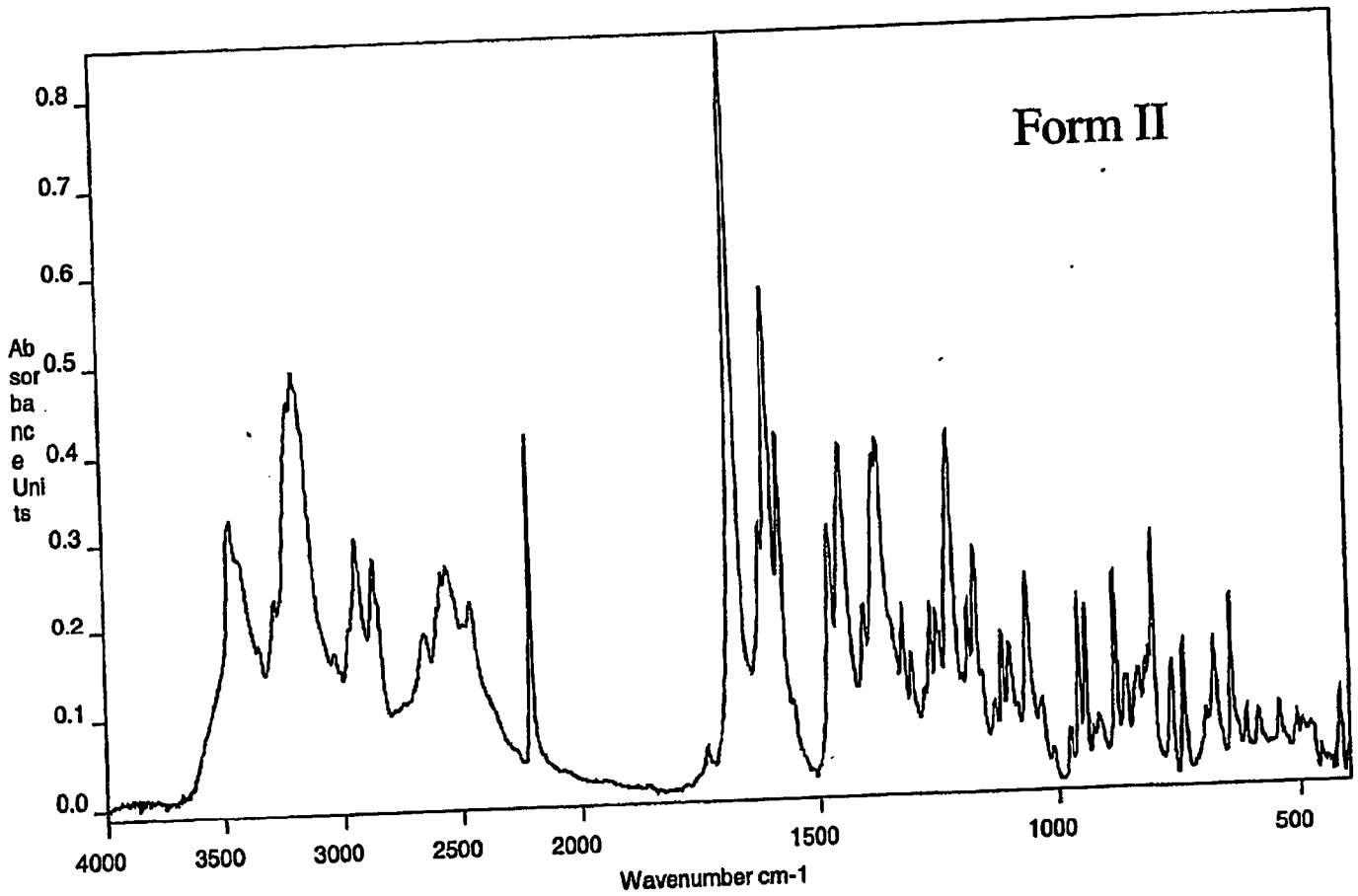

Form II
Absorbance Units
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
4000
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAAL\EMD68843\POLYMORPHE\A9405215.0
AZL-O2
B1/94
20/01/00

Fig. 3

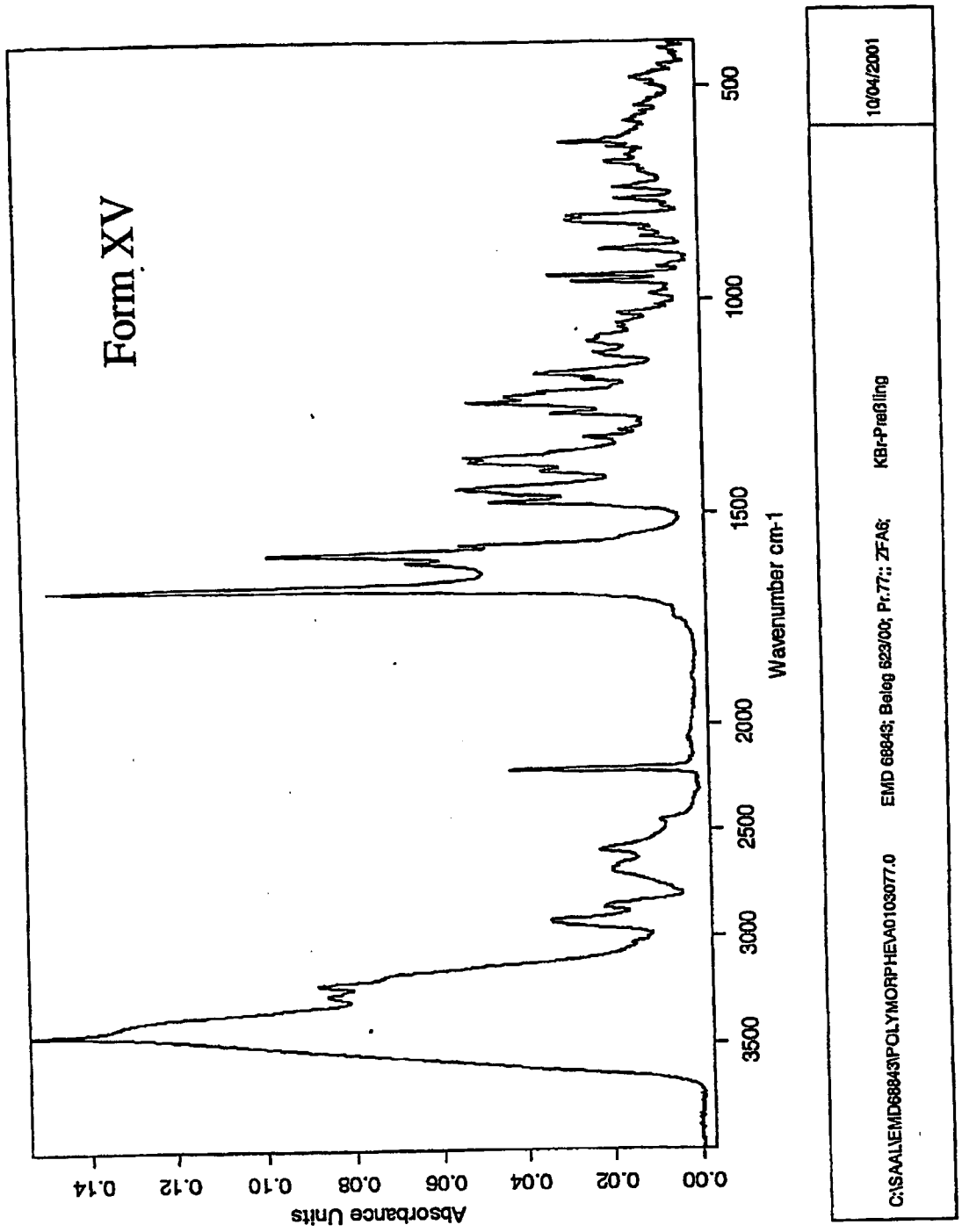
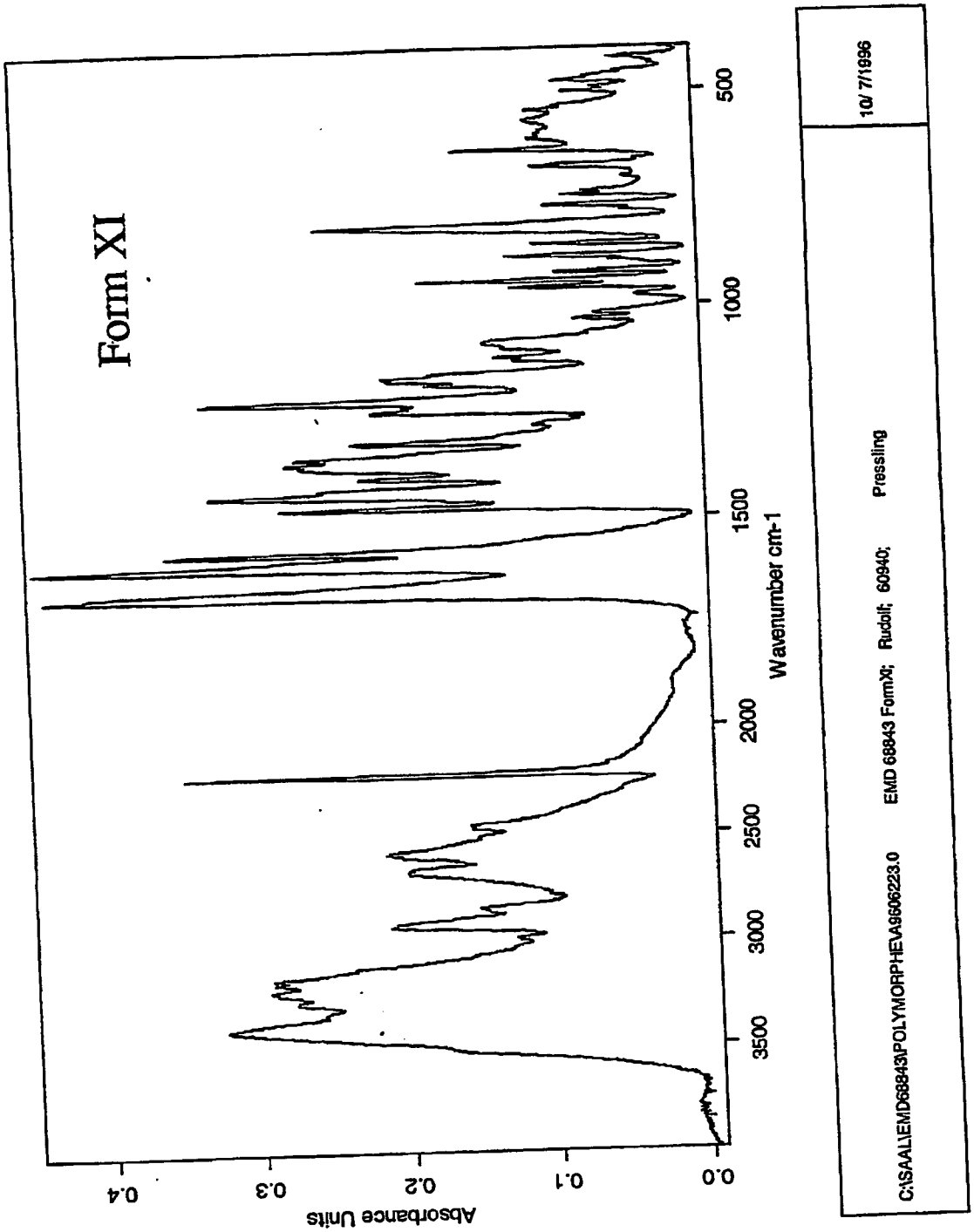

Form XV
Absorbance Units
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAAL\EMD68843\POLYMORPHE\A0103077.0
EMD 68843; Beleg 623/00; Pr.77:; ZFA6;
KBr-Preßling
10/04/2001

Fig. 4



5/39

Fig. 5

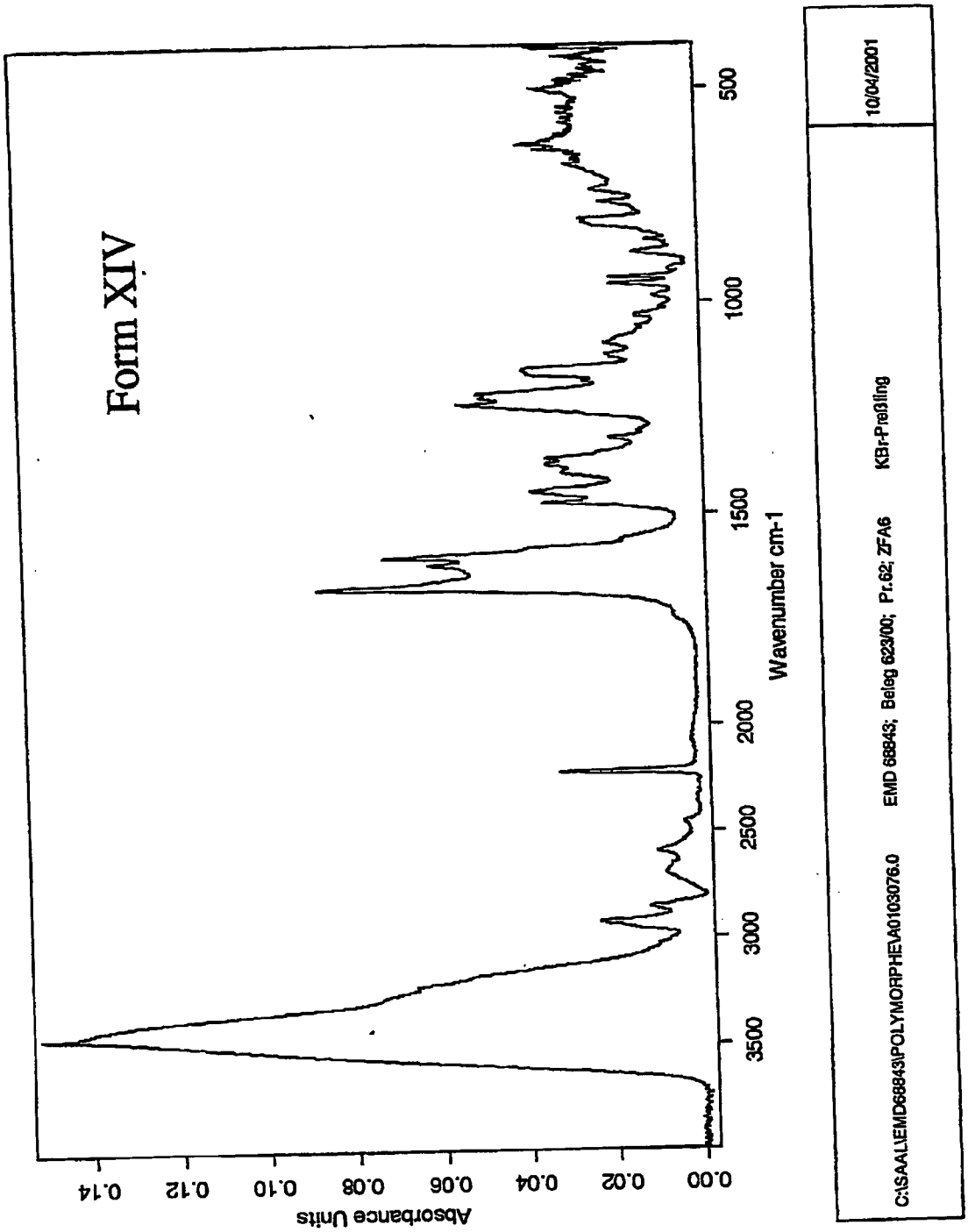

Form XIV
Absorbance Units
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAA\EMD68843\POLYMORPHE\A0103076.0
EMD 68843; Beleg 623/00; Pr.62; ZFA6
KBr-Preßling
10/04/2001

Fig. 6

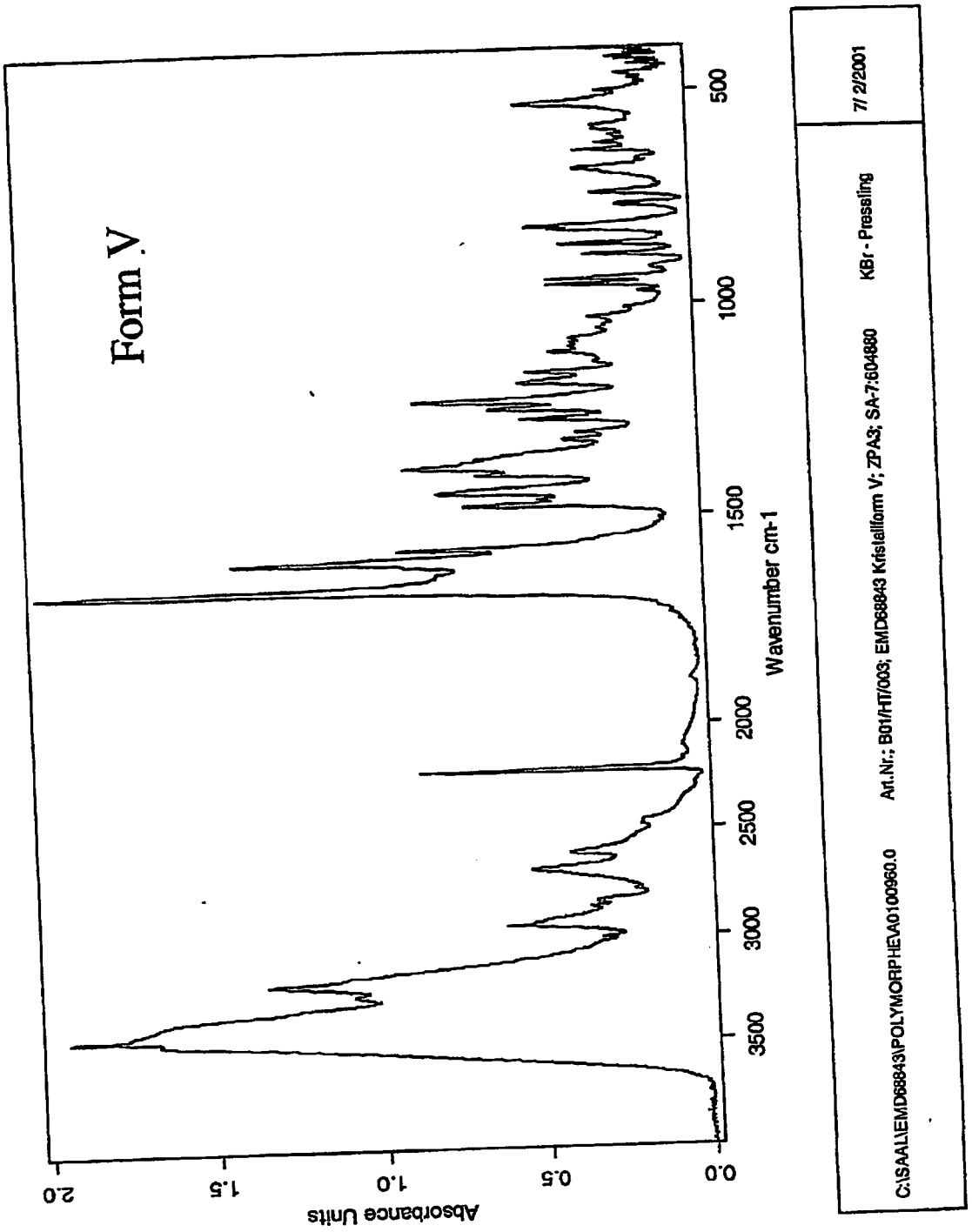
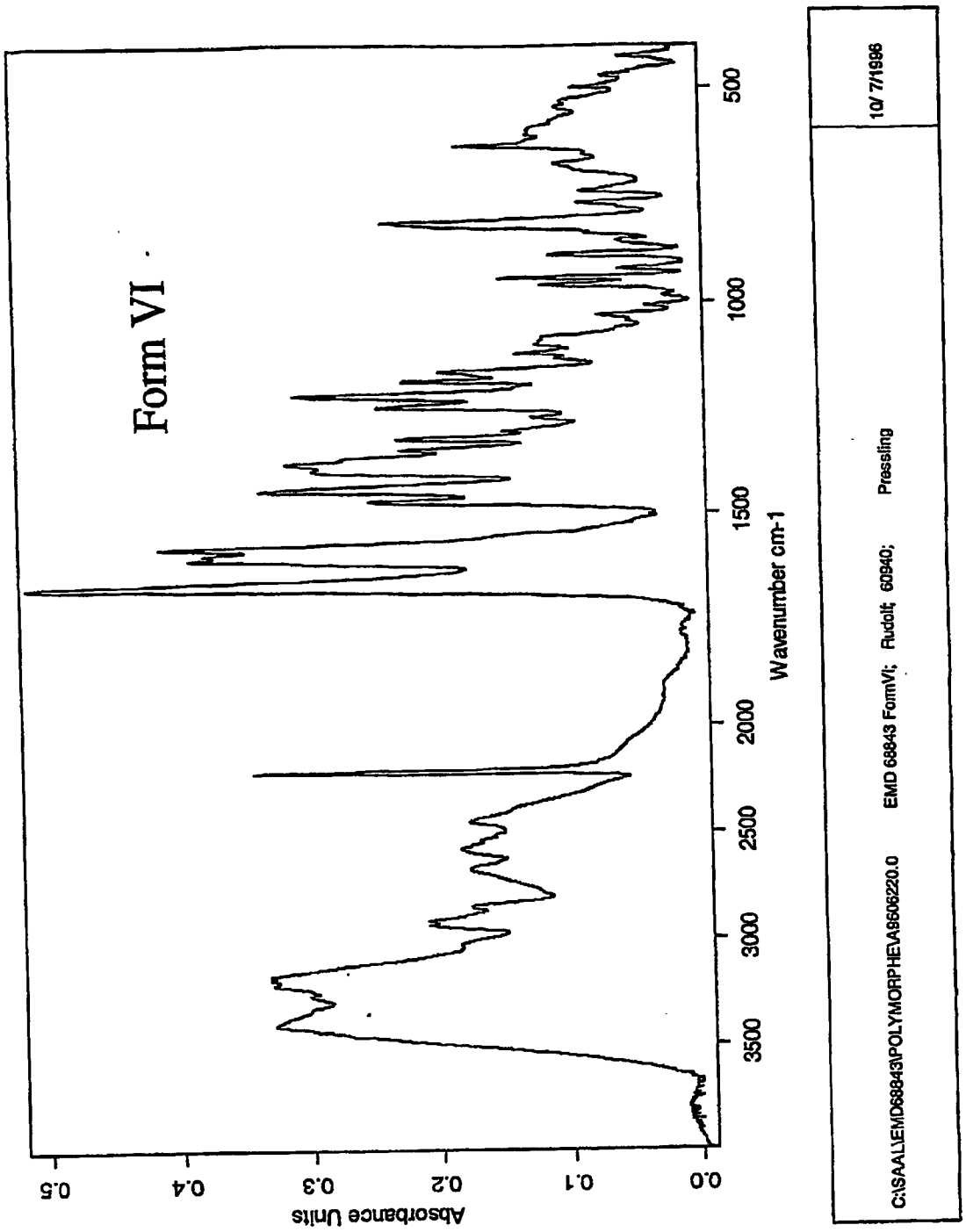


Fig. 7


Form VI
Absorbance Units
0.0
0.1
0.2
0.3
0.4
0.5
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAALLEMD68843\POLYMORPHEVA8606220.0 EMD 68843 FormVi; Rudolf; 60940; Pressling
10/ 7/1996

7/39

Fig. 8

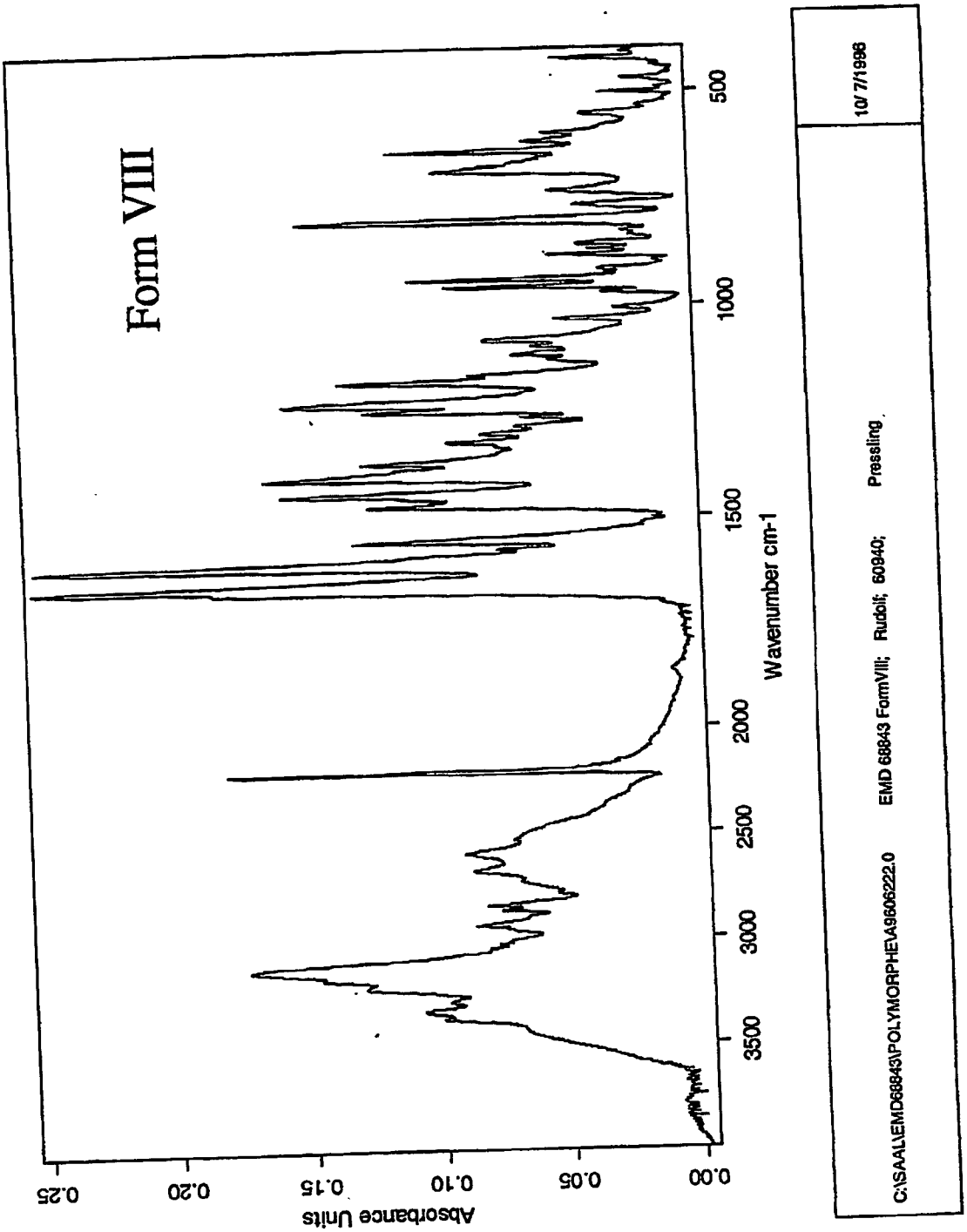


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Fig. 9

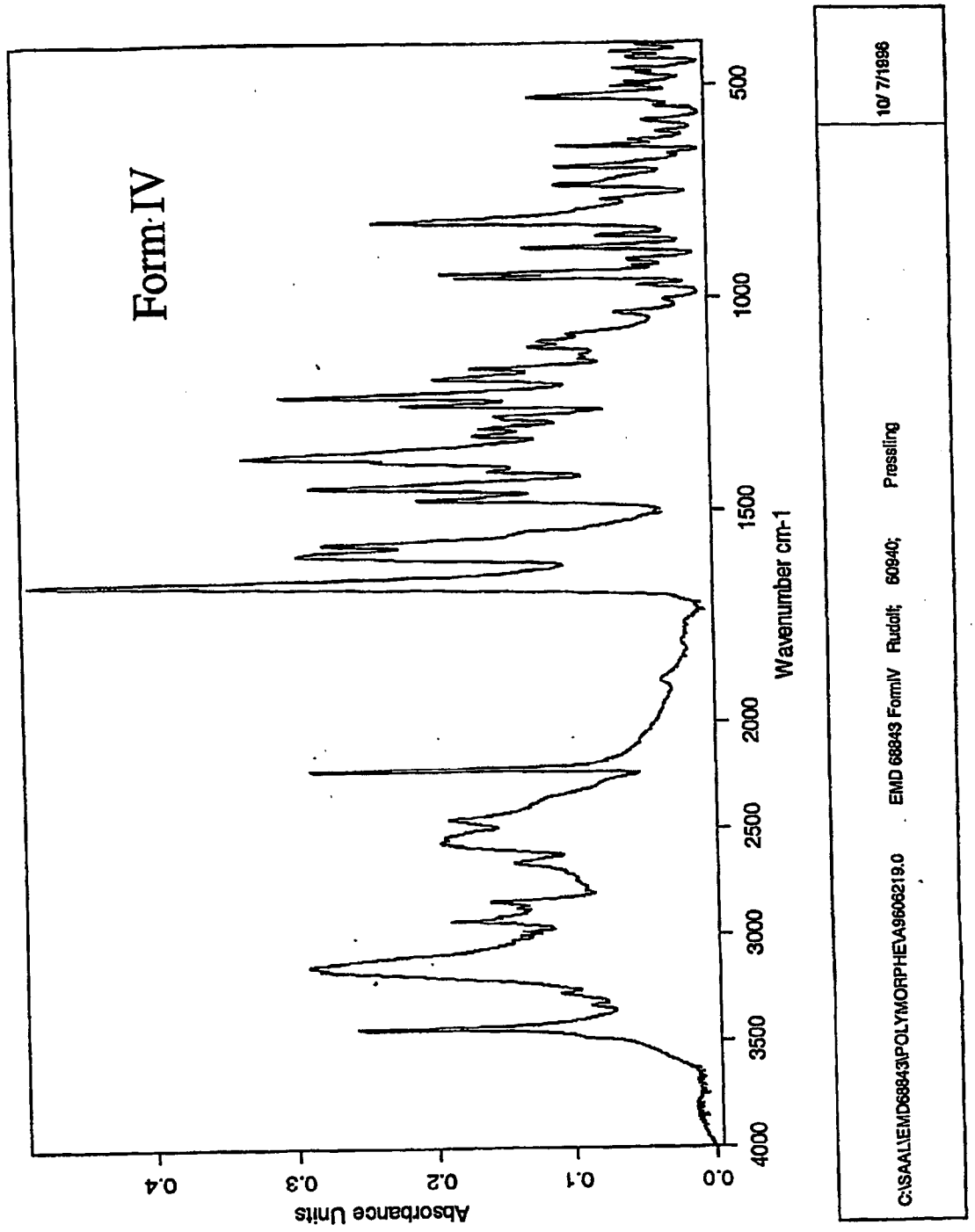
Form IV
Absorbance Units
0.0
0.1
0.2
0.3
0.4
4000
3500
3000
2500
2000
1500
1000
500
Wavenumber cm-1
C:\SAALLEMD68843\POLYMORPHE\A96006219.0 EMD 68843 FormIV Rudolf; 60940; Pressling
10/ 7/1996

Fig.10

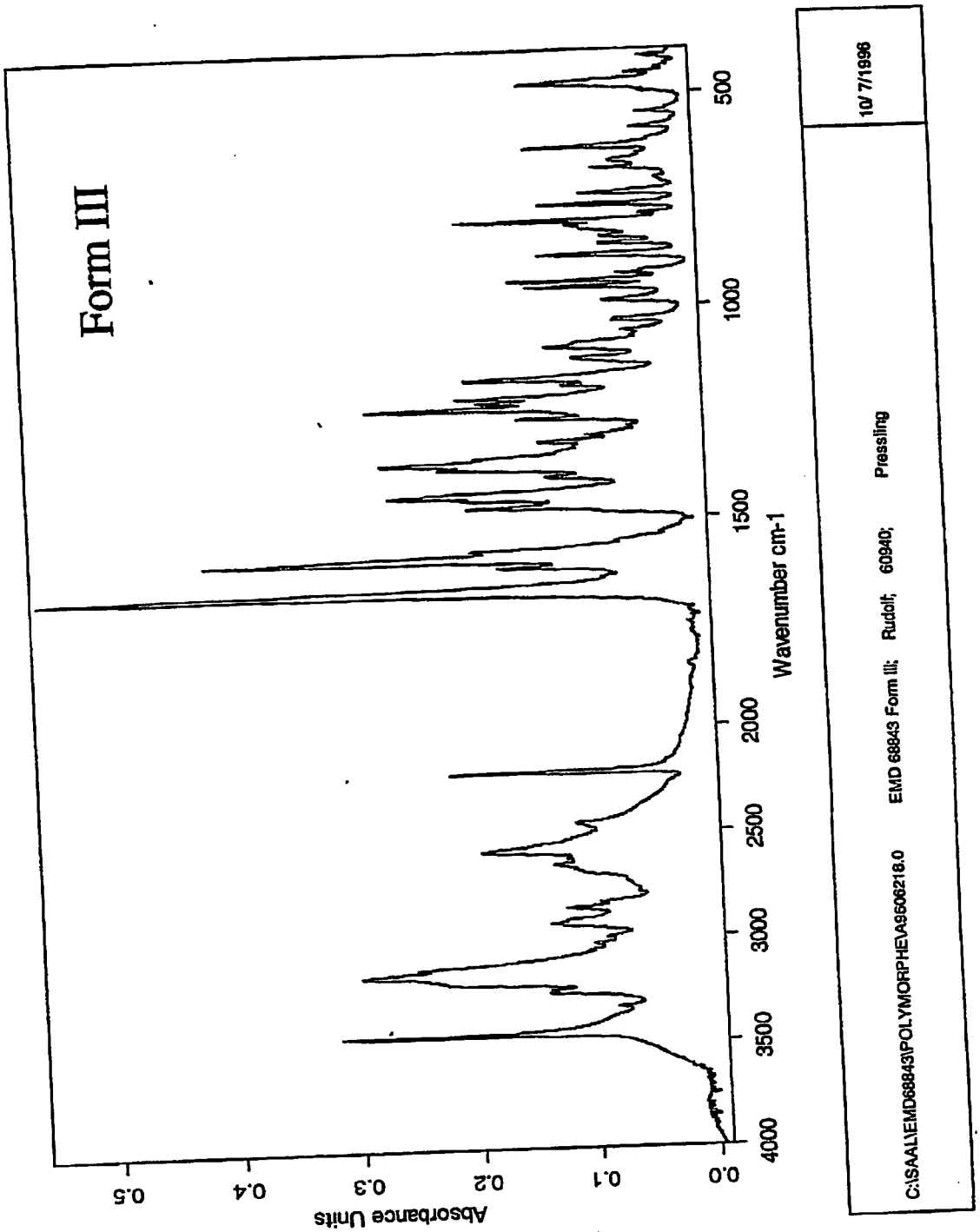

Fig. 11

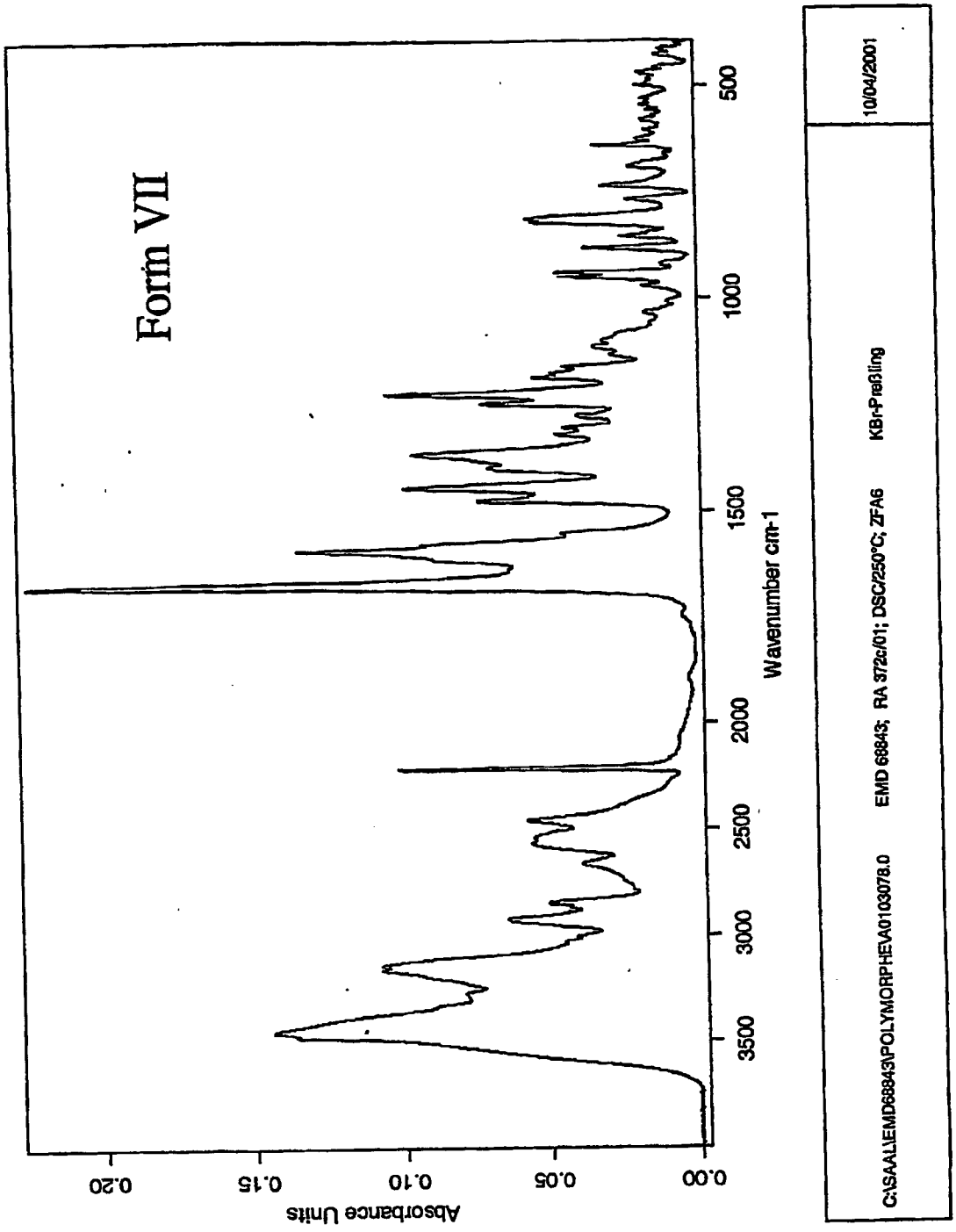
Form VII
Absorbance Units
0.00
0.05
0.10
0.15
0.20
Wavenumber cm-1
3500
3000
2500
2000
1500
1000
500
C:\SAAL\EMD68843\POLYMORPHE\A0103078.0 EMD 68843; RA 372c/01; DSC/250°C; ZFA6 KBr-Pressling 10/04/2001

Fig. 12

Form I

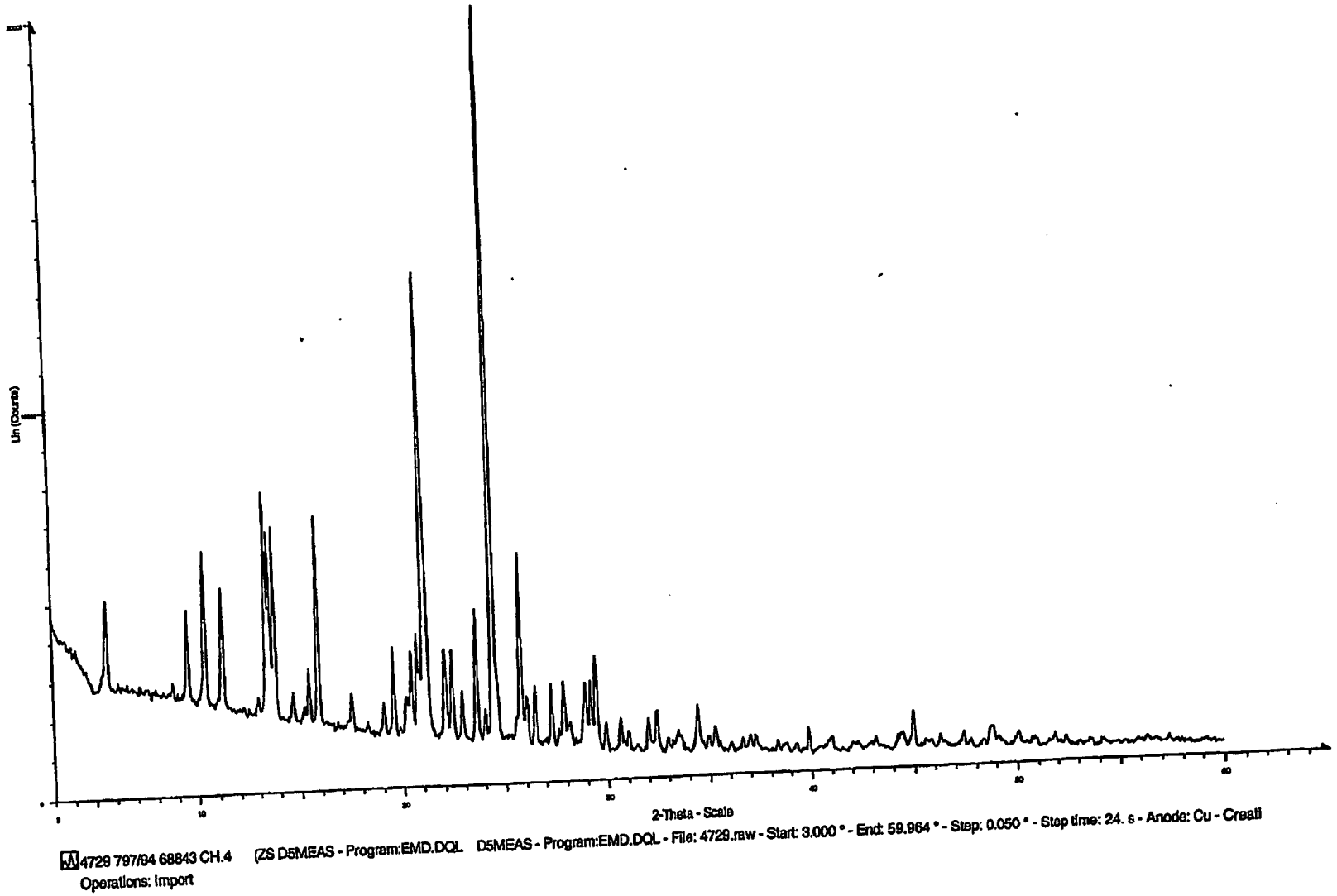
Lin (Counts)
2-Theta - Scale
4729 797/94 68843 CH.4 (ZS D5MEAS - Program:EMD.DQL D5MEAS - Program:EMD.DQL - File: 4729.raw - Start: 3.000 ° - End: 59.964 ° - Step: 0.050 ° - Step time: 24. s - Anode: Cu - Creati
Operations: Import

Fig. 13

Form II

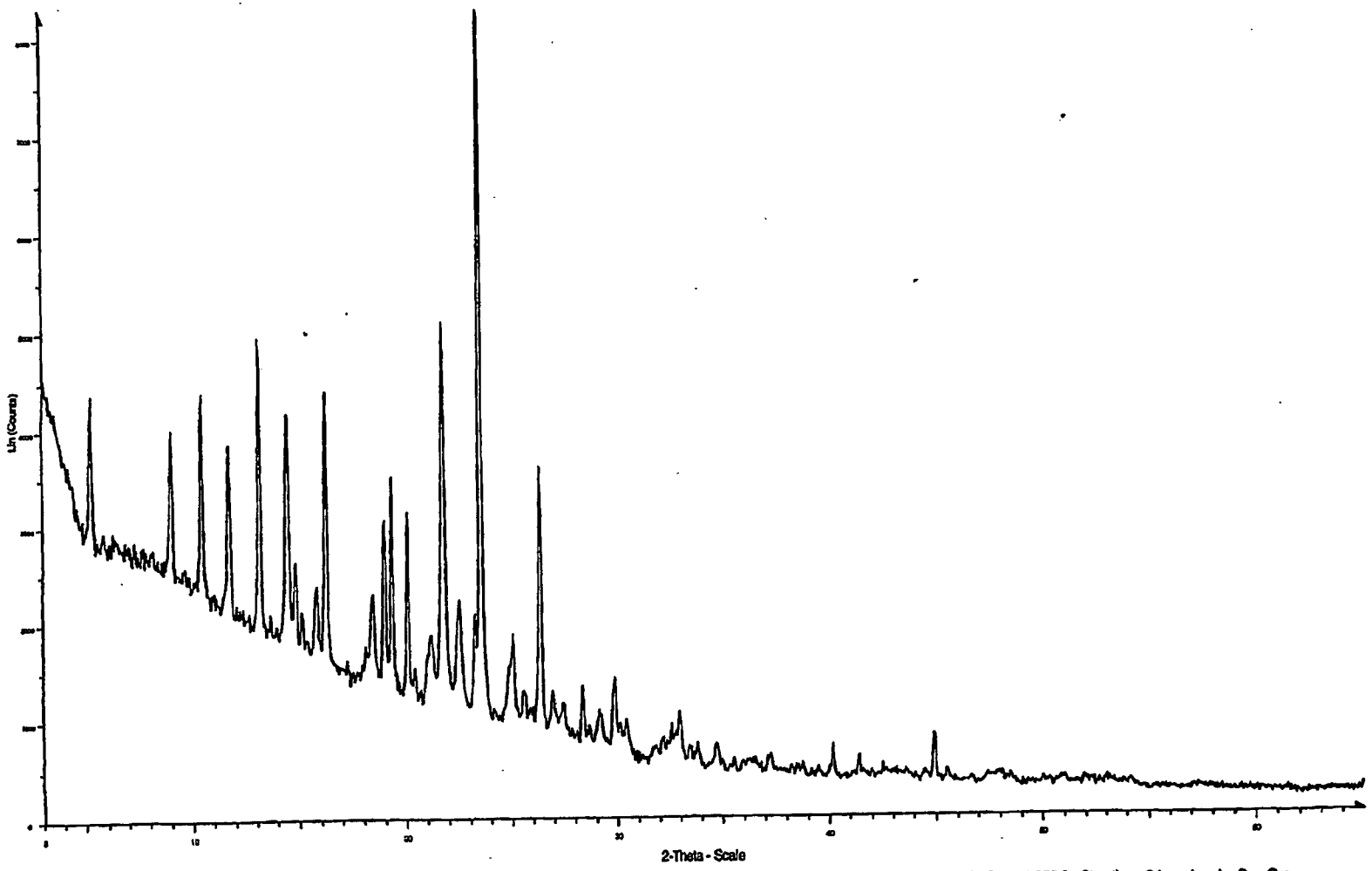

Fig. 14

Form XV

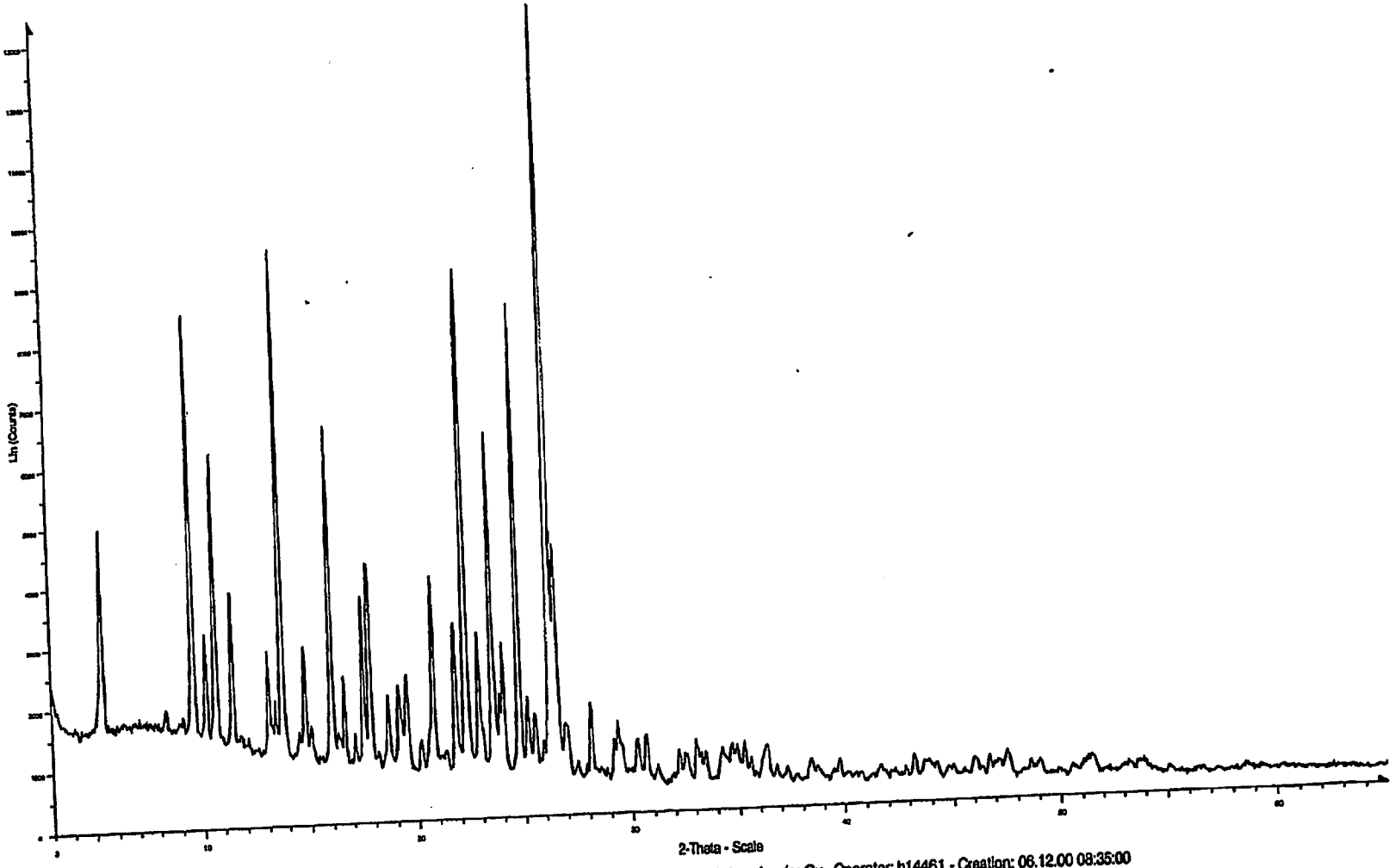

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Fig. 15

Form X

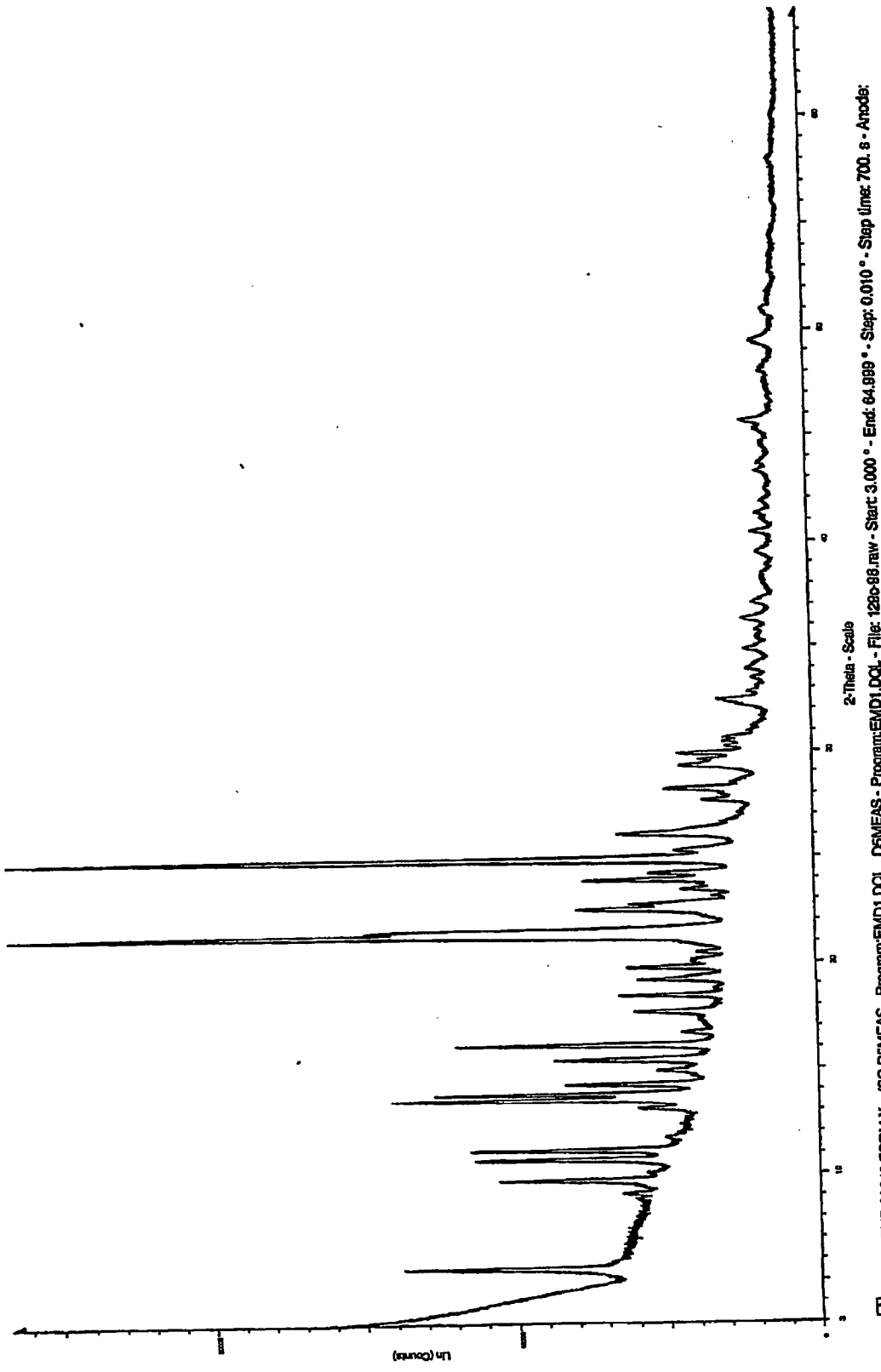

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Fig. 16

Form XI

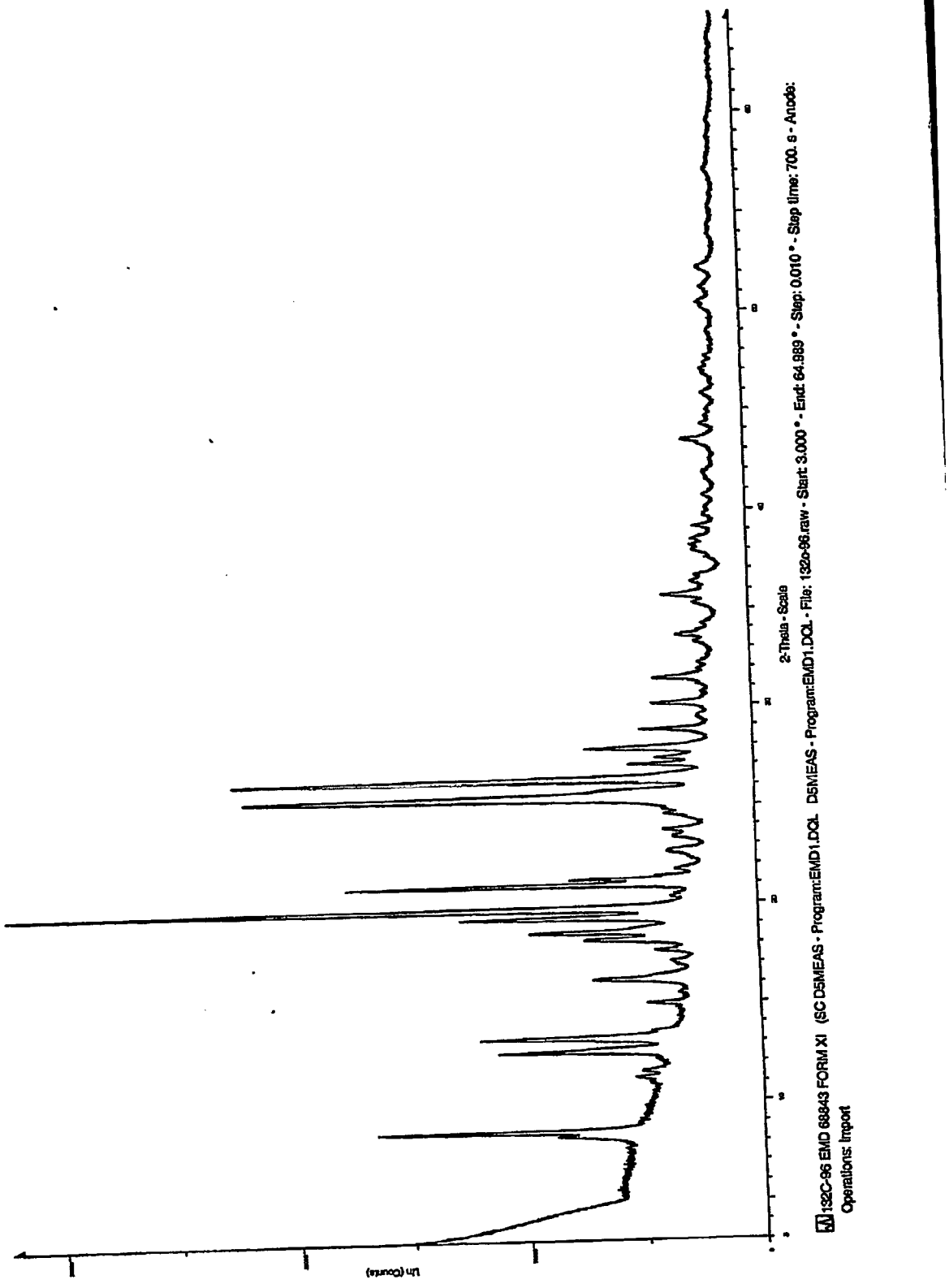
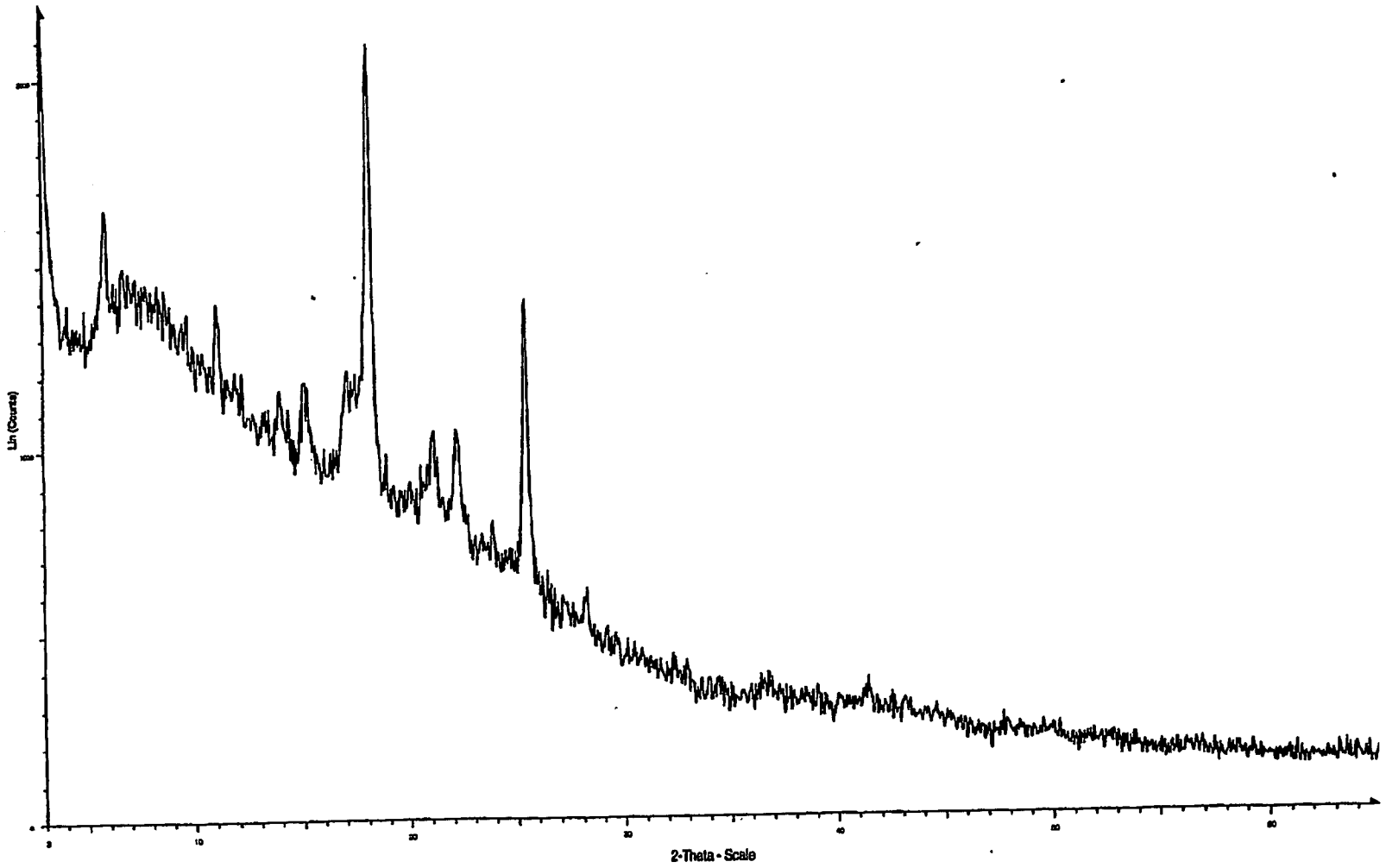


Fig. 17

Form XIV



EMD 68843 Probe 62 - File: RT 1816-00.raw - Start: 3.000 ° - End: 65.014 ° - Step: 0.050 ° - Step time: 1.4 s - Anode: Cu - Operator: b14461 - Creation: 04.12.00 08:21:30
Operations: Import

Fig. 18

Form V

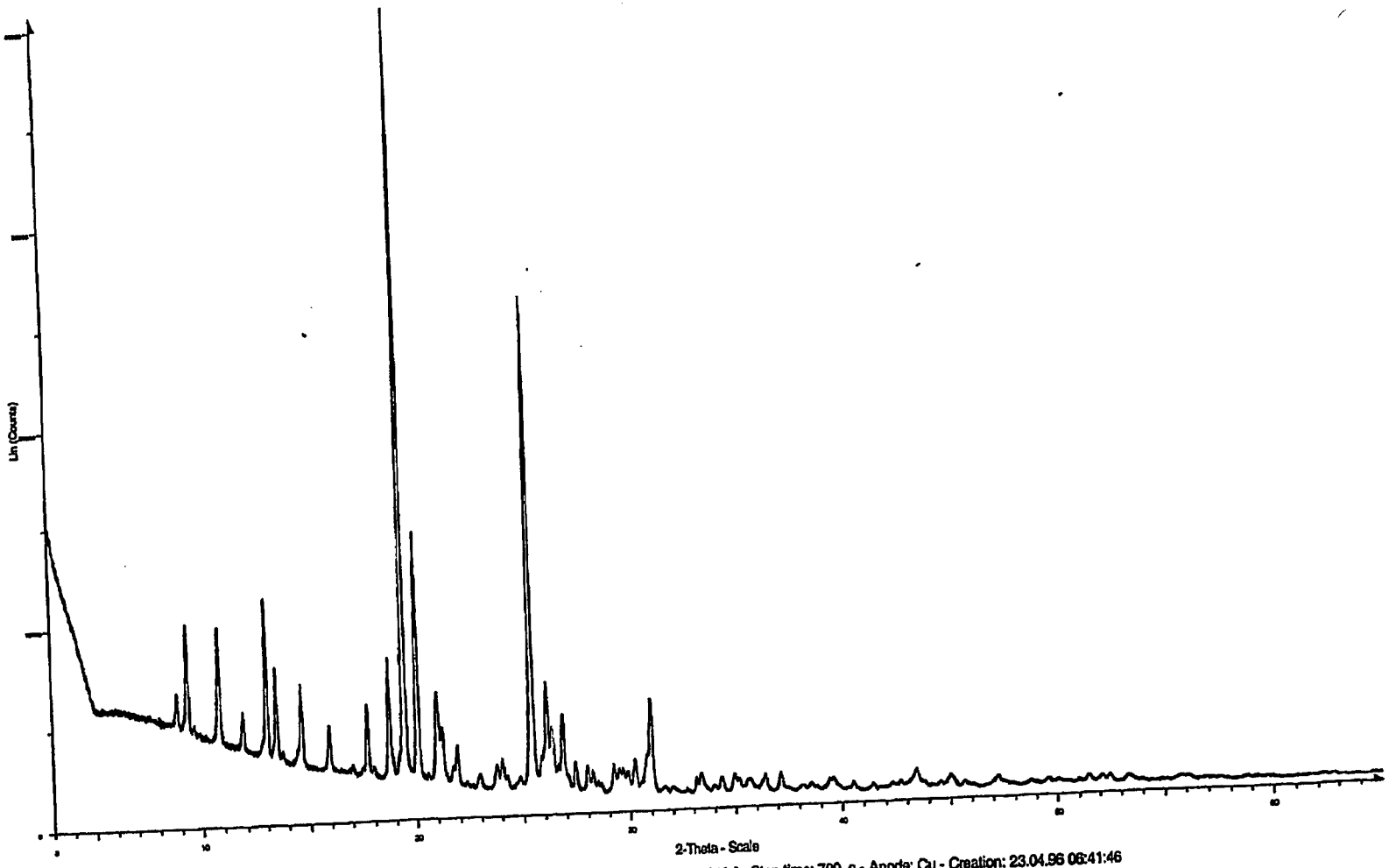


Fig. 19

Form VI

Fig. 20

Form VIII

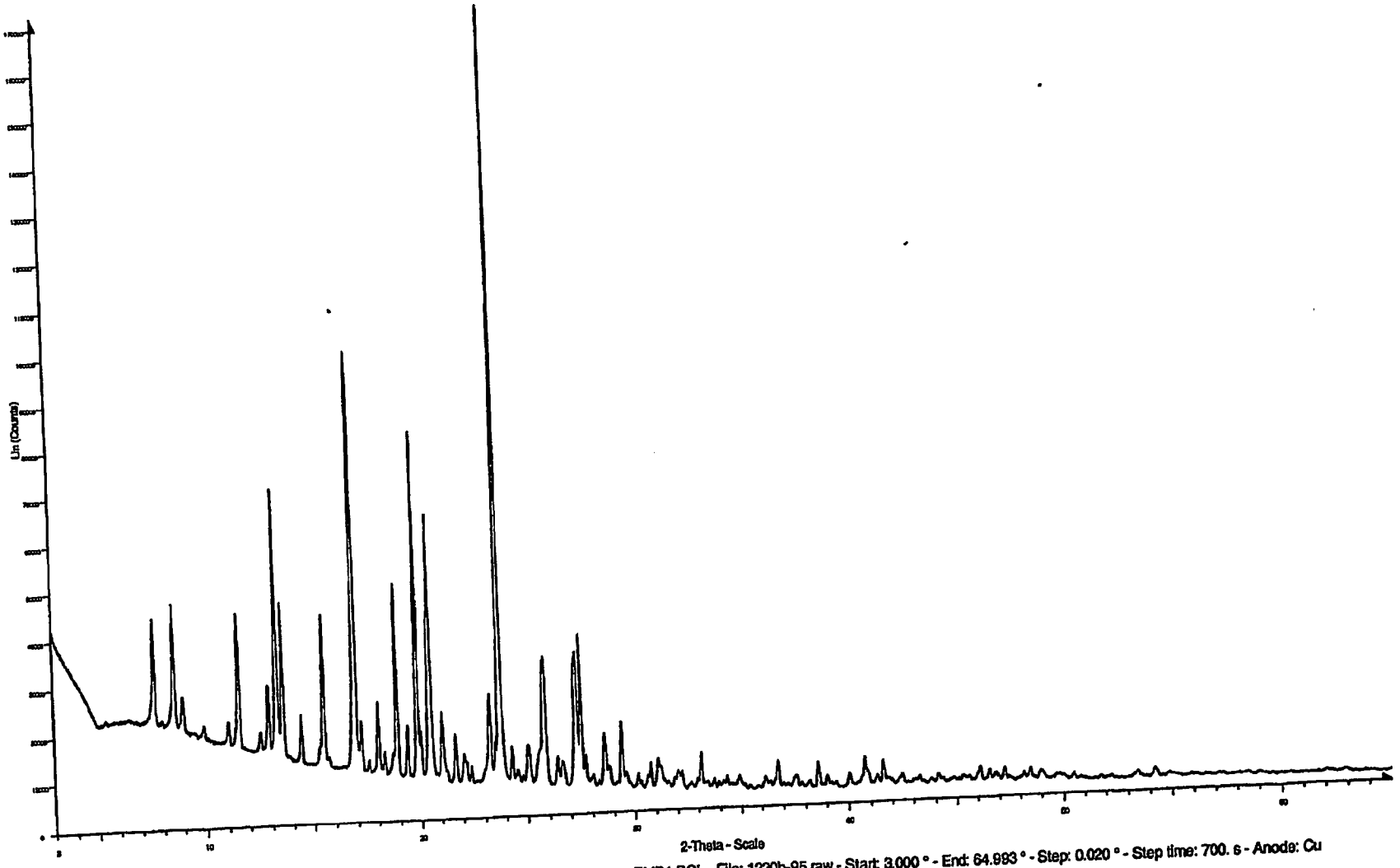


Fig. 21

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Form IV

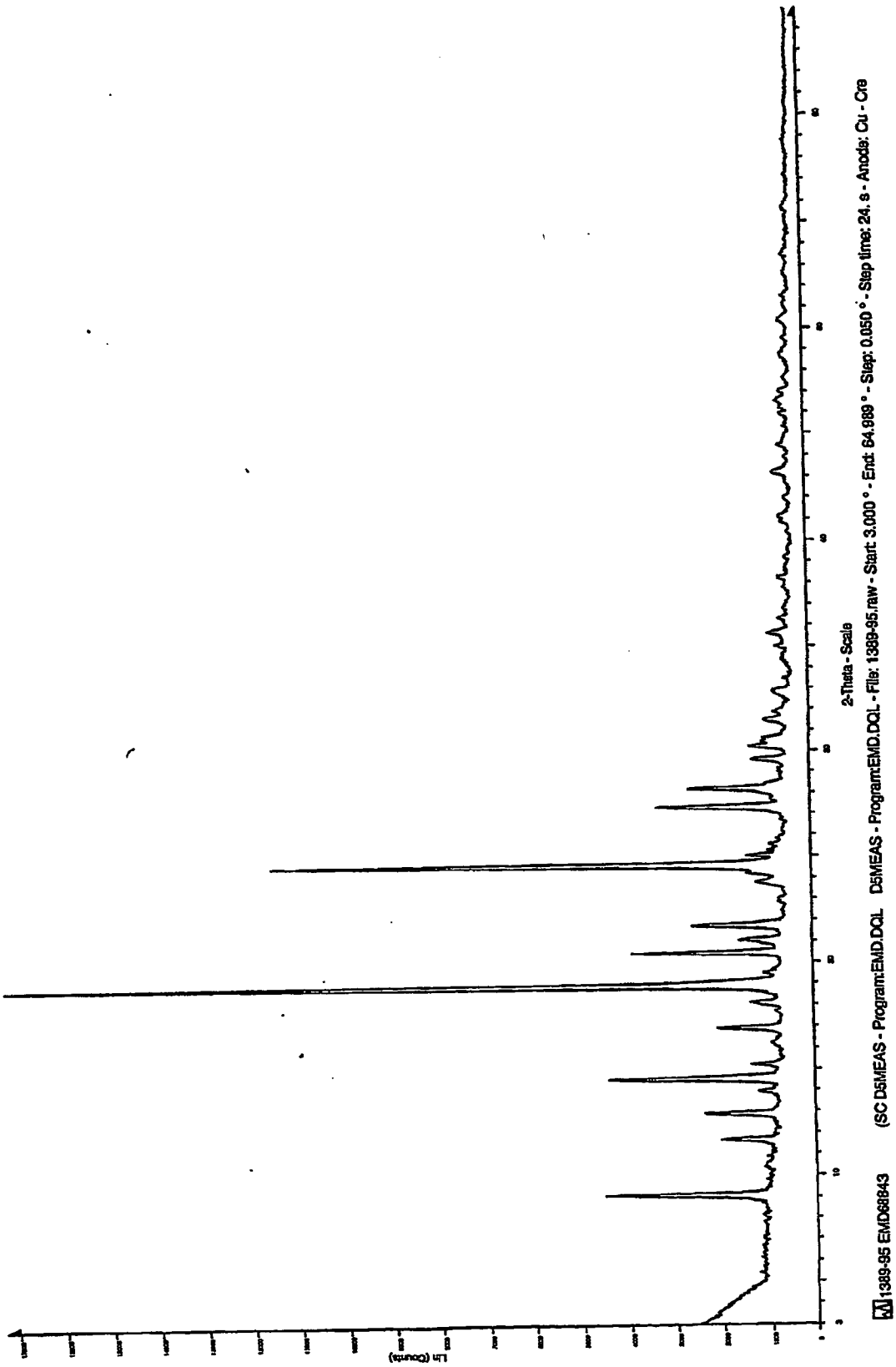


Fig. 22

Form III

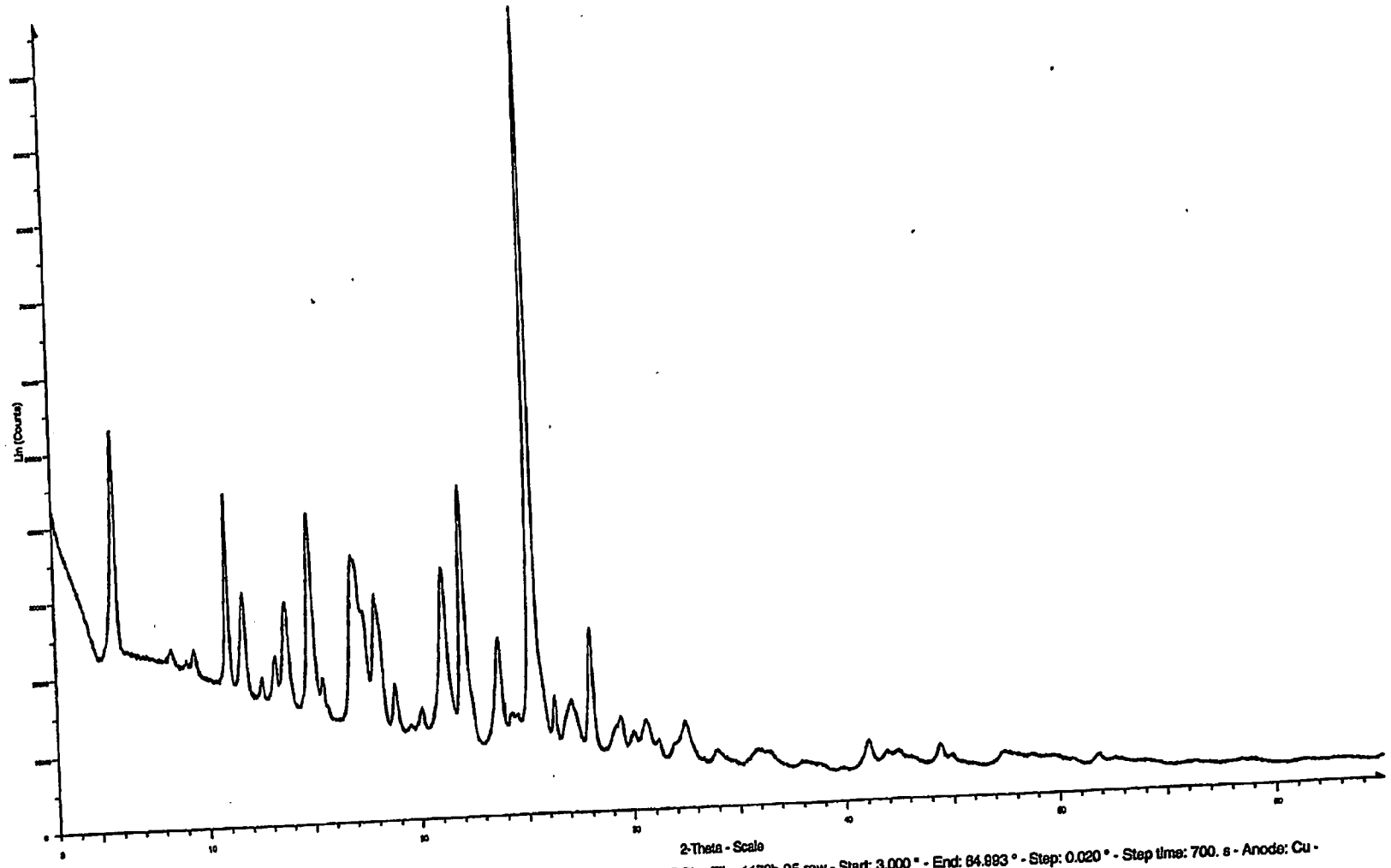
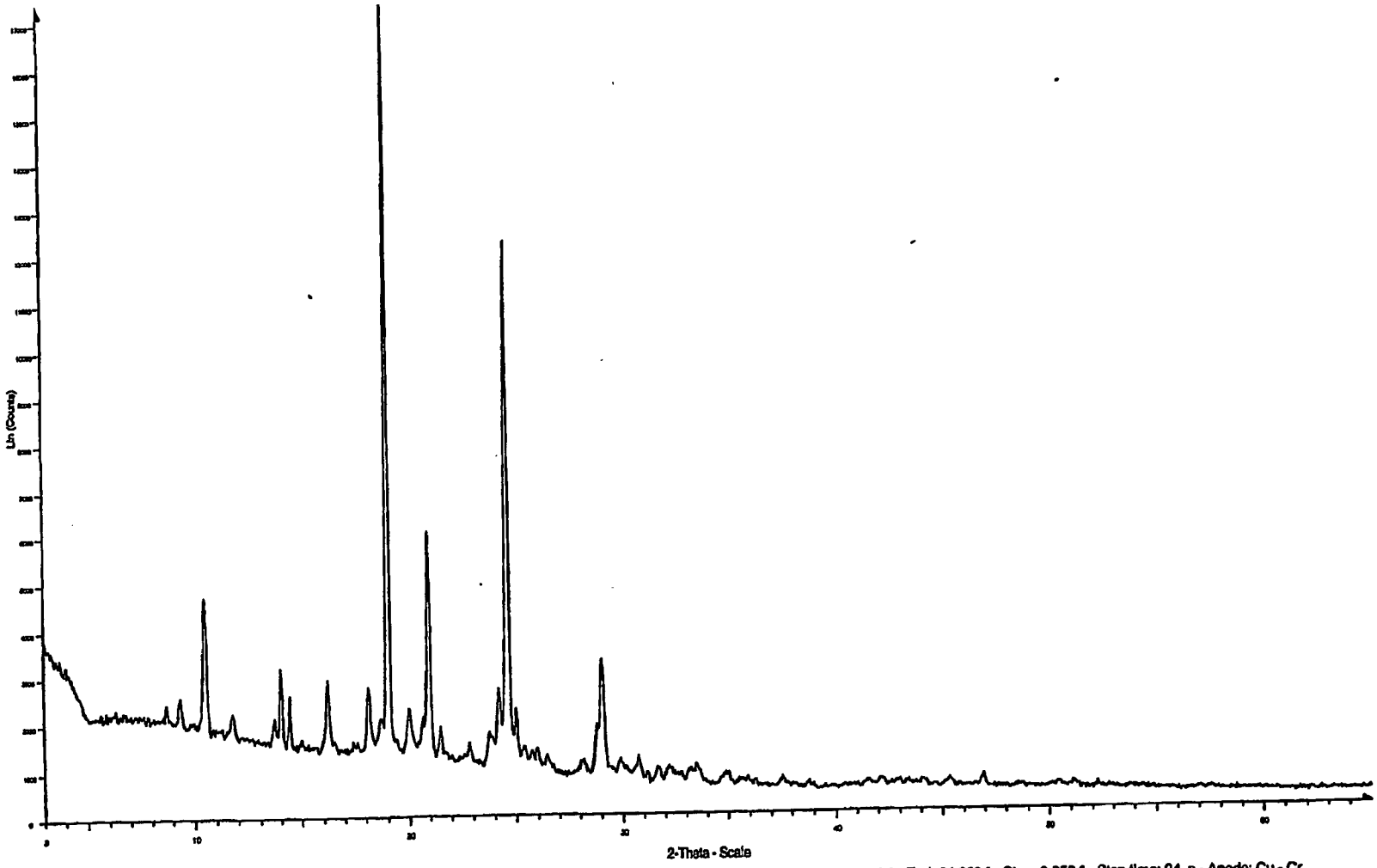


Fig. 23

Form VII



5179 1421/94 EMD 68843 265C (ZS D5MEAS - Program:EMD.DQL D5MEAS - Program:EMD.DQL - File: 5179.raw - Start: 3.000 ° - End: 64.988 ° - Step: 0.050 ° - Step time: 24. s - Anode: Cu - Cr
Operations: Import

Fig. 24

Form IX

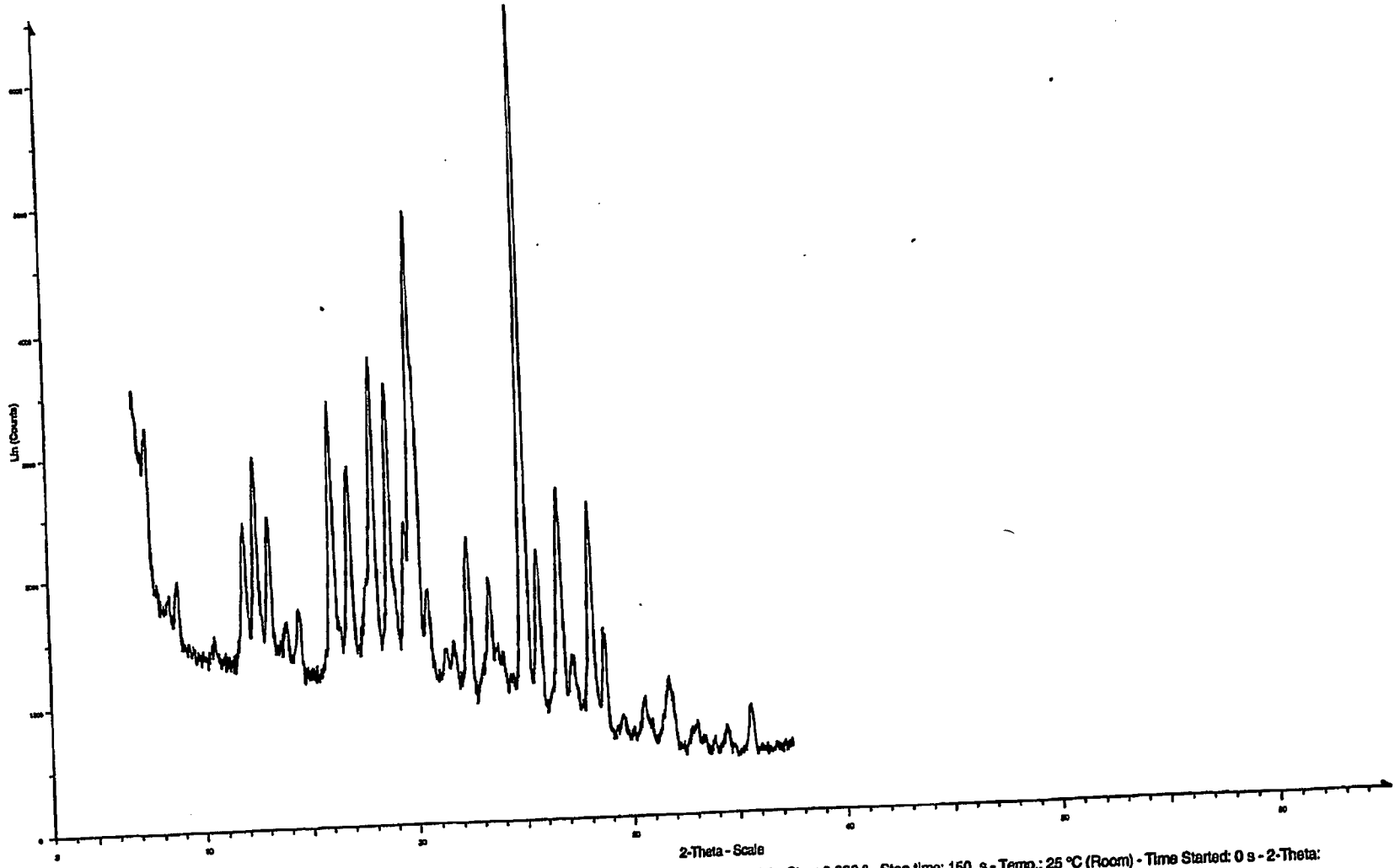


Fig. 25

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Form XIII

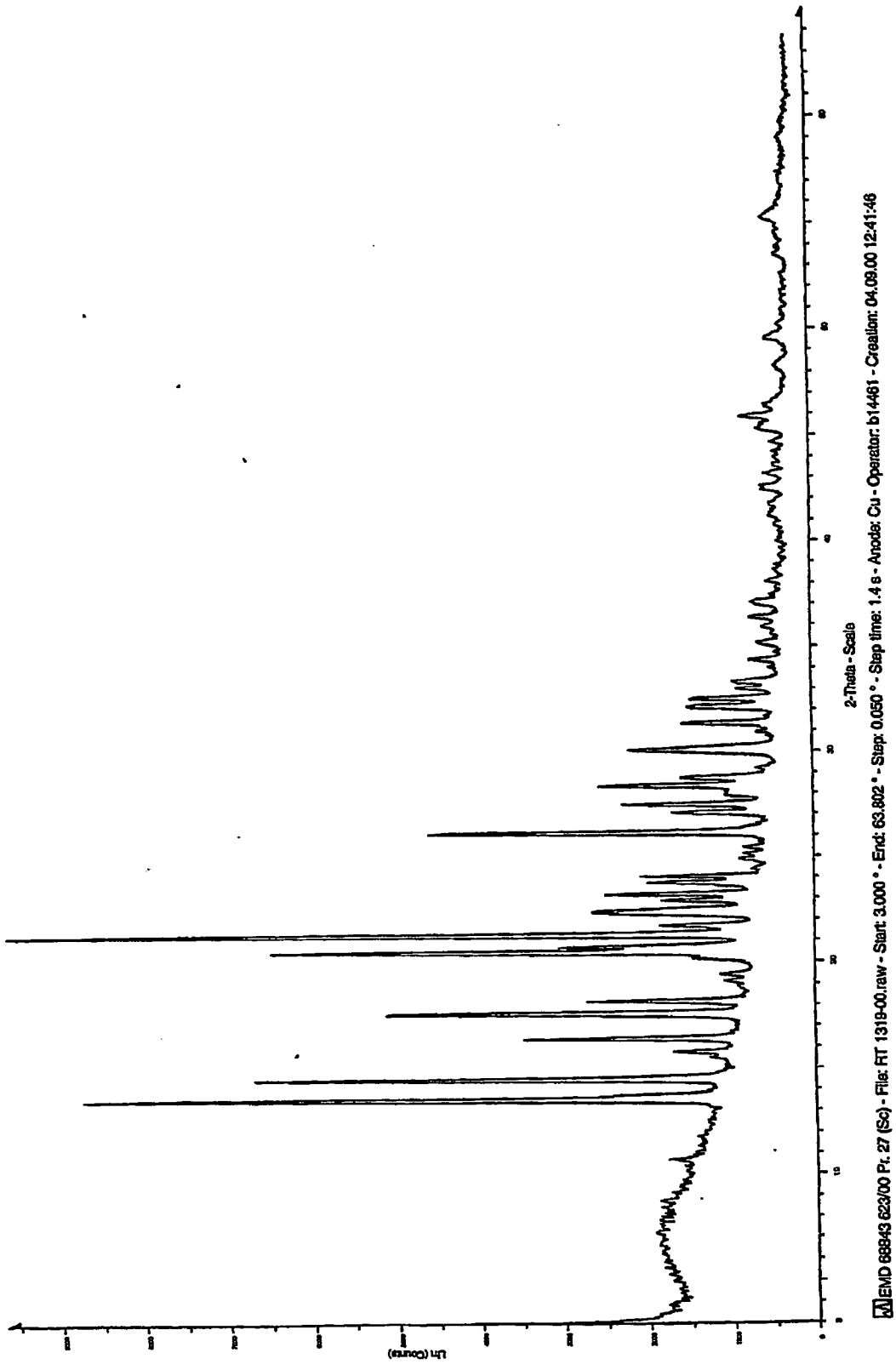

Fig. 26

Form XVI

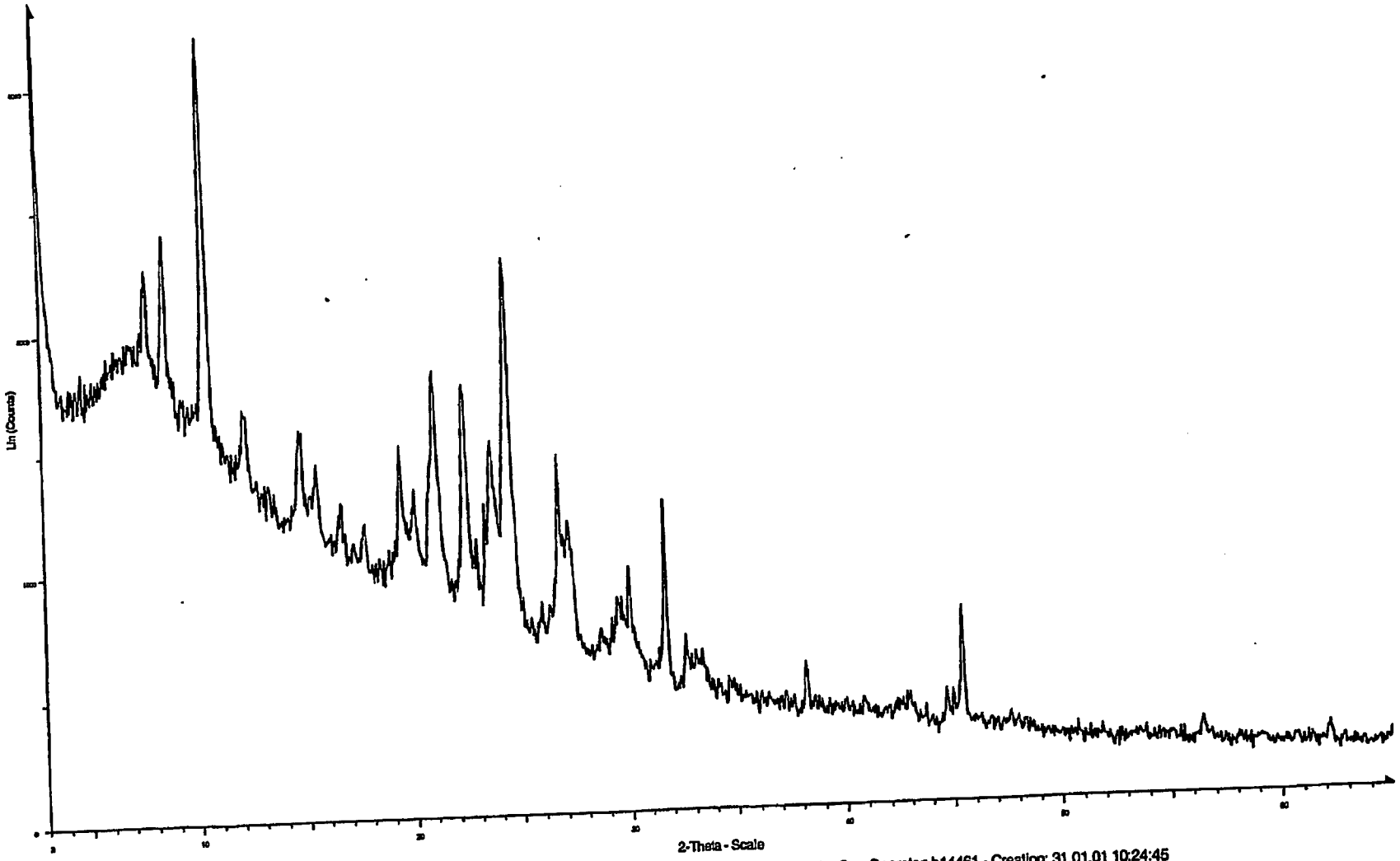

Fig. 27

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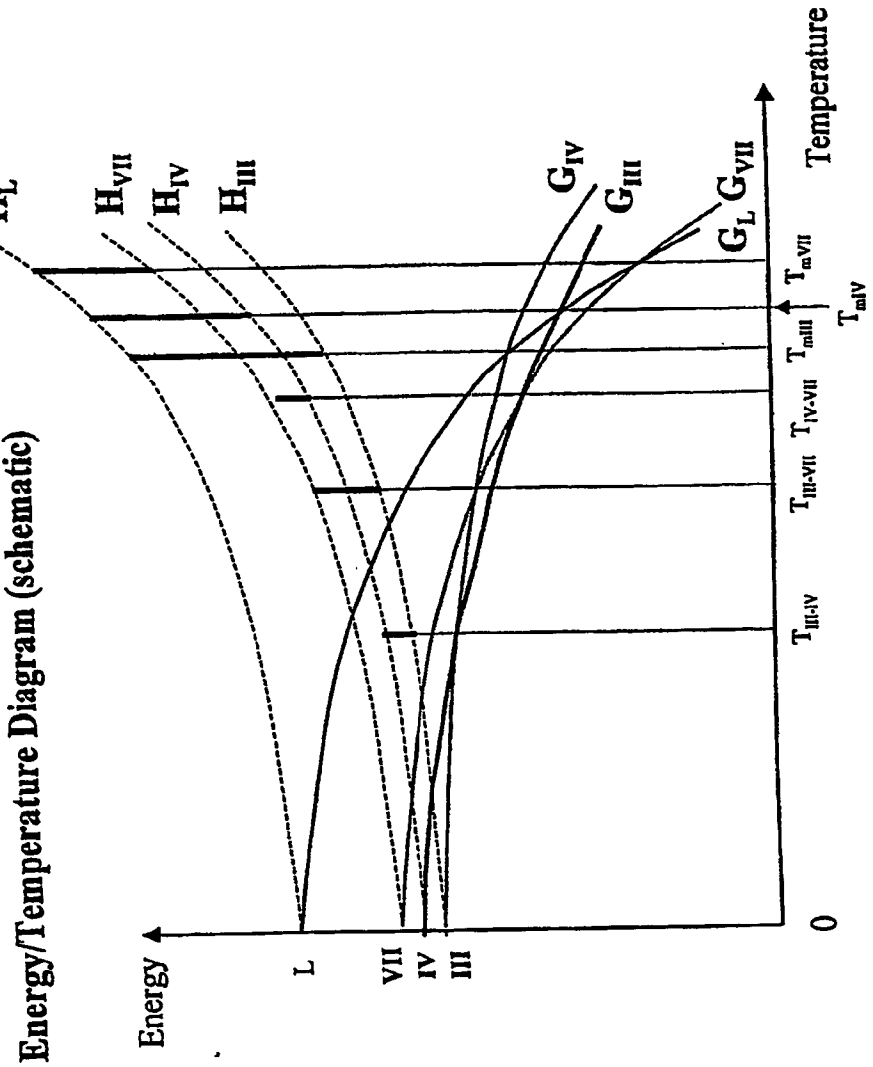
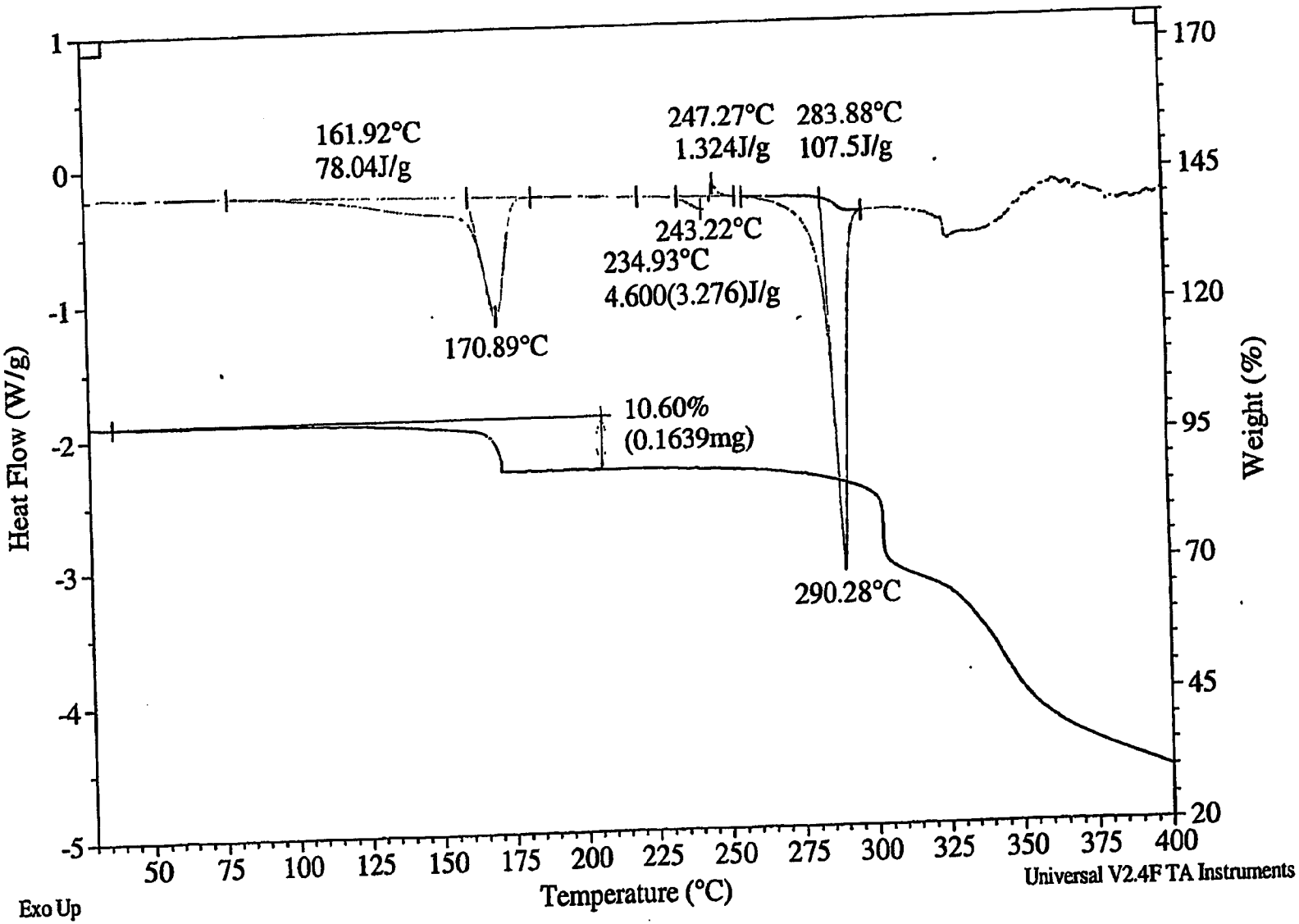
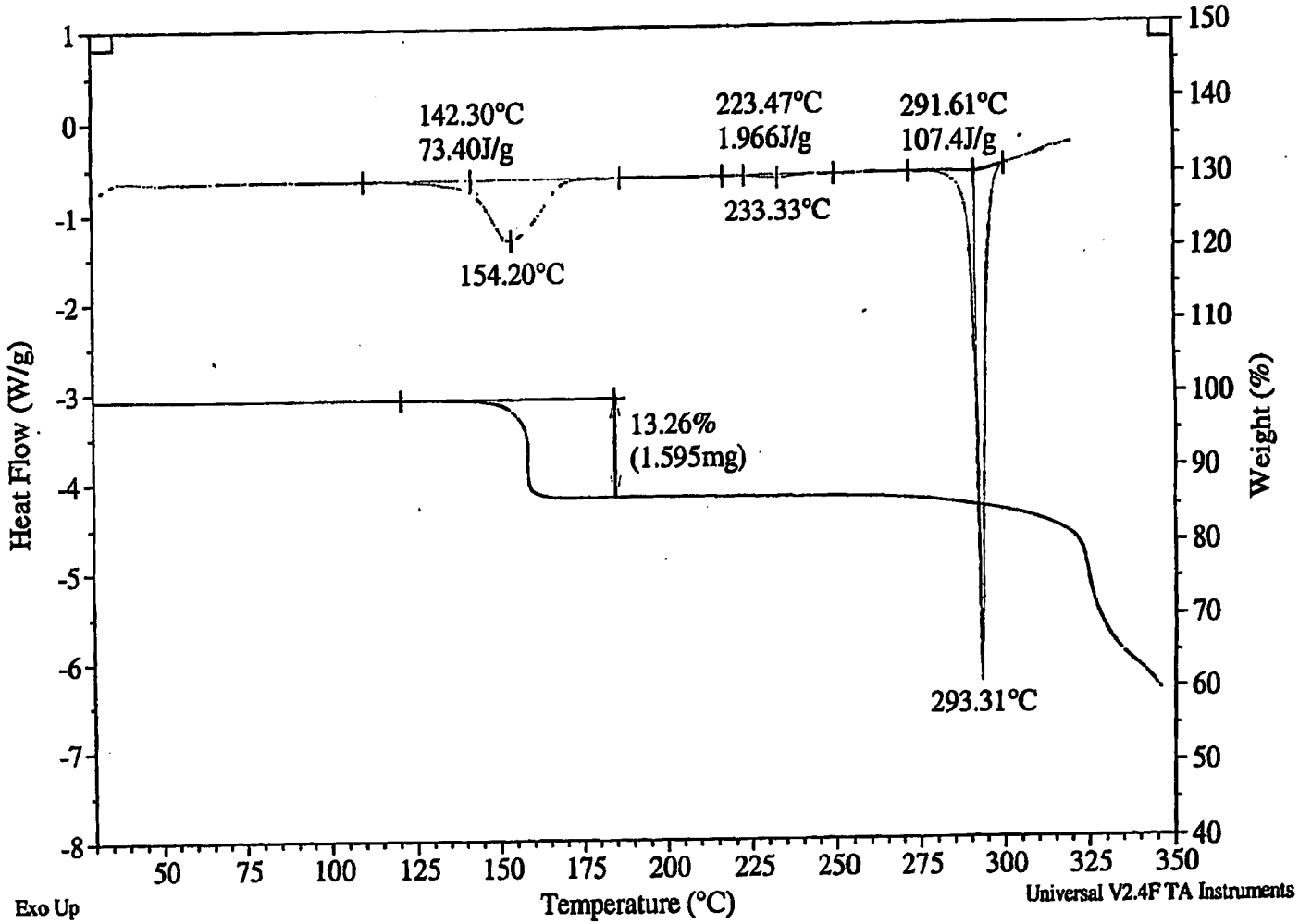

Energy/Temperature Diagram (schematic)
Energy
Temperature
H_L
H_{VII}
H_{IV}
H_{III}
G_{IV}
G_{III}
G_L G_{VII}
L
VII
IV
III
0
T_{III-IV}
$T_{III-VII}$
T_{IV-VII}
T_{mIII}
T_{mVII}
T_{mIV}

Fig. 28



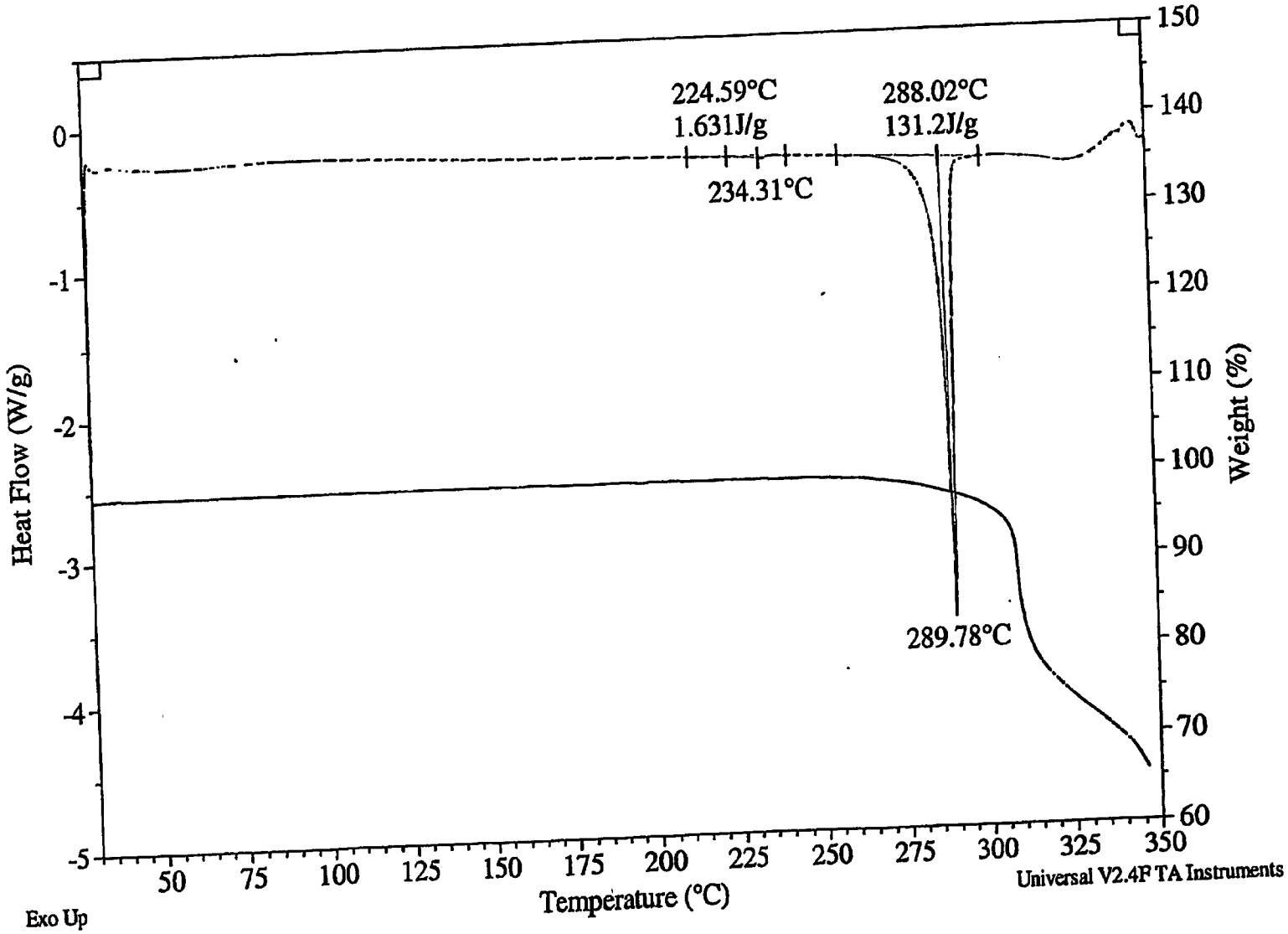
EMD 68843 Form I (Acetone solvate)

Fig. 29



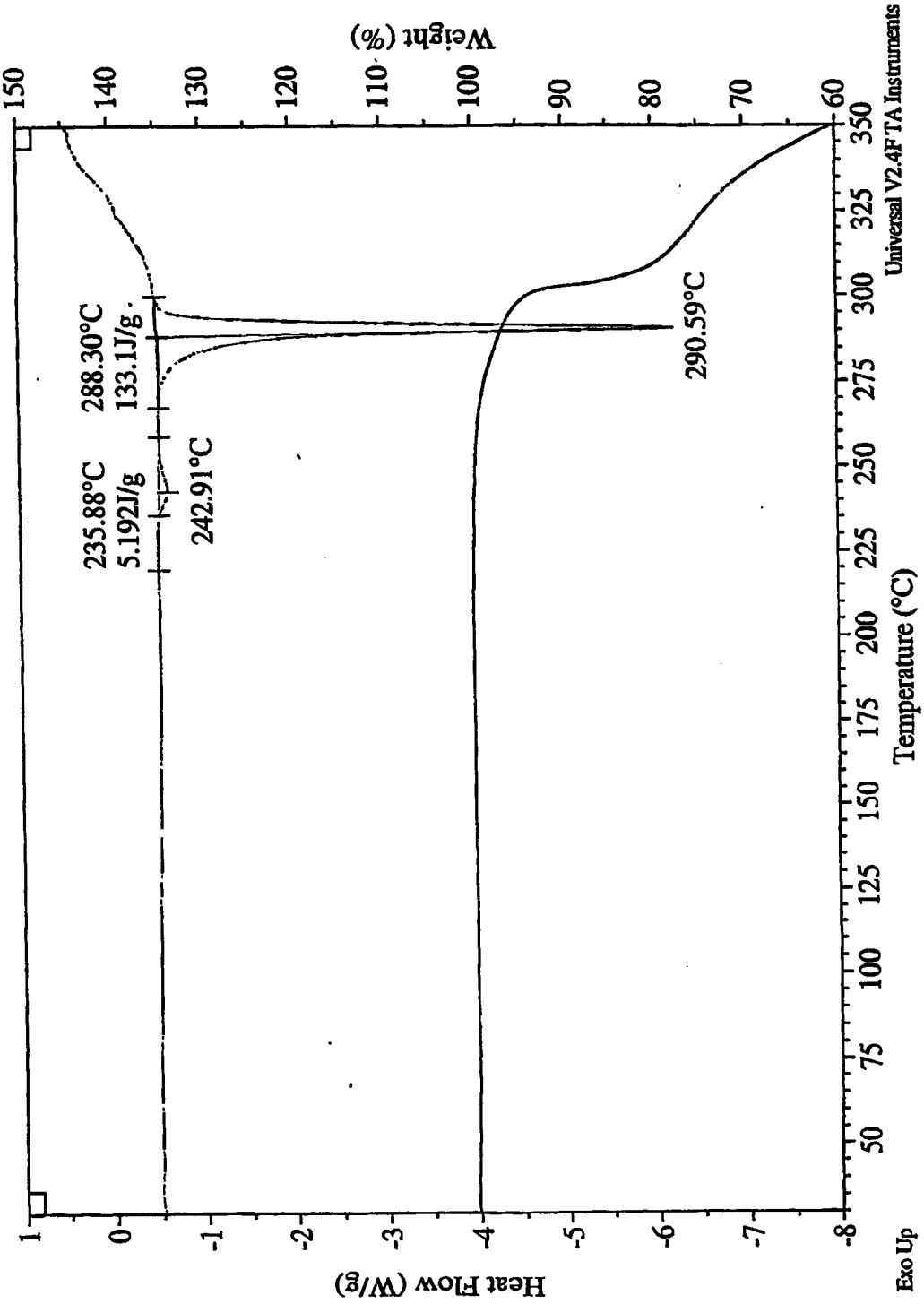
EMD 68843 Form II (THF solvate)

Fig. 30



EMD 68843 Form III

Fig. 31



EMD 68843 Form IV

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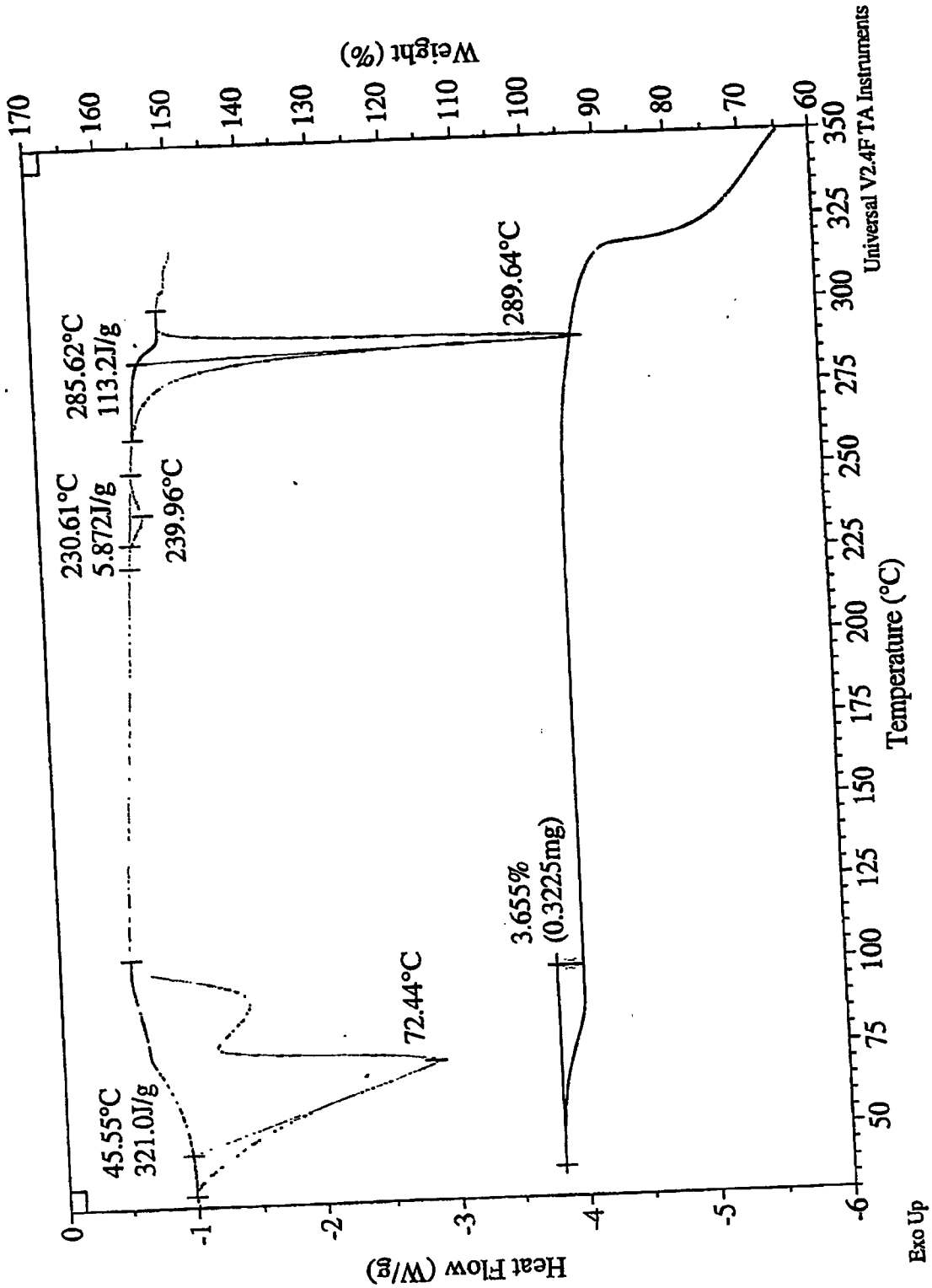
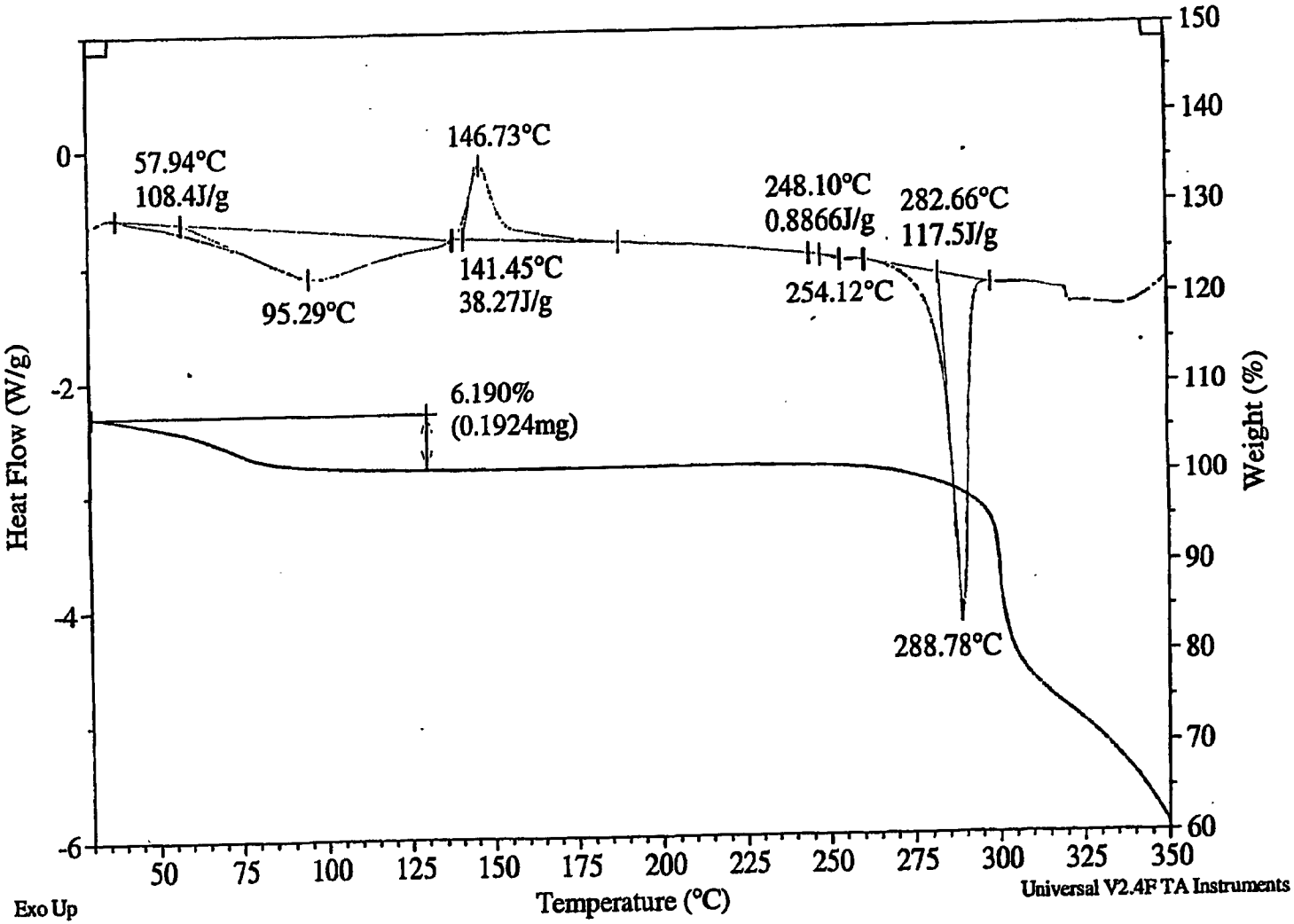
Fig. 32



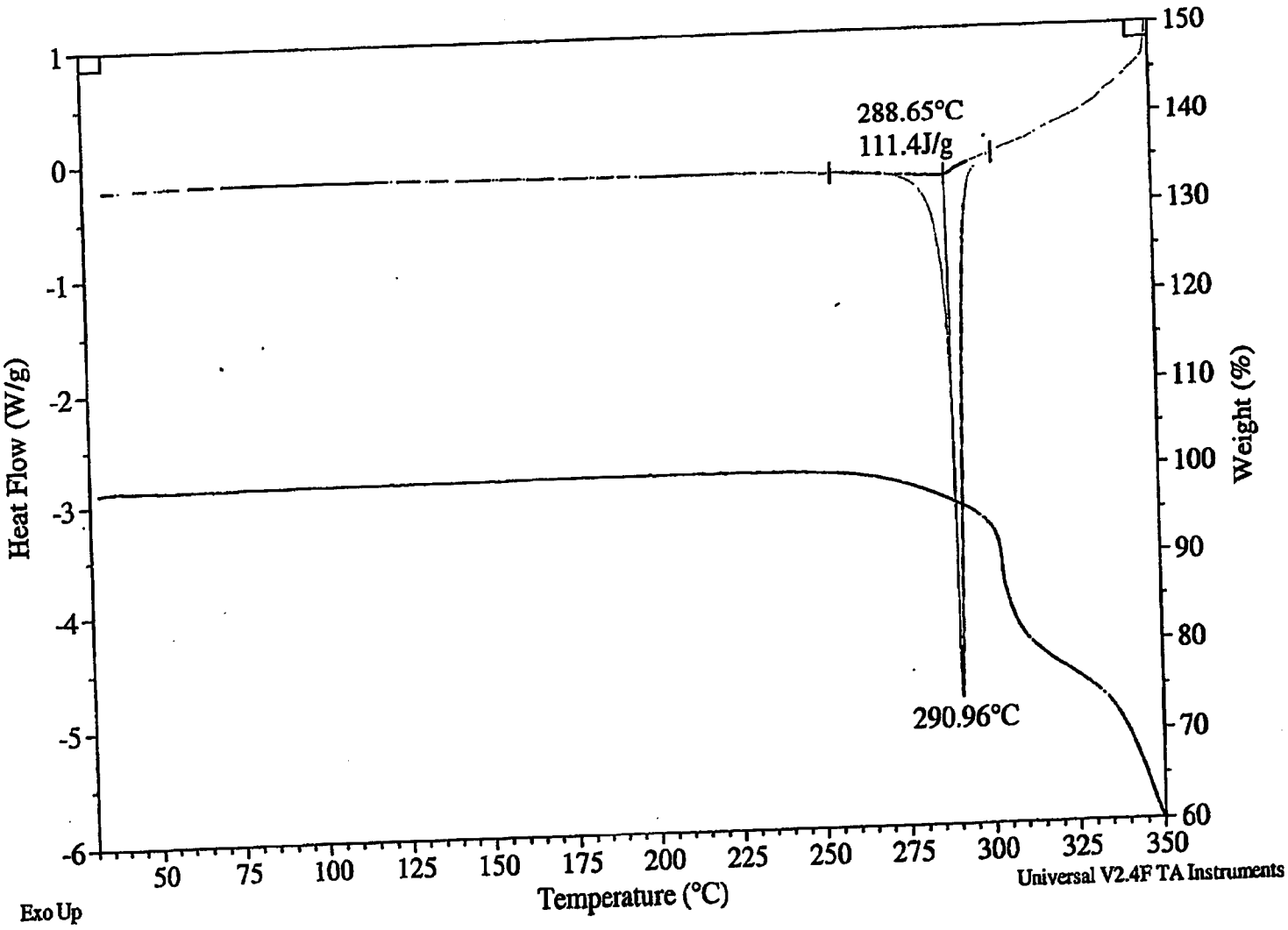
EMD 68843 Form V (monohydrate)

Fig. 33



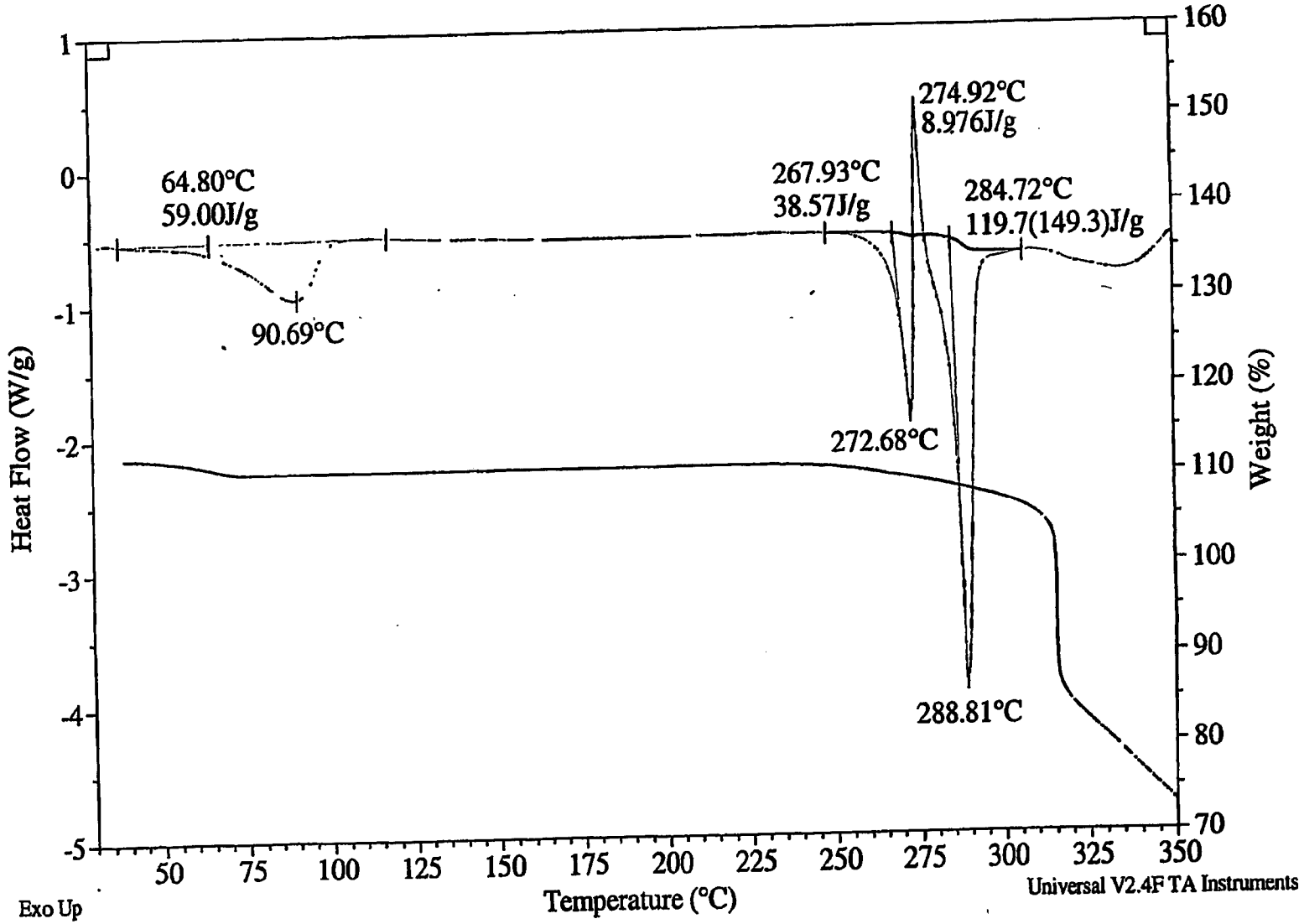
EMD 68843 Form VI (1.75 hydrate)

Fig. 34



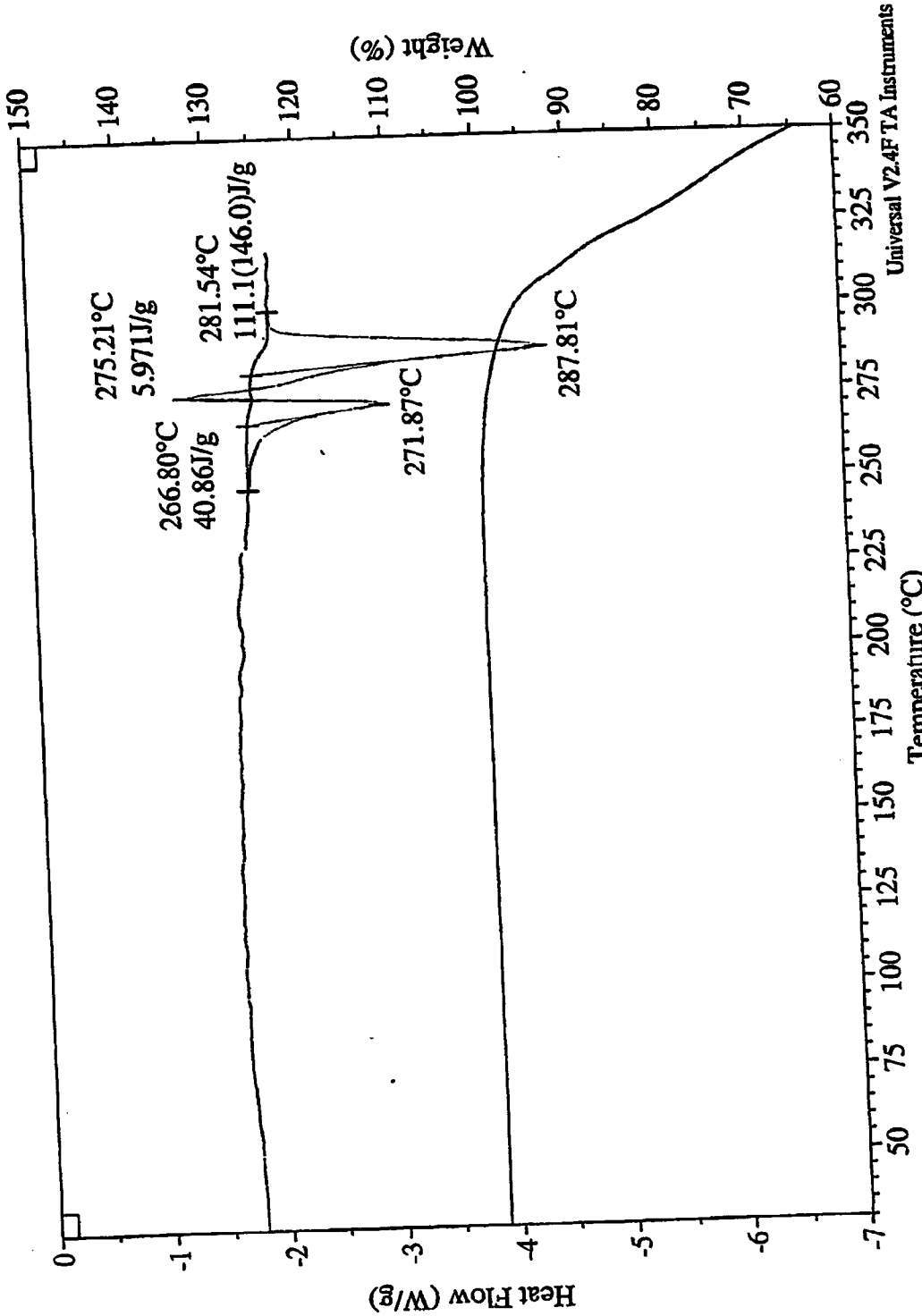
EMD 68843 Form VII

Fig. 35



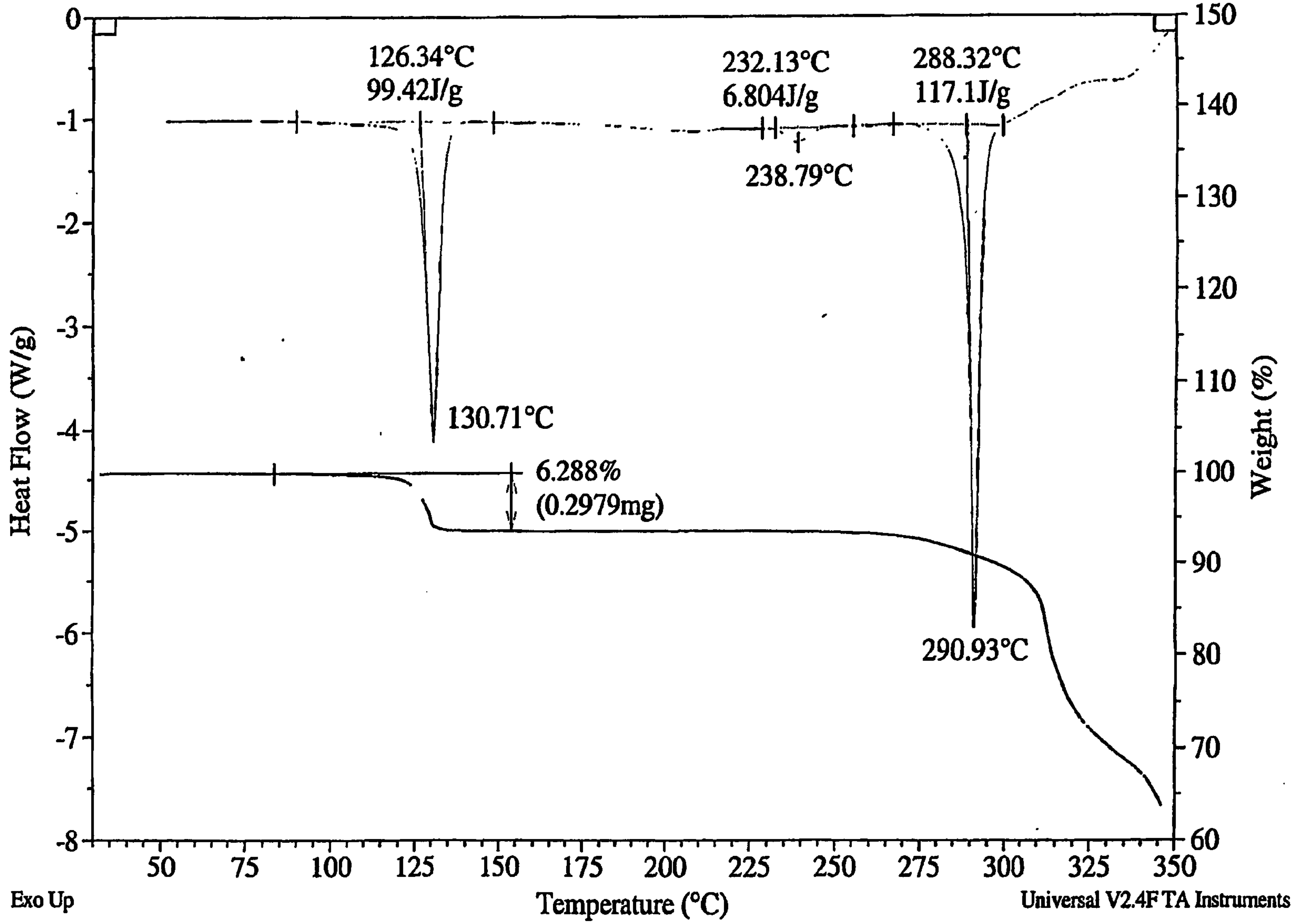
EMD 68843 Form VIII (hemihydrate)

Fig. 36



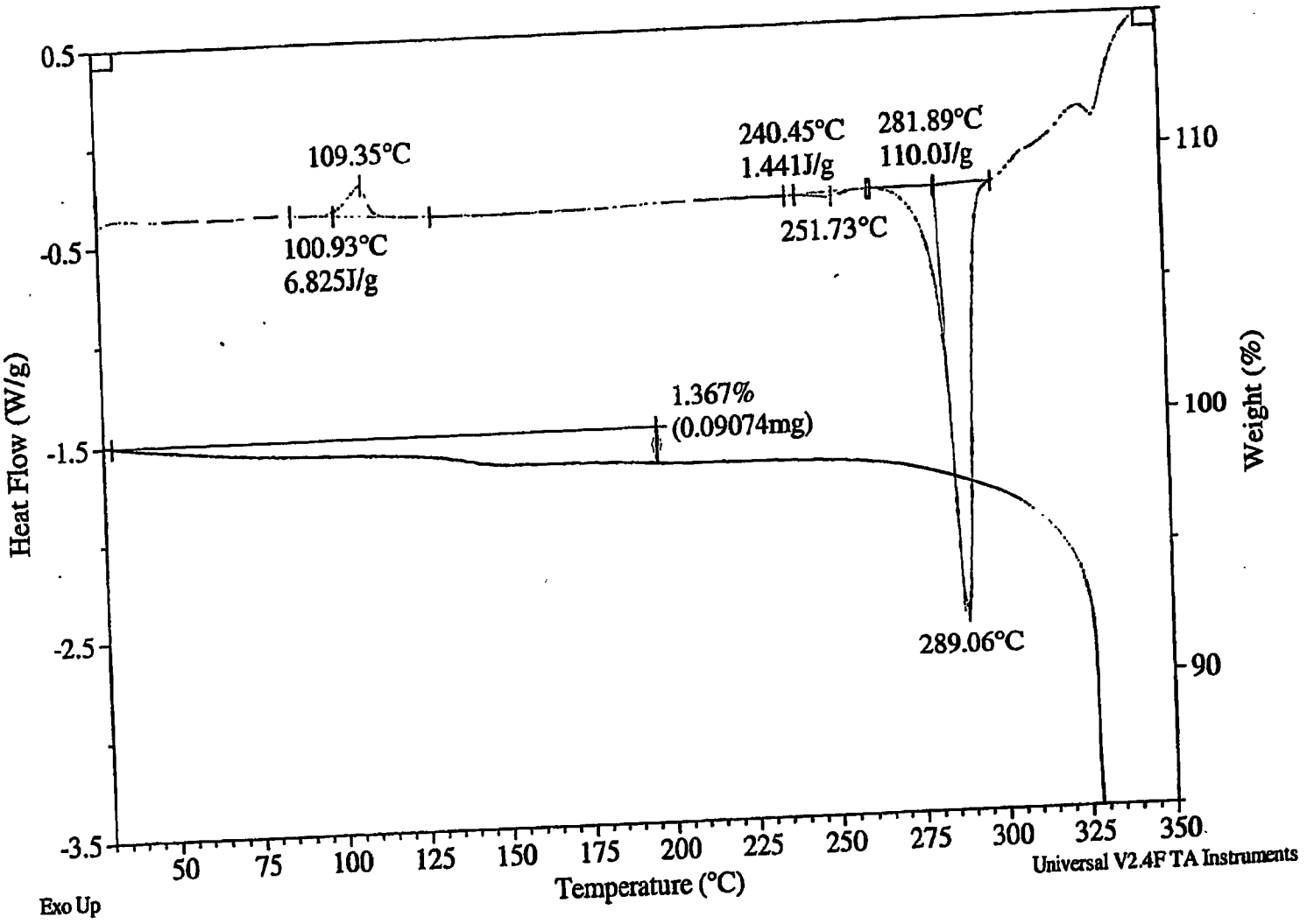
EMD 68843 Form IX

Fig. 37



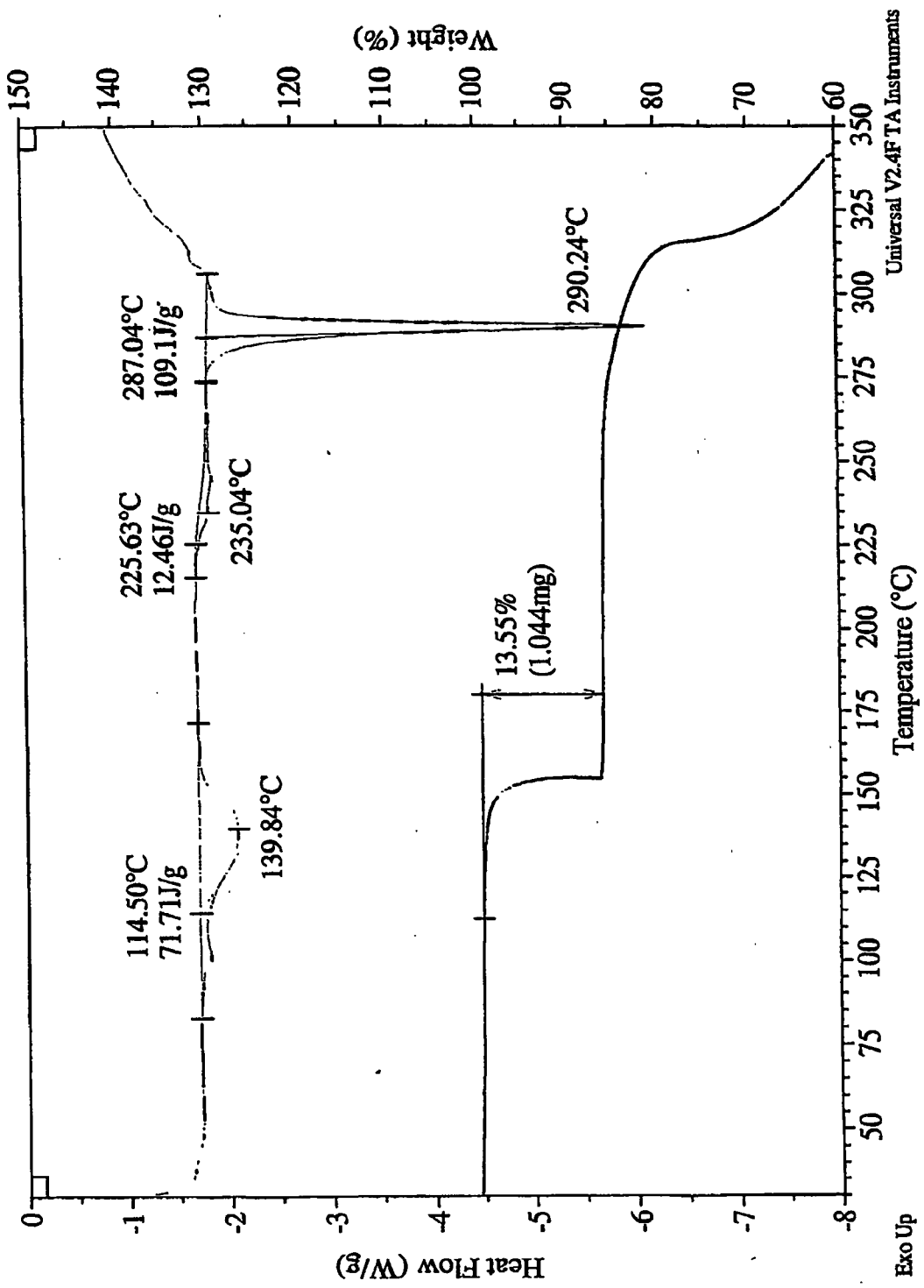
EMD 68843 Form XI (Methanol solvate)

Fig. 38



EMD 68843 Form XIV (n-heptane solvate)

Fig. 39



EMD 68843 Form XV (THF solvate)

39/39

Electronic Patent Application Fee Transmittal

Application Number:	14032183
Filing Date:	19-Sep-2013
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Filer:	Jin Wang
Attorney Docket Number:	120140-00110

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Pet. Delay Sub or Restore Priority-Claim	1454	1	1700	1700
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Certificate of Correction	1811	1	100	100
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1800**

Electronic Acknowledgement Receipt

EFS ID:	24181929
Application Number:	14032183
International Application Number:	
Confirmation Number:	2870
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Customer Number:	86738
Filer:	Jin Wang
Filer Authorized By:	
Attorney Docket Number:	120140-00110
Receipt Date:	24-NOV-2015
Filing Date:	19-SEP-2013
Time Stamp:	17:54:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1800
RAM confirmation Number	5745
Deposit Account	504876
Authorized User	WANG, JIN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	11-24-15_Request_for_Certificate_of_Correction.pdf	23865 8577bfc3ac157abeb98c3391718c0f2b31ef52fc	no	2
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	11-24-15_Petition_to_Correct_Foreign_Priority.pdf	31066 905f812d87e8a6ee9d498df0d4b3b0fda67995b7	no	2
Warnings:					
Information:					
3	Request for Certificate of Correction	Certificate_of_Correction.pdf	15565 29a4fa870cd9ebd9b944c64a47ff986ca5f0bfa9	no	1
Warnings:					
Information:					
4	Interim Copy of the Foreign Priority Document	120140-00110_CertifiedCopyForeignPriorityApplication.PDF	3535297 f28d51db2ed58412d17186e9c13b36b1e2de7b19	no	89
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	32659 f9afc17c590bf6d20d0f30b0a37b772f20a1916d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	3638452		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the District of Delaware on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	3/30/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
FOREST LABORATORIES, LLC, et al.	INVAGEN PHARMACEUTICALS INC.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	3/27/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
Forest Laboratories, LLC, Forest Laboratories Holdings, Ltd. Merck KGaA, and Merck Patent Gesellschaft mit beschrankter Haftung ("Merck Patent GmbH")	Teva Pharmaceuticals USA, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
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DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	3/27/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
Forest Laboratories, LLC, Forest Laboratories Holdings, Ltd. Merck KGaA, and Merck Patent Gesellschaft mit beschrankter Haftung ("Merck Patent GmbH")	Apotex Inc. and Apotex Corp.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	3/27/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
Forest Laboratories, LLC, Forest Laboratories Holdings, Ltd. Merck KGaA, and Merck Patent Gesellschaft mit beschrankter Haftung ("Merck Patent GmbH")	Accord Healthcare Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the District of Delaware on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
	3/27/2015	for the District of Delaware

PLAINTIFF	DEFENDANT
Forest Laboratories, LLC, Forest Laboratories Holdings, Ltd. Merck KGaA, and Merck Patent Gesellschaft mit beschrankter Haftung ("Merck Patent GmbH")	Alembic Pharmaceuticals Ltd., Alembic Global Holding SA and Alembic Pharmaceuticals, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,834,020	11/16/2010	Merck Patent GmbH
2	8,193,195	6/5/2012	Merck Patent GmbH
3	8,236,804	8/7/2012	Merck Patent GmbH
4	8,673,921	3/18/2014	Merck Patent GmbH
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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CLERK	(BY) DEPUTY CLERK	DATE

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/032,183	03/18/2014	8673921	120140-00110	2870

86738 7590 02/26/2014

MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Merck Patentgesellschaft, Darmstadt, GERMANY, Assignee (with 37 CFR 1.172 Interest);
Andreas Bathe, Darmstadt, GERMANY;
Bernd Helfert, Ober-Ramstadt, GERMANY;
Steffen Neuenfeld, Messel, GERMANY;
Heike Kniel, Heppenheim, GERMANY;
Matthias Bartels, Darmstadt, GERMANY;
Susanne Rudolph, Dieburg, GERMANY;
Henning Böttcher, Darmstadt, GERMANY;

PART B -FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

McCARTER & ENGLISH, LLP
265 Franklin Street
Boston, Massachusetts 02110

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Electronic Transmission

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4), on the date indicated below.

Jin Wang, Esq.	(Depositor's name)
/Jin Wang/	(Signature)
January 24, 2014	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/032,183	09/19/2013	Andreas Bathe	120140-00110	2870

TITLE OF INVENTION: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960.00			$960.00	03/13/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
Samantha L. Shterengarts	1626	514/254.090

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- [ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- [ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 McCarter & English, LLP
2 Danielle L. Herritt, Esq.
3 Jin Wang, Esq.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Merck Patentgesellschaft

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Darmstadt, GERMANY

Please check the appropriate assignee category or categories (will not be printed on the patent) : [ ] Individual [X] Corporation or other private group entity [ ] Government

4a. The following fee(s) are submitted:
- [X] Issue Fee
- [ ] Publication Fee (No small entity discount permitted)
- [ ] Advance Order - # of Copies _____

4b. Payment of Fee(s): (**Please first reapply any previously paid issue fee shown above**)
- [ ] A check is enclosed.
- [ ] Payment by credit card. Form PTO-2038 is attached.
- [X] The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-4876 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- [ ] Applicant certifying micro entity status. See 37 CFR 1.29.
- [ ] Applicant asserts small entity status. See 37 CFR 1.27.
- [ ] Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Jin Wang/ Date January 24, 2014

Typed or printed name Jin Wang, Esq. Registration No. 66,467

Electronic Patent Application Fee Transmittal

Application Number:	14032183
Filing Date:	19-Sep-2013
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Filer:	Jin Wang
Attorney Docket Number:	120140-00110

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	18018891
Application Number:	14032183
International Application Number:	
Confirmation Number:	2870
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Customer Number:	86738
Filer:	Jin Wang
Filer Authorized By:	
Attorney Docket Number:	120140-00110
Receipt Date:	24-JAN-2014
Filing Date:	19-SEP-2013
Time Stamp:	15:27:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$960
RAM confirmation Number	1989
Deposit Account	504876
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	120140-00110_IssueFeeTransmittal.pdf	18517 52c612fcbf417823970819e40d6a6d1b776c7359	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30457 1971db3838e06d0f31e206e183e271c1523eca20	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	48974		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/032,183	09/19/2013	Andreas Bathe	120140-00110

CONFIRMATION NO. 2870

86738
MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

POA ACCEPTANCE LETTER

OC000000066108457

Date Mailed: 01/23/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/ttkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/032,183	09/19/2013	Andreas Bathe	120140-00110

CONFIRMATION NO. 2870

86738
MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

PUBLICATION NOTICE

OC000000066208334

Title:POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Publication No.US-2014-0024658-A1
Publication Date:01/23/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	14/032,183
Filing Date	September 19, 2013
First Named Inventor	Andreas Bathe
Title	POLYMORPHIC FORMS OF 1-'4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
Art Unit	1626
Examiner Name	SHTERENGARTS, Samantha L.
Attorney Docket Number	120140-00110

SIGNATURE of Applicant or Patent Practitioner

Signature	/Jin Wang/	Date (Optional)	January 14, 2014
Name	Jin Wang, Esq.	Registration Number	66,467
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

[X] *Total of 1 form is submitted.

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being transmitted via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4).

Dated: January 14, 2014 Electronic Signature for Jin Wang, Esq.: /Jin Wang/

Doc Code: PA..

Document Description: Power of Attorney

PTO/AIA/82B(07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in the attached transmittal letter.

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent): 86738

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A or equivalent):

Name	Registration Number	Name	Registration Number

Please recognize or change the correspondence address for the application identified in the attached transmittal letter to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number: 86738

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant:

☐ Inventor or Joint Inventor

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor

☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (*e.g.*, a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature		Date	December 18, 2012
Name	Dr. Bauer / Dr. Wodopia	Telephone	+49 6151 72 2104
Title and Company	Associate Director / Director / Merck Patentgesellschaft		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below *.

☐ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	17911903
Application Number:	14032183
International Application Number:	
Confirmation Number:	2870
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Customer Number:	86738
Filer:	Jin Wang
Filer Authorized By:	
Attorney Docket Number:	120140-00110
Receipt Date:	14-JAN-2014
Filing Date:	19-SEP-2013
Time Stamp:	17:40:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	signed_POA_clearer_copy.pdf	150322 ab6dea71edee8dbfb6897113b2e62014710aed00	no	2

Warnings:

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing	
Information:	
Total Files Size (in bytes):	150322

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

86738 7590 12/13/2013

MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

EXAMINER
SHTERENGARTS, SAMANTHA L

ART UNIT	PAPER NUMBER
1626	

DATE MAILED: 12/13/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/032,183	09/19/2013	Andreas Bathe	120140-00110	2870

TITLE OF INVENTION: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$0	$0	$1780	03/13/2014

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

86738 7590 12/13/2013
MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/032,183	09/19/2013	Andreas Bathe	120140-00110	2870

TITLE OF INVENTION: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$0	$0	$1780	03/13/2014

EXAMINER	ART UNIT	CLASS-SUBCLASS
SHTERENGARTS, SAMANTHA L	1626	514-254090

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/032,183	09/19/2013	Andreas Bathe	120140-00110	2870

86738 7590 12/13/2013

MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

EXAMINER	
SHTERENGARTS, SAMANTHA L	
ART UNIT	PAPER NUMBER
1626	

DATE MAILED: 12/13/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and December 31, 2013

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to $0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

Notice of Allowability	Application No. 14/032,183	Applicant(s) BATHE ET AL.	
	Examiner Samantha Shterengarts	Art Unit 1626	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *19 September 2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *56-70 (renumbered 1-15)* . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 9/19/2013
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Samantha Shterengarts/
Primary Examiner, Art Unit 1626

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

2. Claims 56-70 are pending in the instant application.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on September 19, 2013 were in compliance with the provisions of 37 CFR 1.97 and 37 CFR 1.98. The IDS documents were considered. A signed copy of each form 1449 is enclosed herewith.

REASONS FOR ALLOWANCE

4. The following is an examiner's statement of reasons for allowance: The instantly claimed crystalline compounds, compositions, and methods for using the same, are novel and non-obvious over the prior art. The closest prior art is U.S. Patent no. 5,532,241, which does not teach the claimed crystalline forms. This reference does not encompass the scope of the instant application. This reference lacks identical or obvious crystalline forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine. A person of ordinary skill in the art would not have expected that making modifications would retain identical activity as disclosed in the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

5. Claims 56-70 (renumbered 1-15) are allowed.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samantha Shterengarts whose telephone number is (571)270-5316. The examiner can normally be reached on Monday thru Thursday 9-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Joseph K. McKane can be reached on 571-272-0699. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Samantha Shterengarts/
Primary Examiner, Art Unit 1626

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14032183	BATHE ET AL.
	Examiner	**Art Unit**
	SAMANTHA SHTERENGARTS	1626

CPC						
Symbol					**Type**	**Version**
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	15	
/SAMANTHA SHTERENGARTS/ Primary Examiner.Art Unit 1626	12/02/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	----------

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14032183	BATHE ET AL.
	Examiner	**Art Unit**
	SAMANTHA SHTERENGARTS	1626

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION												
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED							
514	254.09	A	6	1	K	31 / 496 (2006.0)								
CROSS REFERENCE(S)		C	0	7	D	405 / 14 (2006.01.01)								
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)													
544	373													

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	15	
/SAMANTHA SHTERENGARTS/ Primary Examiner.Art Unit 1626	12/02/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	----------

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14032183	BATHE ET AL.
	Examiner	**Art Unit**
	SAMANTHA SHTERENGARTS	1626

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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12	67														
13	68														
14	69														
15	70														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	15	
/SAMANTHA SHTERENGARTS/ Primary Examiner.Art Unit 1626	12/02/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	----------

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14032183	BATHE ET AL.
	Examiner	Art Unit
	SAMANTHA SHTERENGARTS	1626

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
514	254.09	12/2/2013	SLS
544	373	12/2/2013	SLS

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor Name Search	12/2/2013	SLS
IDS Reference Search	12/2/2013	SLS
STN Structure Search	12/2/2013	SLS
EAST Class/Subclass Keyword Search	12/2/2013	SLS
Interference Search	12/2/2013	SLS

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
514	254.09	12/2/2013	SLS
544	373	12/2/2013	SLS

	/SAMANTHA SHTERENGARTS/ Primary Examiner.Art Unit 1626

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L2	38	((HELFERT) near2 (BERND)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:22
L3	25	((NEUENFELD) near2 (STEFFEN)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:22
L4	20	((KNIEL) near2 (HEIKE)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:22
L5	25	((BARTELS) near2 (MATTHIAS)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:22
L6	19	((RUDOLPH) near2 (SUSANNE)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:23
L7	89	((BOTTCHER) near2 (HENNING)).inv.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:23
L8	166	1 2 3 4 5 6 7	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:23
L9	33	8 and (cyanoindol or cyanoindole)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:23
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L11	1549	544/373.ccls.	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:25
L12	1898	10 11	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:25
L13	73	12 and (cyanoindol or cyanoindole)	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/12/02 14:25

EAST Search History (Interference)

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L15	12	((HELFERT) near2 (BERND)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:25
L16	8	((NEUENFELD) near2 (STEFFEN)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:25
L17	7	((KNIEL) near2 (HEIKE)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:26
L18	8	((BARTELS) near2 (MATTHIAS)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:26
L19	7	((RUDOLPH) near2 (SUSANNE)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:26
L20	53	((BOTTCHER) near2 (HENNING)).inv.	USPAT; UPAD	OR	ON	2013/12/02 14:26

L21	420	514/254.09.ccls.	USPAT; UPAD	OR	ON	2013/12/02 14:26
L22	808	544/373.ccls.	USPAT; UPAD	OR	ON	2013/12/02 14:26
L23	950	21 22	USPAT; UPAD	OR	ON	2013/12/02 14:26
L24	28	23 and (cyanoindol or cyanoindole)	USPAT; UPAD	OR	ON	2013/12/02 14:26

12/ 2/ 2013 2:27:32 PM

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 NEWS  5  MAY 21  STN Updated to Reflect Streamlining of CAS Roles
 NEWS  6  MAY 24  CABA Has Been Reloaded on May 24, 2013
 NEWS  7  MAY 28  STN Adds Indian Patent Full Text File - INFULL
 NEWS  8  JUL 09  TULSA and TULSA2 were reloaded on July 8, 2013
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                  Capabilities
 NEWS 10  JUL 24  Find the Most Comprehensive and Timely Results When Searching
                  the Newly Enhanced Embase Alert(TM) together with Embase(TM)
 NEWS 11  JUL 31  New PV Cluster on STN(R) Simplifies Pharmacovigilance
                  Alerting and Searching
 NEWS 12  AUG 15  PCTFULL documents with Chinese, Japanese, or Korean as
                  filing language have English machine translations
 NEWS 13  AUG 16  The 2013 Inventory of Existing Chemical Substances in China
                  is Now Available on STN
 NEWS 14  SEP 10  CAS Expands Coverage of Philippines Patents
 NEWS 15  SEP 13  STN on the Web Enhanced with Updated Structure and BLAST
                  Plug-ins
 NEWS 16  SEP 24  Emtree Thesaurus Updated in Embase
 NEWS 17  SEP 27  Application Numbers for U.S. Patents in CA/CAplus and
                  USPATFUL/USPAT2 Enhanced with U.S. Series Code Information
 NEWS 18  OCT 10  Additional Experimental Spectra Now Available in CAS
                  REGISTRY on SciFinder and in STN
 NEWS 19  NOV 13  Removal of CHEMINFORMRX, DETHERM, CHEMSAFE and SPECINFO
                  from STN
 NEWS 20  NOV 25  IFIALL Enhanced with the Addition of Cooperative Patent
                  Classification (CPC) Data

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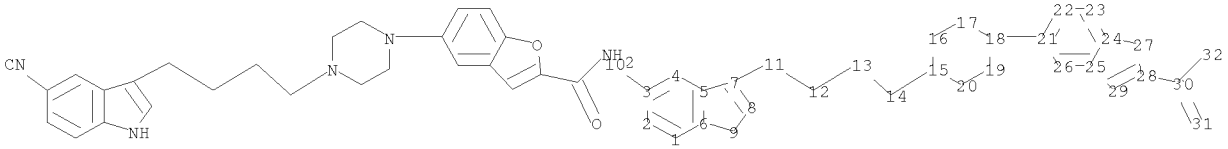

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ring nodes :
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ring bonds :
1-2 1-6 2-3 3-4 4-5 5-6 5-7 6-9 7-8 8-9 15-16 15-20 16-17 17-18 18-19 19-20 21-22 21-26 22-23 23-24 24-25 24-27 25-26 25-29 27-28 28-29

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exact/norm bonds :
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exact bonds :
3-10  7-11  11-12  12-13  13-14  28-30
normalized bonds :
1-2  1-6  2-3  3-4  4-5  5-6  21-22  21-26  22-23  23-24  24-25  25-26


Match level :
1:Atom  2:Atom  3:Atom  4:Atom  5:Atom  6:Atom  7:Atom  8:Atom  9:Atom  10:CLASS
11:CLASS  12:CLASS  13:CLASS  14:CLASS  15:Atom  16:Atom  17:Atom  18:Atom  19:Atom
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RN   1472627-97-6  REGISTRY
ED   Entered STN:  13 Nov 2013
CN   Benzoic acid, 4-hydroxy-, compd. with
     5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-2-
     benzofurancarboxamide (2:1)  (CA INDEX NAME)
MF   C26 H27 N5 O2 . 2 C7 H6 O3
SR   CA
LC   STN Files:   CA, CAPLUS

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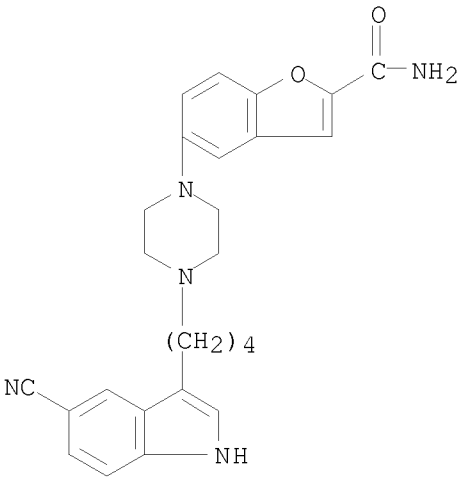

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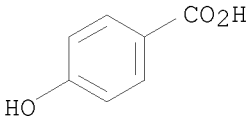

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 2 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-96-5 REGISTRY
ED Entered STN: 13 Nov 2013
CN Benzoic acid, 4-nitro-, compd. with
5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-2-
benzofurancarboxamide (2:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C7 H5 N O4
SR CA
LC STN Files: CA, CAPLUS

CM 1

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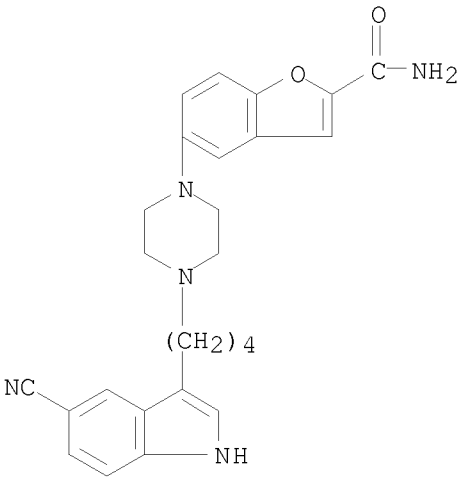

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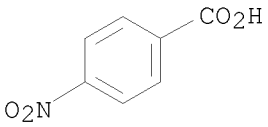
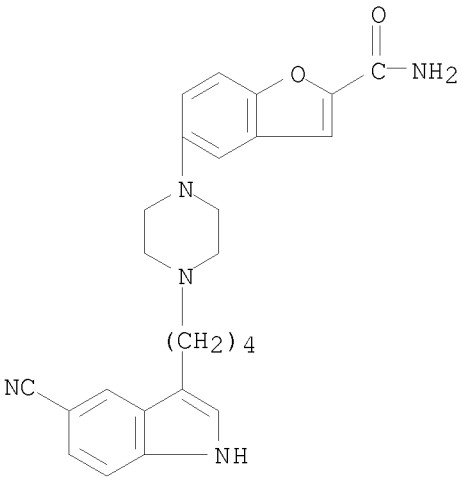


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 3 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-95-4 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, benzoate (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C7 H6 O2
SR CA
LC STN Files: CA, CAPLUS

CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 65-85-0
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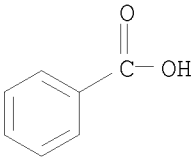
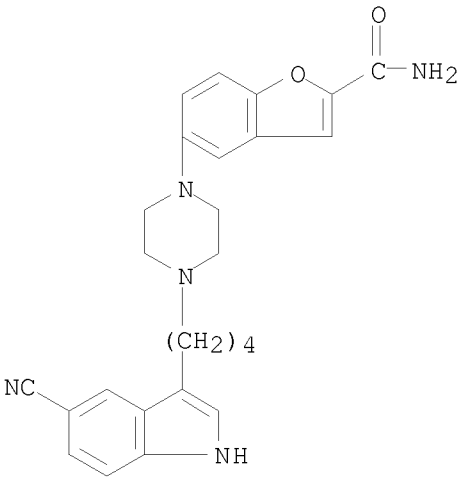


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 4 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-94-3 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, 4-methylbenzenesulfonate (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C7 H8 O3 S
SR CA
LC STN Files: CA, CAPLUS

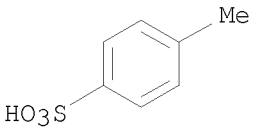
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 104-15-4
CMF C7 H8 O3 S

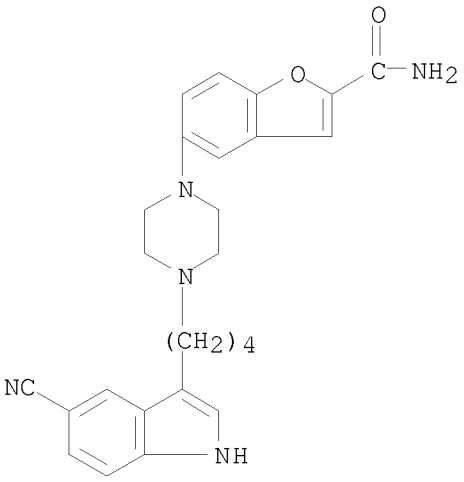


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 5 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-93-2 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, methanesulfonate (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C H4 O3 S
SR CA
LC STN Files: CA, CAPLUS

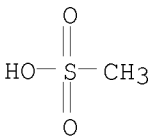
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 75-75-2
CMF C H4 O3 S

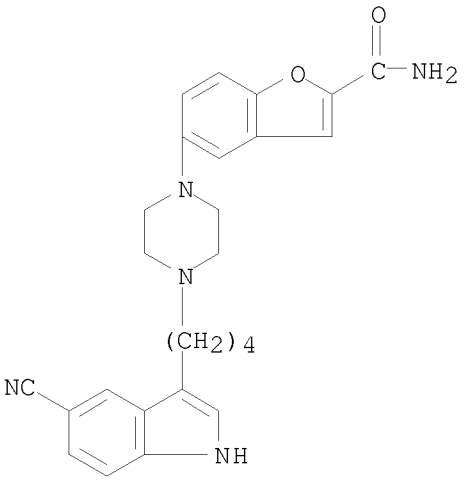


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 6 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-91-0 REGISTRY
ED Entered STN: 13 Nov 2013
CN Benzeneacetic acid, α-hydroxy-, compd. with 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-2-benzofurancarboxamide (2:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C8 H8 O3
SR CA
LC STN Files: CA, CAPLUS

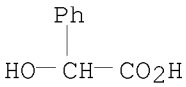
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 90-64-2
CMF C8 H8 O3

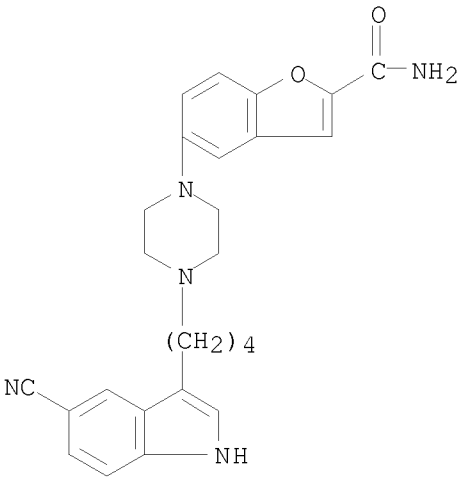


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 7 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-89-6 REGISTRY
ED Entered STN: 13 Nov 2013
CN Butanedioic acid, compd. with 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-2-benzofurancarboxamide (1:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . C4 H6 O4
SR CA
LC STN Files: CA, CAPLUS

CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

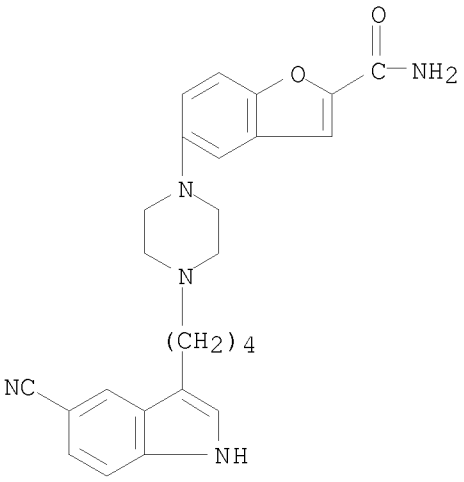
CRN 110-15-6
CMF C4 H6 O4

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 8 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-87-4 REGISTRY
ED Entered STN: 13 Nov 2013
CN Formic acid, compd. with 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-2-benzofurancarboxamide (2:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C H2 O2
SR CA
LC STN Files: CA, CAPLUS

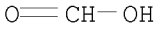
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 64-18-6
CMF C H2 O2

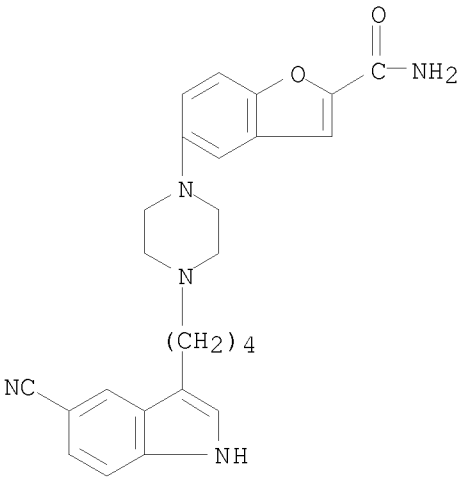


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 9 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-85-2 REGISTRY
ED Entered STN: 13 Nov 2013
CN INDEX NAME NOT YET ASSIGNED
MF C26 H27 N5 O2 . H3 O4 P
SR CA
LC STN Files: CA, CAPLUS

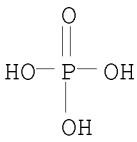
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 7664-38-2
CMF H3 O4 P

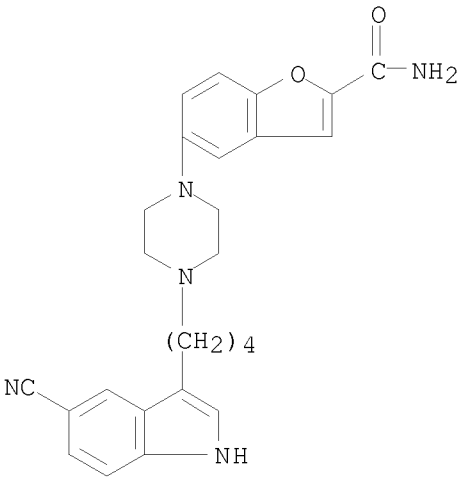


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 10 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-83-0 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, 2-hydroxy-1,2,3-propanetricarboxylate (1:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . C6 H8 O7
SR CA
LC STN Files: CA, CAPLUS

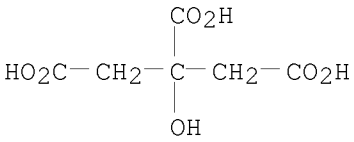
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 77-92-9
CMF C6 H8 O7

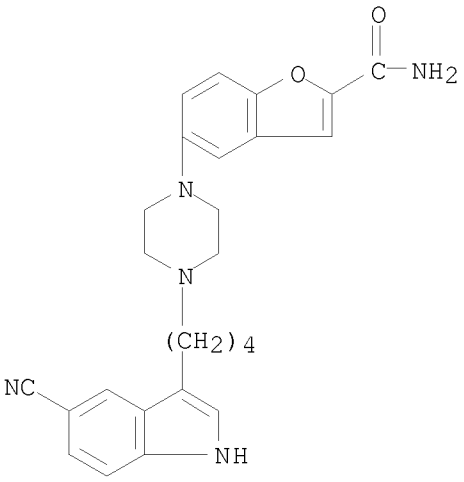


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 11 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-81-8 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, ethanedioate (1:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . C2 H2 O4
SR CA
LC STN Files: CA, CAPLUS

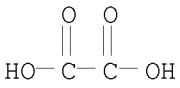
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 144-62-7
CMF C2 H2 O4

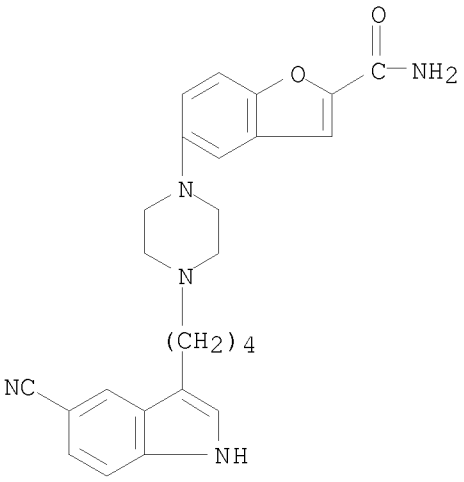


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 12 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-79-4 REGISTRY
ED Entered STN: 13 Nov 2013
CN INDEX NAME NOT YET ASSIGNED
FS STEREOSEARCH
MF C26 H27 N5 O2 . C4 H4 O4
SR CA
LC STN Files: CA, CAPLUS

CM 1

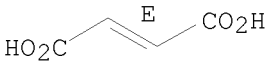
CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 110-17-8
CMF C4 H4 O4

Double bond geometry as shown.

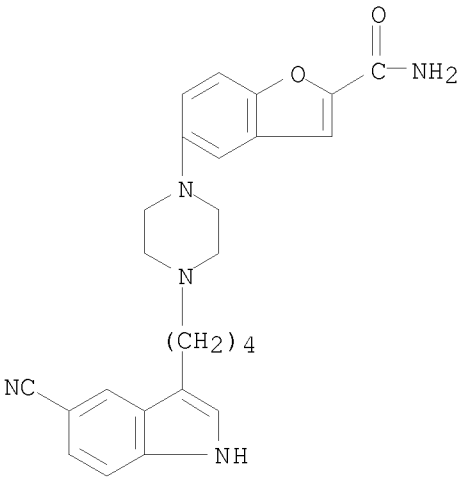


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 13 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-77-2 REGISTRY
ED Entered STN: 13 Nov 2013
CN INDEX NAME NOT YET ASSIGNED
FS STEREOSEARCH
MF C26 H27 N5 O2 . C4 H4 O4
SR CA
LC STN Files: CA, CAPLUS

CM 1

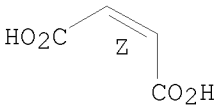
CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 110-16-7
CMF C4 H4 O4

Double bond geometry as shown.

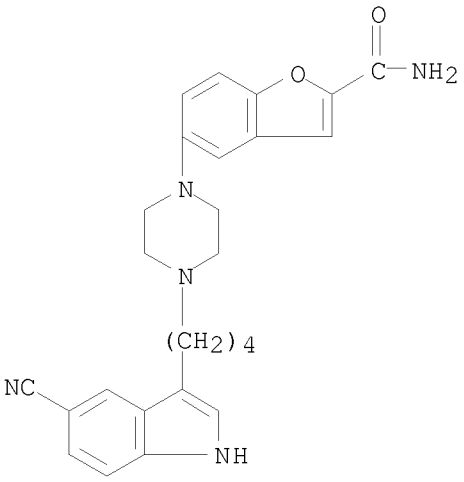


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 14 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-76-1 REGISTRY
ED Entered STN: 13 Nov 2013
CN INDEX NAME NOT YET ASSIGNED
FS STEREOSEARCH
MF C26 H27 N5 O2 . C4 H6 O6
SR CA
LC STN Files: CA, CAPLUS

CM 1

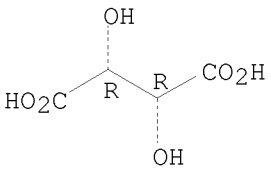
CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 87-69-4
CMF C4 H6 O6

Absolute stereochemistry.

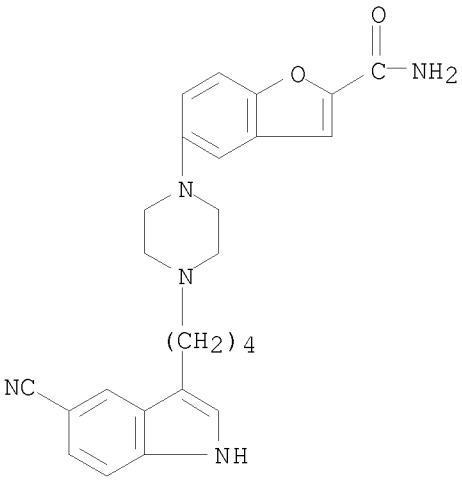


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 15 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-75-0 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, acetate (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C2 H4 O2
SR CA
LC STN Files: CA, CAPLUS

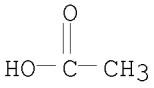
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



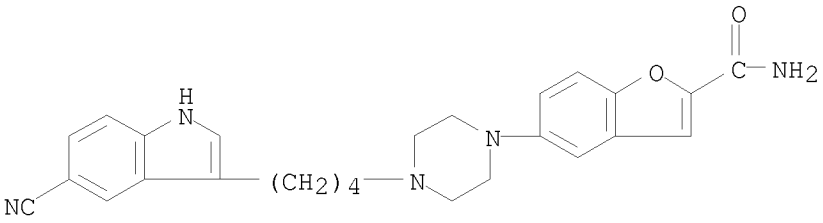
CM 2

CRN 64-19-7
CMF C2 H4 O2



1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 16 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-74-9 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrobromide (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 Br H
SR CA
LC STN Files: CA, CAPLUS
CRN (163521-12-8)



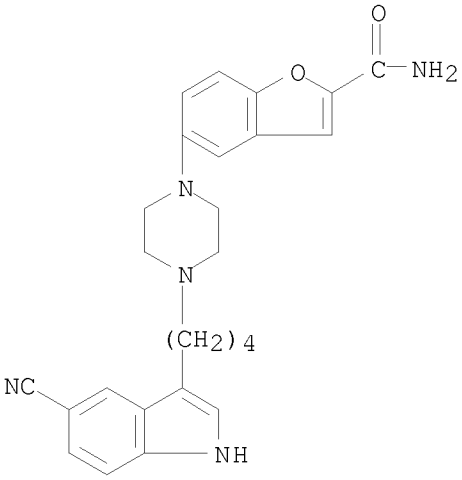
● 2 HBr

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 17 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-73-8 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, sulfate (1:1) (CA INDEX NAME)
MF C26 H27 N5 O2 . H2 O4 S
SR CA
LC STN Files: CA, CAPLUS

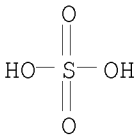
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



CM 2

CRN 7664-93-9
CMF H2 O4 S

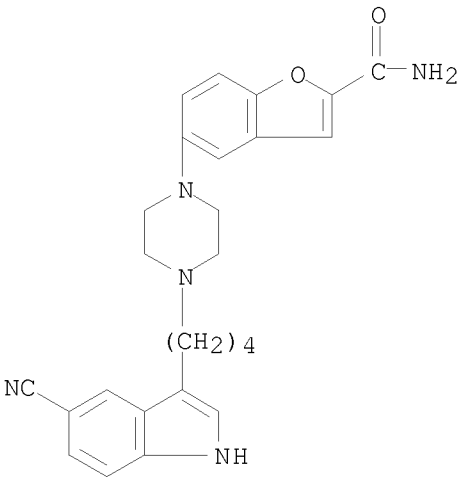


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 18 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1472627-72-7 REGISTRY
ED Entered STN: 13 Nov 2013
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, 2,2,2-trifluoroacetate (1:2) (CA INDEX NAME)
MF C26 H27 N5 O2 . 2 C2 H F3 O2
SR CA
LC STN Files: CA, CAPLUS

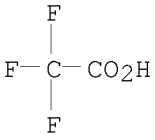
CM 1

CRN 163521-12-8
CMF C26 H27 N5 O2



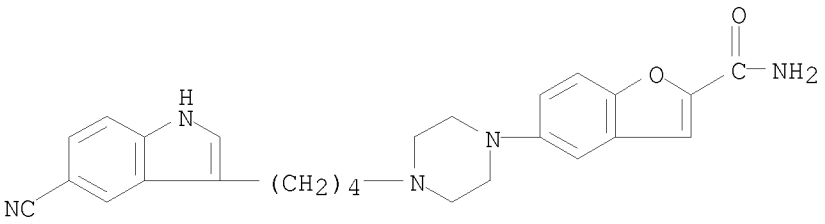
CM 2

CRN 76-05-1
CMF C2 H F3 O2



1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

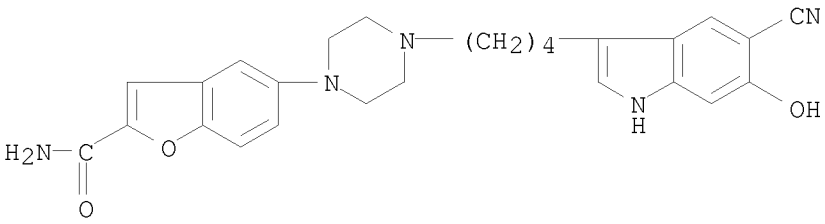
L2 ANSWER 19 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 1266397-95-8 REGISTRY
ED Entered STN: 04 Mar 2011
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:?) (CA INDEX NAME)
OTHER NAMES:
CN 1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride
MF C26 H27 N5 O2 . x Cl H
SR CA
LC STN Files: CA, CAPLUS
CRN (163521-12-8)



● x HCl

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 20 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 816438-39-8 REGISTRY
ED Entered STN: 19 Jan 2005
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:?) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (9CI)
MF C26 H27 N5 O3 . x Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL
CRN (714950-70-6)

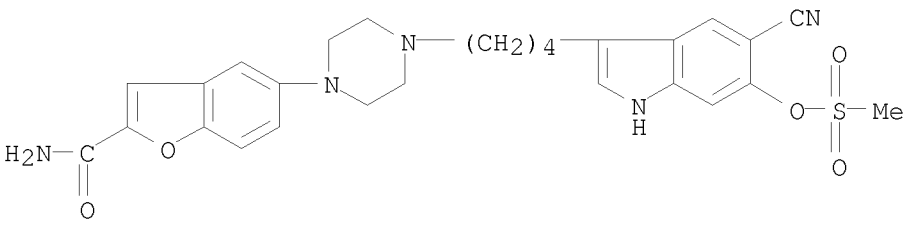


● x HCl

PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

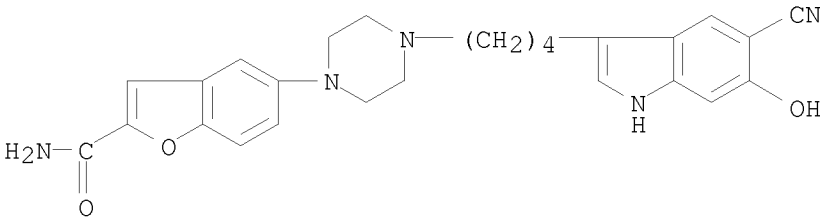
L2 ANSWER 21 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 714950-88-6 REGISTRY
ED Entered STN: 23 Jul 2004
CN 2-Benzofurancarboxamide, 5-[4-[4-[5-cyano-6-[(methylsulfonyl)oxy]-1H-indol-3-yl]butyl]-1-piperazinyl]- (CA INDEX NAME)
MF C27 H29 N5 O5 S
SR CA
LC STN Files: CA, CAPLUS, CASREACT, TOXCENTER, USPAT2, USPATFULL



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 22 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 714950-70-6 REGISTRY
ED Entered STN: 23 Jul 2004
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)
OTHER NAMES:
CN 5-[4-[4-(5-Cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]-2-benzofurancarboxamide
MF C26 H27 N5 O3
CI COM
SR CA
LC STN Files: CA, CAPLUS, CASREACT, TOXCENTER, USPAT2, USPATFULL



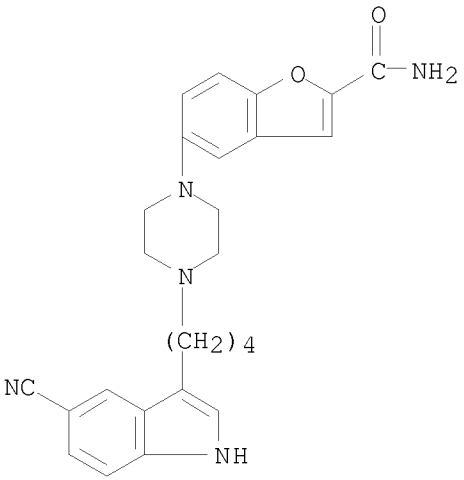
PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 23 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-97-4 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (2:1) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, hydrate (2:1) (9CI)
MF C26 H27 N5 O2 . Cl H . 1/2 H2 O
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



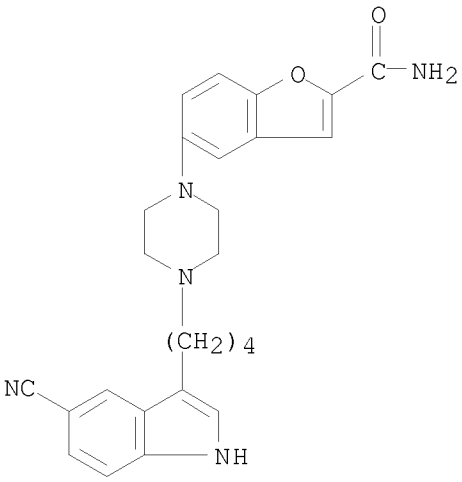
● HCl

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 24 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-96-3 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (2:3) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, hydrate (2:3) (9CI)
MF C26 H27 N5 O2 . Cl H . 3/2 H2 O
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



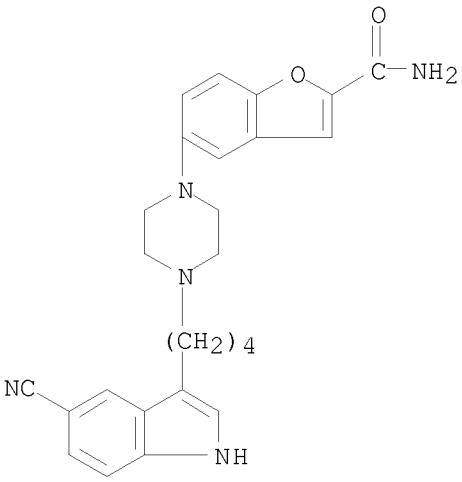
● HCl

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 25 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-95-2 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (1:1) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, monohydrate (9CI)
MF C26 H27 N5 O2 . Cl H . H2 O
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



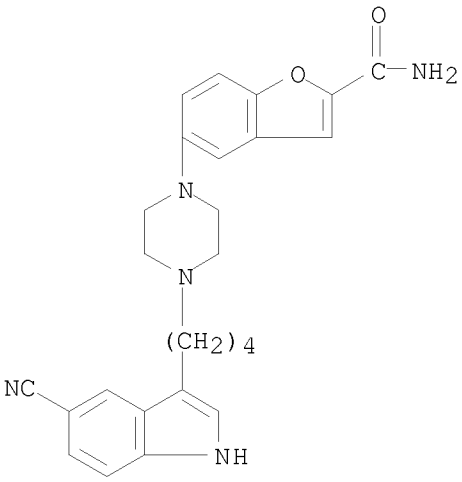
● HCl

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 26 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-94-1 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with heptane (1:1:1) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with heptane (1:1) (9CI)
MF C26 H27 N5 O2 . C7 H16 . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

CRN 142-82-5
CMF C7 H16

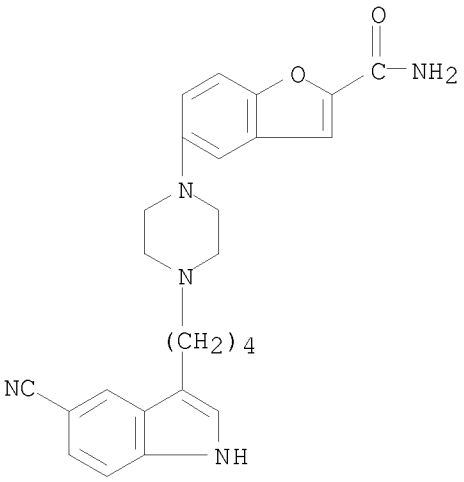
Me—$(CH_2)_5$—Me

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 27 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-93-0 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with methanol (1:1) (9CI) (CA INDEX NAME)
MF C26 H27 N5 O2 . C H4 O . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

CRN 67-56-1
CMF C H4 O

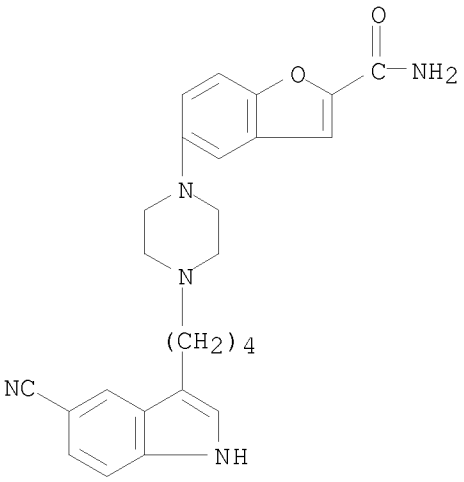
$H_3C—OH$

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 28 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-92-9 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with tetrahydrofuran (2:1) (9CI) (CA INDEX NAME)
MF C26 H27 N5 O2 . 1/2 C4 H8 O . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



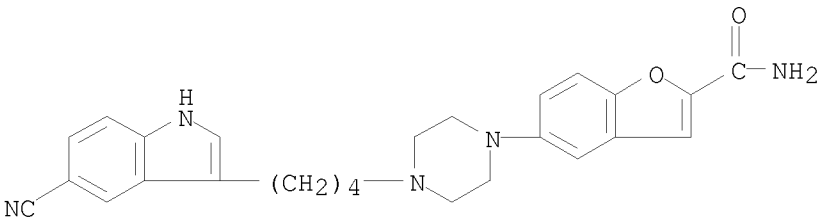
● HCl

CM 2

CRN 109-99-9
CMF C4 H8 O

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 29 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-91-8 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:2) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, dihydrochloride (9CI)
MF C26 H27 N5 O2 . 2 Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL
CRN (163521-12-8)



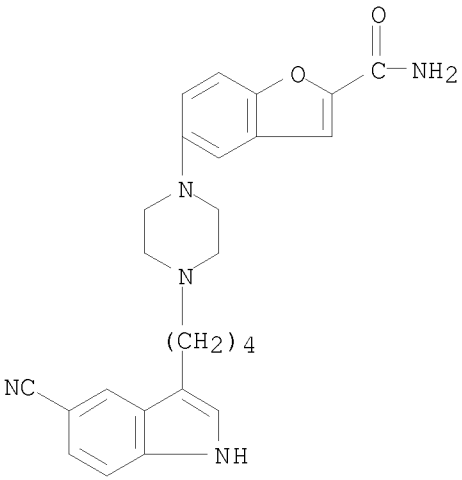
● 2 HCl

2 REFERENCES IN FILE CA (1907 TO DATE)
2 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 30 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-90-7 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (1:?) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, hydrate (9CI)
MF C26 H27 N5 O2 . Cl H . x H2 O
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



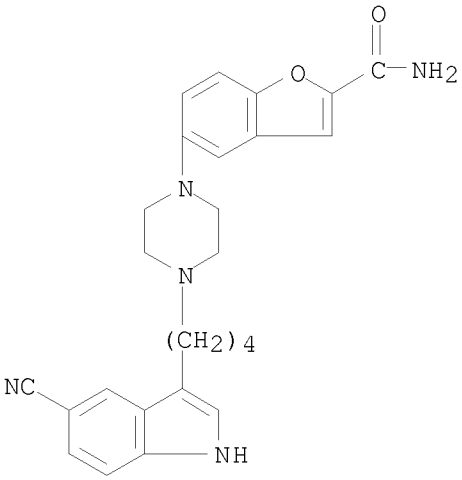
● HCl

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 31 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-89-4 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-
    piperazinyl]-, hydrochloride, compd. with heptane (1:1:?) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-
    piperazinyl]-, monohydrochloride, compd. with heptane (9CI)
MF C26 H27 N5 O2 . x C7 H16 . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

    CM 1

    CRN 163521-08-2 (163521-12-8)
    CMF C26 H27 N5 O2 . Cl H



● HCl

    CM 2

    CRN 142-82-5
    CMF C7 H16

Me—(CH2)5—Me

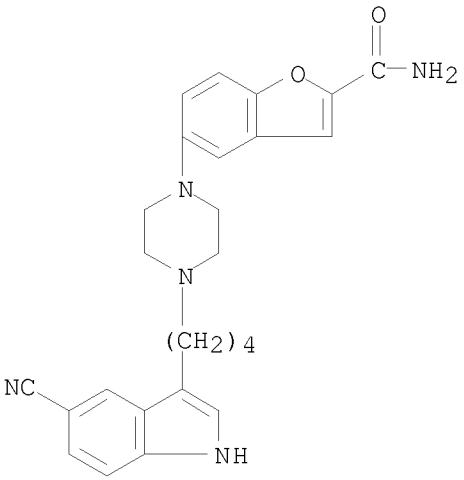
              1 REFERENCES IN FILE CA (1907 TO DATE)
              1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 32 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-88-3 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-
    piperazinyl]-, hydrochloride, compd. with methanol (1:1:?) (CA INDEX
    NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-

piperazinyl]-, monohydrochloride, compd. with methanol (9CI)
MF C26 H27 N5 O2 . x C H4 O . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

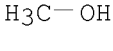
CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

CRN 67-56-1
CMF C H4 O

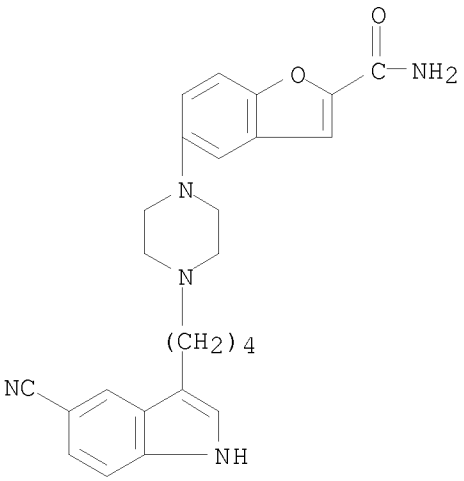


1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 33 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-87-2 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with tetrahydrofuran (1:1:1) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with tetrahydrofuran (1:1) (9CI)
MF C26 H27 N5 O2 . C4 H8 O . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

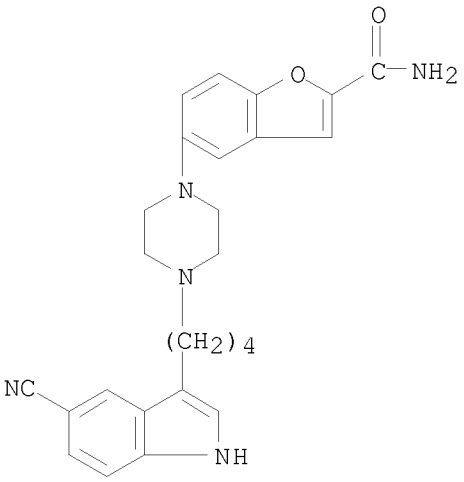
CRN 109-99-9
CMF C4 H8 O

1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 34 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 478917-86-1 REGISTRY
ED Entered STN: 14 Jan 2003
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with 2-propanone (1:1:?) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with 2-propanone (9CI)
MF C26 H27 N5 O2 . x C3 H6 O . Cl H
SR CA
LC STN Files: CA, CAPLUS, TOXCENTER, USPAT2, USPATFULL

CM 1

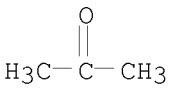
CRN 163521-08-2 (163521-12-8)
CMF C26 H27 N5 O2 . Cl H



● HCl

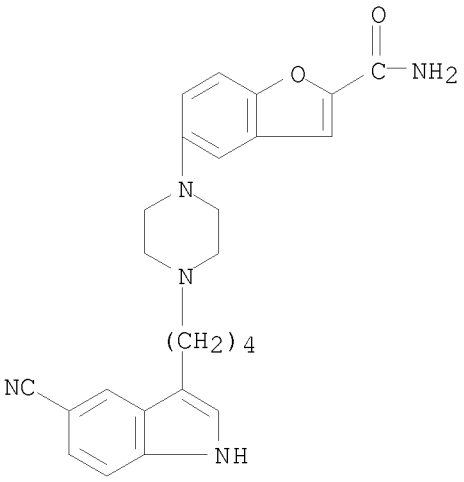
CM 2

CRN 67-64-1
CMF C3 H6 O



1 REFERENCES IN FILE CA (1907 TO DATE)
1 REFERENCES IN FILE CAPLUS (1907 TO DATE)

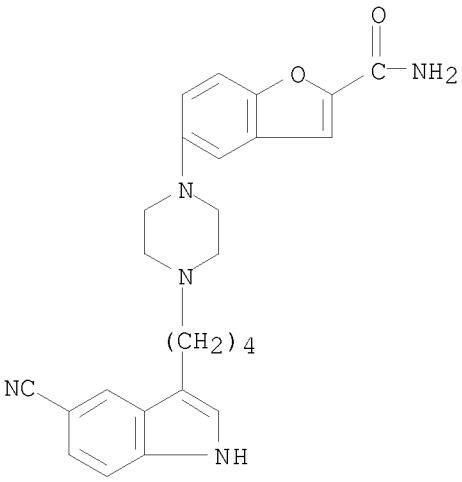
L2 ANSWER 35 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 163521-12-8 REGISTRY
ED Entered STN: 06 Jun 1995
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)
OTHER NAMES:
CN 1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoylbenzofuran-5-yl)piperazine
CN EMD 515259
CN Vilazodone
MF C26 H27 N5 O2
CI COM
SR CA
LC STN Files: ADISINSIGHT, BIOSIS, CA, CAPLUS, CASREACT, CBNB, CHEMCATS, CHEMLIST, CIN, EMBASE, IMSPATENTS, IMSRESEARCH, IPA, TOXCENTER, USAN, USPAT2, USPATFULL



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

103 REFERENCES IN FILE CA (1907 TO DATE)
5 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
104 REFERENCES IN FILE CAPLUS (1907 TO DATE)

L2 ANSWER 36 OF 36 REGISTRY COPYRIGHT 2013 ACS on STN
RN 163521-08-2 REGISTRY
ED Entered STN: 06 Jun 1995
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride (9CI)
OTHER NAMES:
CN EMD 68843
CN SB 659746A
CN Vilazodone hydrochloride
MF C26 H27 N5 O2 . Cl H
CI COM
SR CA
LC STN Files: BIOSIS, CA, CAPLUS, CASREACT, CHEMCATS, CIN, EMBASE, IMSPATENTS, IMSRESEARCH, IPA, RTECS*, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)
CRN (163521-12-8)



● HCl

PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

34 REFERENCES IN FILE CA (1907 TO DATE)
35 REFERENCES IN FILE CAPLUS (1907 TO DATE)

=> d his

(FILE 'HOME' ENTERED AT 14:12:05 ON 02 DEC 2013)

FILE 'REGISTRY' ENTERED AT 14:12:12 ON 02 DEC 2013
L1 STRUCTURE UPLOADED
L2 36 S L1 SSS FULL

=> file capl
COST IN U.S. DOLLARS SINCE FILE ENTRY TOTAL SESSION
FULL ESTIMATED COST 292.56 292.80

FILE 'CAPLUS' ENTERED AT 14:13:09 ON 02 DEC 2013
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

FILE COVERS 1907 - 2 Dec 2013 VOL 159 ISS 24

FILE LAST UPDATED: 1 Dec 2013 (20131201/ED)
REVISED CLASS FIELDS (/NCL) LAST RELOADED: July 2013
USPTO MANUAL OF CLASSIFICATIONS THESAURUS ISSUE DATE: July 2013

CAplus includes complete International Patent Classification (IPC) reclassification data for the fourth quarter of 2013.

CAplus now includes the comprehensive Cooperative Patent Classification (CPC). See HELP CPC for details.

CAS Information Use Policies apply and are available at:

http://www.cas.org/legal/infopolicy

This file contains CAS Registry Numbers for easy and accurate substance identification.

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=> s l2
L3         121 L2

=> s l3 and (crystal or crystalline or polymorph or polymorphic or hydrate or
monohydrate or solvate or solvated or hydrochloride or dihydrochloride)
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        112070 CRYSTALLINE
         13572 POLYMORPH
         71609 POLYMORPHIC
        124325 HYDRATE
         41732 MONOHYDRATE
         14660 SOLVATE
         20562 SOLVATED
        240893 HYDROCHLORIDE
         26378 DIHYDROCHLORIDE
L4           44 L3 AND (CRYSTAL OR CRYSTALLINE OR POLYMORPH OR POLYMORPHIC OR
                HYDRATE OR MONOHYDRATE OR SOLVATE OR SOLVATED OR HYDROCHLORIDE
                OR DIHYDROCHLORIDE)

=> d l4 1-44 ibib hitstr

L4   ANSWER 1 OF 44  CAPLUS  COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER:        2013:1734306  CAPLUS
DOCUMENT NUMBER:         159:674362
TITLE:                   Crystalline forms of vilazodone hydrochloride
INVENTOR(S):             Kaushik, Poonam; Das, Prasenjit; Thaimattam, Ram;
                         Prasad, Mohan; Arora, Sudershan Kumar
PATENT ASSIGNEE(S):      Ranbaxy Laboratories Limited, India
SOURCE:                  PCT Int. Appl., 26pp.
                         CODEN: PIXXD2
DOCUMENT TYPE:           Patent
LANGUAGE:                English
FAMILY ACC. NUM. COUNT:  1
PATENT INFORMATION:

     PATENT NO.          KIND  DATE        APPLICATION NO.          DATE
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     WO 2013164794        A1   20131107    WO 2013-IB53499          20130502
         W:  AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
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             EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS,
             JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY,
             MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
             PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK,
             SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
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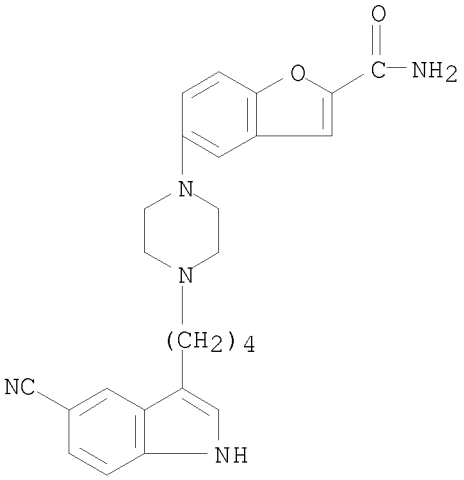
VC, VN, ZA, ZM, ZW
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM
PRIORITY APPLN. INFO.: IN 2012-DE1382 A 20120504
IT 163521-08-2, Vilazodone hydrochloride
RL: PEP (Physical, engineering or chemical process); THU (Therapeutic use); BIOL (Biological study); PROC (Process); USES (Uses)
(crystalline forms of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 2 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1654613 CAPLUS
DOCUMENT NUMBER: 159:596440
TITLE: Process for the preparation of crystalline form of vilazodone hydrochloride
INVENTOR(S): Das, Prasenjit; Srivastava, Bindu; Maheshwari, Nitin; Meeran, Hashim Nizar Poovanathil Nagoor; Prasad, Mohan; Arora, Sudershan Kumar
PATENT ASSIGNEE(S): Ranbaxy Laboratories Limited, India
SOURCE: PCT Int. Appl., 25pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2013156935	A1	20131024	WO 2013-IB53024	20130416

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS,

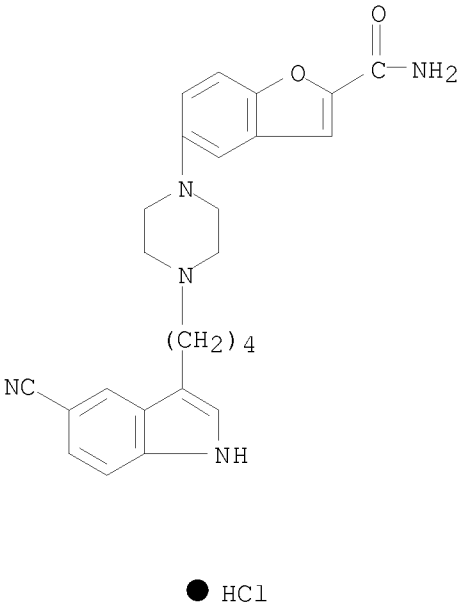
JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY,
MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK,
SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VC, VN, ZA, ZM, ZW
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR,
HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS,
SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML,
MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD,
SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM

PRIORITY APPLN. INFO.: IN 2012-DE1173 A 20120416

IT 163521-08-2P, Vilazodone hydrochloride
RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(process for preparation of crystalline form of vilazodone hydrochloride)

RN 163521-08-2 CAPLUS

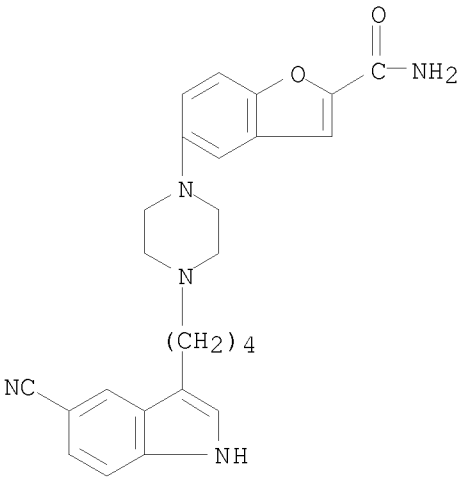
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



IT 163521-12-8, Vilazodone
RL: RCT (Reactant); THU (Therapeutic use); BIOL (Biological study); RACT (Reactant or reagent); USES (Uses)
(process for preparation of crystalline form of vilazodone hydrochloride)

RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



L4 ANSWER 3 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1625268 CAPLUS
DOCUMENT NUMBER: 159:624683
TITLE: A process for the preparation of vilazodone hydrochloride
INVENTOR(S): Jayaraman, Venkat Raman; Rathod, Dhiraj; Vohra, Irfan; Bhujade, Vinayak; Modi, Viral; Gandhi, Ojas; Budh, Mayur
PATENT ASSIGNEE(S): Alembic Pharmaceuticals Limited, India
SOURCE: PCT Int. Appl., 36pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

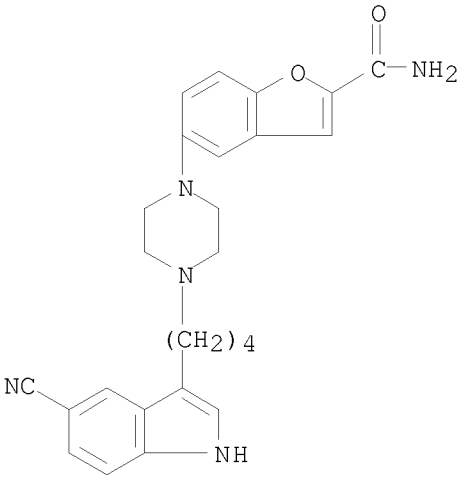
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2013153492	A2	20131017	WO 2013-IB52729	20130405

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

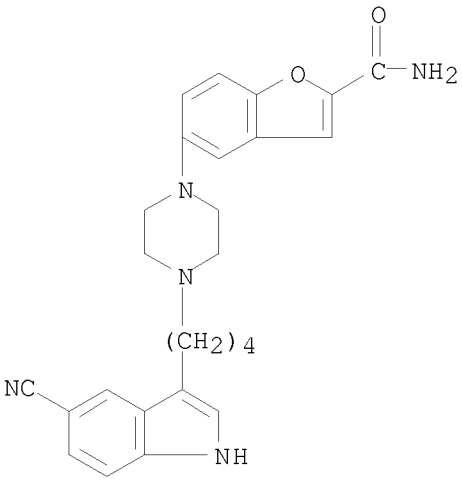
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM

PRIORITY APPLN. INFO.: IN 2012-MU1187 A 20120412
IN 2012-MU1784 A 20120621

IT 163521-12-8P, Vilazodone
RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(a process for the preparation of vilazodone hydrochloride)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P, Vilazodone hydrochloride
RL: SPN (Synthetic preparation); PREP (Preparation)
(a process for the preparation of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 4 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1337156 CAPLUS
DOCUMENT NUMBER: 159:413088
TITLE: Process for preparing vilazodone hydrochloride
INVENTOR(S): Ferrari, Massimo; De Zani, Daniele; Bonaldi, Matteo
PATENT ASSIGNEE(S): Erregierre S.p.A., Italy
SOURCE: U.S. Pat. Appl. Publ., 12pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent

LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20130225818	A1	20130829	US 2013-13855549	20130402
EP 2647625	A1	20131009	EP 2013-161625	20130328

R: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LI, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BA, ME

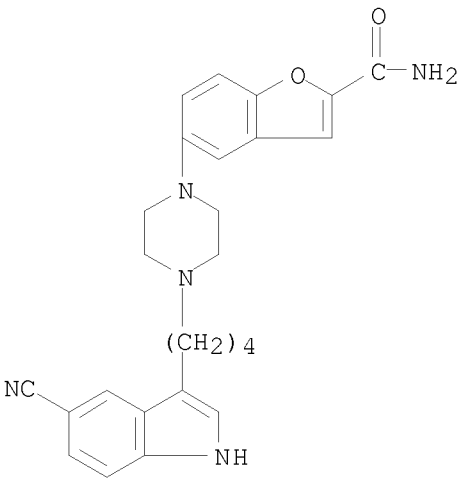
PRIORITY APPLN. INFO.: IT 2012-MI531 A 20120204

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

IT 163521-12-8P, Vilazodone
RL: RCT (Reactant); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
(process for preparing vilazodone hydrochloride)

RN 163521-12-8 CAPLUS

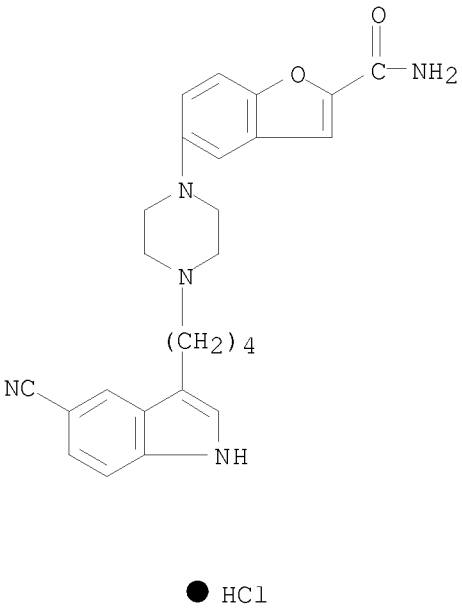
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P, Vilazodone hydrochloride
RL: SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(process for preparing vilazodone hydrochloride)

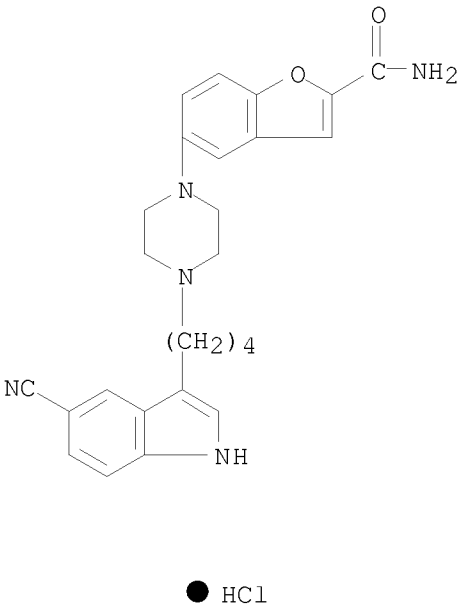
RN 163521-08-2 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 5 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1241287 CAPLUS
DOCUMENT NUMBER: 159:357783
TITLE: Improved method for synthesis of vilazodone hydrochloride
AUTHOR(S): Cheng, Qing-fang; Wang, Qi-fa; Qiu, Feng; Tang, Jian-ping; Liao, Yun-peng
CORPORATE SOURCE: Jiangsu Marine Resources Development Research Institute, Lianyungang, 222001, Peop. Rep. China
SOURCE: Zhongguo Xinyao Zazhi (2013), 22(2), 226-229
CODEN: ZXZHA6; ISSN: 1003-3734
PUBLISHER: Zhongguo Xinyao Zazhi Youxian Gongsi
DOCUMENT TYPE: Journal
LANGUAGE: Chinese
IT 163521-08-2P, Vilazodone hydrochloride
RL: SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(improved method for synthesis of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 6 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1225355 CAPLUS
DOCUMENT NUMBER: 159:348191
TITLE: Process for the preparation of vilazodone or its pharmaceutically acceptable salts
INVENTOR(S): Das, Prasenjit; Srivastava, Bindu; Maheshwari, Nitin; Meeran, Hashim Nizar Poovanathil Nagoor; Prasad, Mohan; Arora, Sudershan Kumar
PATENT ASSIGNEE(S): Ranbaxy Laboratories Limited, India
SOURCE: PCT Int. Appl., 21pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2013114338	A1	20130808	WO 2013-IB50881	20130201

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

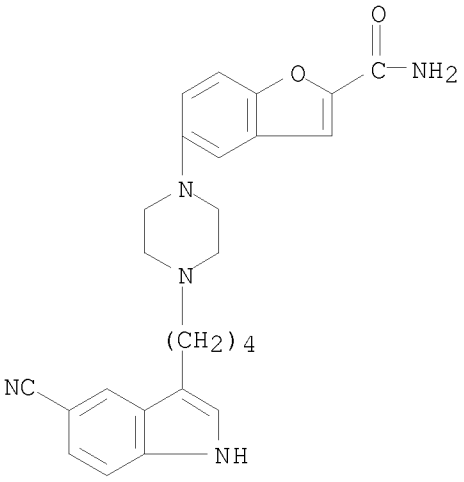
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM

PRIORITY APPLN. INFO.: IN 2012-DE281 A 20120201
OTHER SOURCE(S): CASREACT 159:348191
IT 163521-12-8P, Vilazodone
RL: IMF (Industrial manufacture); PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP

(Preparation); USES (Uses)
(process for the preparation of vilazodone or its pharmaceutically acceptable salts)

RN 163521-12-8 CAPLUS

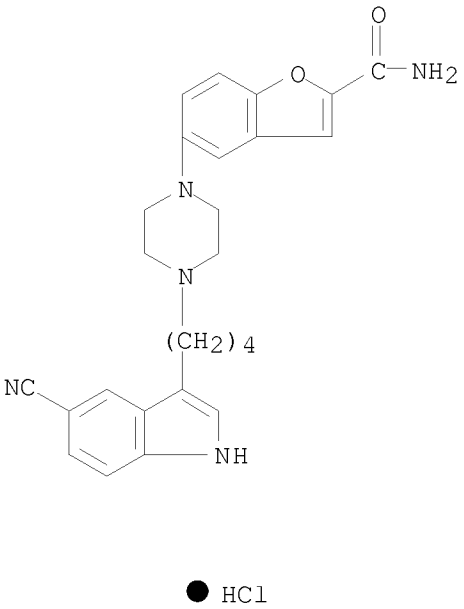
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P, Vilazodone hydrochloride
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(process for the preparation of vilazodone or its pharmaceutically acceptable salts)

RN 163521-08-2 CAPLUS

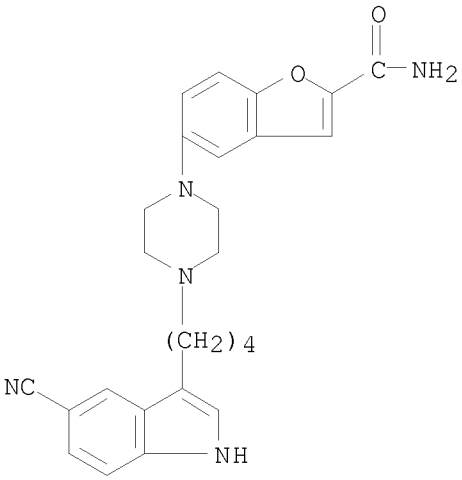
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS

RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 7 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1183264 CAPLUS
TITLE: Electrophysiological evidence for rapid 5-HT1A autoreceptor inhibition by vilazodone, a 5-HT1A receptor partial agonist and 5-HT reuptake inhibitor
AUTHOR(S): Ashby, Charles R.; Kehne, John H.; Bartoszyk, Gerd D.; Renda, Matthew J.; Athanasiou, Maria; Pierz, Kerri A.; Seyfried, Christoph A.
CORPORATE SOURCE: Department of Pharmaceutical Sciences, College of Pharmacy and Allied Health Professions, St. John's University, Queens, NY, 11439, USA
SOURCE: European Journal of Pharmacology (2013), 714(1-3), 359-365
CODEN: EJPHAZ; ISSN: 0014-2999
PUBLISHER: Elsevier B.V.
DOCUMENT TYPE: Journal; (online computer file)
LANGUAGE: English
IT INDEXING IN PROGRESS
IT 163521-08-2, Vilazodone hydrochloride
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(combined SSRI and serotonin type 1A receptor partial agonist vilazodone hydrochloride, citalopram hydrobromide, sertraline-, paroxetine- and fluoxetine-hydrochloride variedly inhibited PCA-induced serotonin depletion in brain of rat model)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



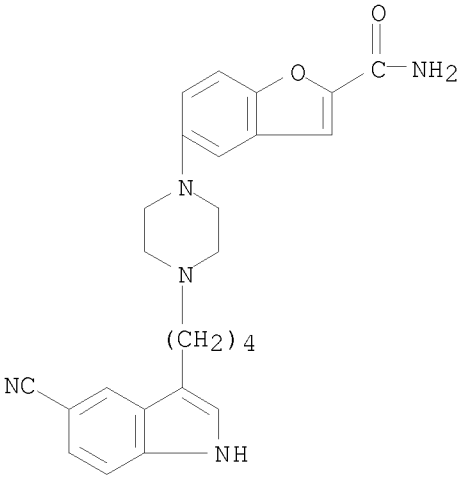
REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 8 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1151773 CAPLUS
DOCUMENT NUMBER: 159:279781
TITLE: Vilazodone containing pharmaceutical composition and

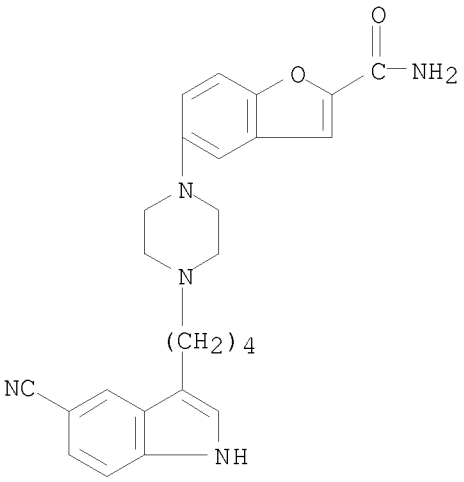
its preparation method
INVENTOR(S): Wang, Qiqi; Huang, Xue; Ren, Guangzhi; Meng, Min
PATENT ASSIGNEE(S): Beijing Wanquan Dezhong Pharmaceutical Biotechnology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 5pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 103211751	A	20130724	CN 2013-10107660	20130330
PRIORITY APPLN. INFO.:			CN 2013-10107660	20130330

IT 163521-12-8, Vilazodone
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone containing pharmaceutical composition and its preparation method)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

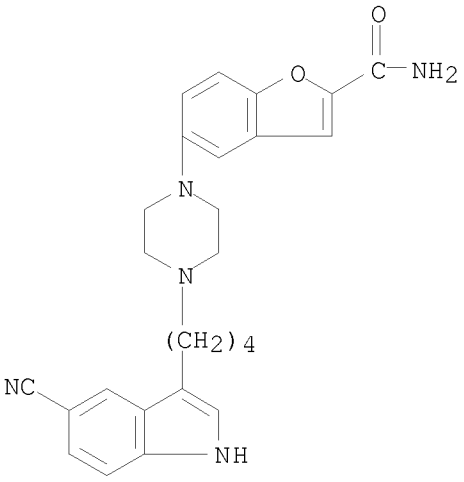


IT 163521-08-2, Vilazodone hydrochloride
RL: PKT (Pharmacokinetics); PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone containing pharmaceutical composition and its preparation method)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



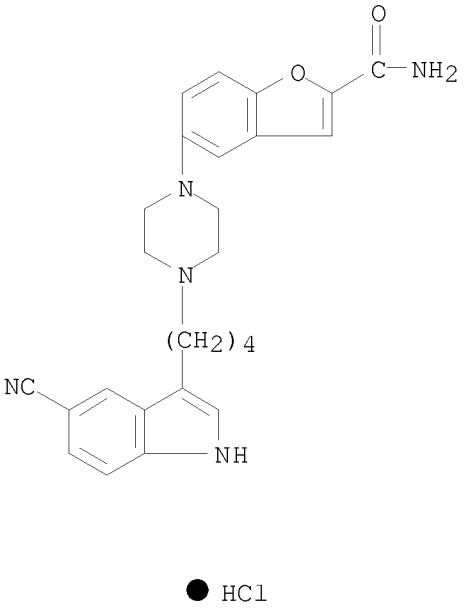
● HCl

IT 163521-12-8D, Vilazodone, salts
RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone containing pharmaceutical composition and its preparation method)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



L4 ANSWER 9 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:1054813 CAPLUS
DOCUMENT NUMBER: 159:282370
TITLE: Pharmacological effect and clinical research of vilazodone hydrochloride
AUTHOR(S): Guo, Zhi; Wang, Dan; Liu, Ting-li; Xue, Ye; Song, Dong-mei
CORPORATE SOURCE: Affiliated Hospital, Inner Mongolia Medical College, Hohhot, Inner Mongolia Province, 010050, Peop. Rep.

China
SOURCE: Zhongnan Yaoxue (2013), 11(3), 219-221
CODEN: ZYHAC6; ISSN: 1672-2981
PUBLISHER: Zhongnan Yaoxue Zazhishe
DOCUMENT TYPE: Journal; General Review
LANGUAGE: Chinese
IT 163521-08-2, Vilazodone hydrochloride
RL: PAC (Pharmacological activity); PKT (Pharmacokinetics); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(pharmacol. effect and clin. research of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



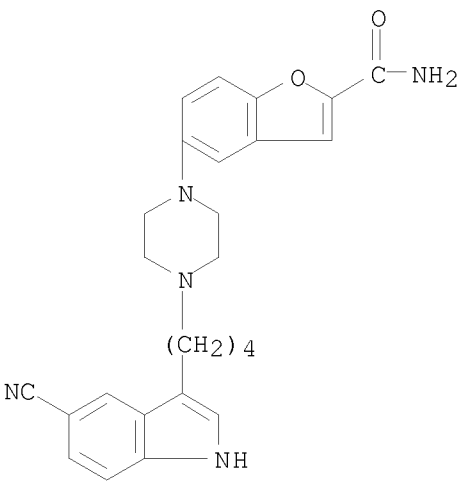
● HCl

L4 ANSWER 10 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:970547 CAPLUS
DOCUMENT NUMBER: 159:166047
TITLE: Method for synthesis of antidepressant Vilazodone
INVENTOR(S): Ge, Min
PATENT ASSIGNEE(S): Nanjing Youjie Pharmatech Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 9pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 103159749	A	20130619	CN 2011-10416975	20111213

PRIORITY APPLN. INFO.: CN 2011-10416975 20111213
IT 163521-12-8P, Vilazodone
RL: SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(process for preparation of antidepressant Vilazodone)
RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



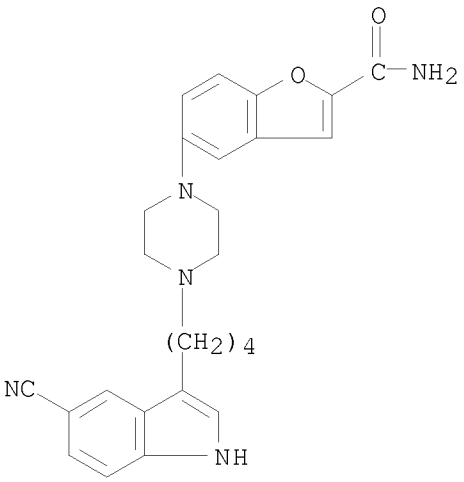
L4 ANSWER 11 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:963562 CAPLUS
DOCUMENT NUMBER: 159:110075
TITLE: Amorphous vilazodone hydrochloride, a process for its preparation and pharmaceutical compositions thereof
INVENTOR(S): Kaushik, Poonam; Thaimattam, Ram; Prasad, Mohan; Arora, Sudershan Kumar
PATENT ASSIGNEE(S): Ranbaxy Laboratories Limited, India
SOURCE: PCT Int. Appl., 18pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2013088373	A1	20130620	WO 2012-IB57247	20121212

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM

PRIORITY APPLN. INFO.: IN 2011-DE3608 A 20111212
IT 163521-08-2, Vilazodone hydrochloride
RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(preparation and compns. of amorphous vilazodone HCl for treating or preventing major depressive disorder)

RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 12 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:830085 CAPLUS
DOCUMENT NUMBER: 159:30772
TITLE: Solid state forms of vilazodone and vilazodone hydrochloride
INVENTOR(S): Leksic, Edislav; Pavlicic, Dubravka; Skalec Samec, Dijana; Dogan, Jasna; Mrsic, Natasa
PATENT ASSIGNEE(S): Assia Chemical Industries Ltd., Israel; Teva Pharmaceuticals USA, Inc.
SOURCE: PCT Int. Appl., 96pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

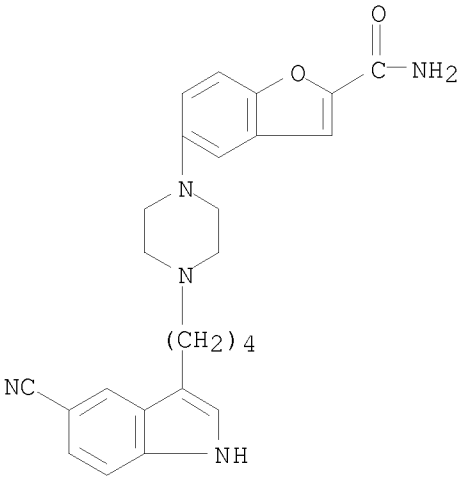
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2013078361	A1	20130530	WO 2012-US66324	20121121

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

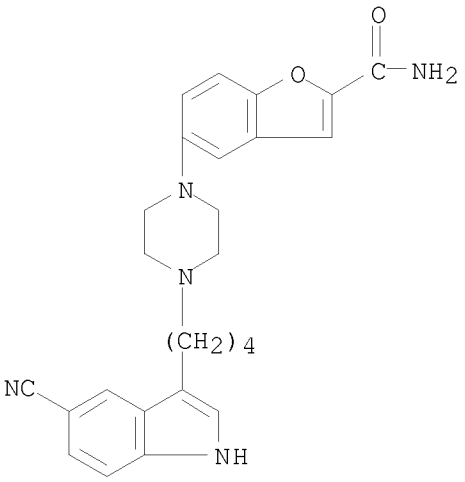
RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD,

SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, RU, TJ, TM
PRIORITY APPLN. INFO.: US 2011-61563150 P 20111123
US 2012-61583368 P 20120105
US 2012-61584499 P 20120109
US 2012-61590412 P 20120125
US 2012-61637416 P 20120424
US 2012-61651221 P 20120524
US 2012-61653778 P 20120531
US 2012-61670895 P 20120712
US 2012-61717351 P 20121023

IT 163521-12-8P, Vilazodone
RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(solid state forms of vilazodone and vilazodone hydrochloride
)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

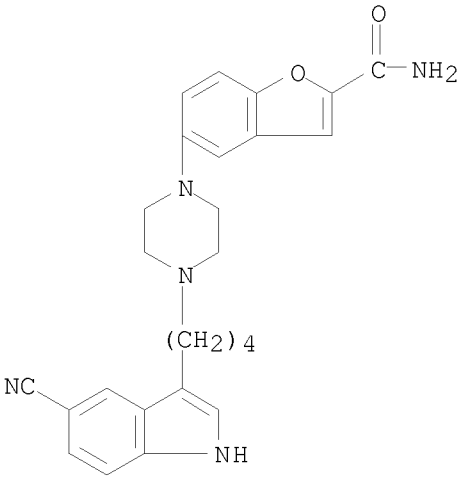


IT 163521-08-2, Vilazodone hydrochloride
163521-12-8D, Vilazodone, salts
RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(solid state forms of vilazodone and vilazodone hydrochloride
)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

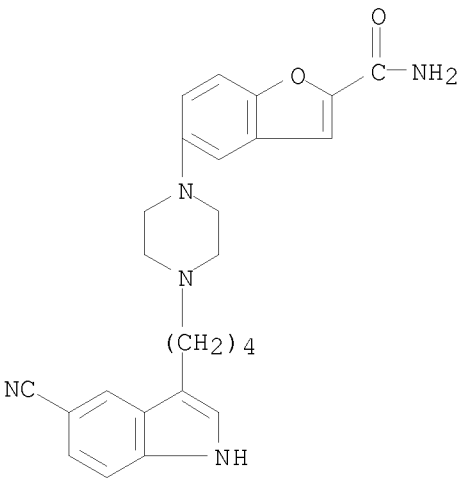
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 13 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:740259 CAPLUS
DOCUMENT NUMBER: 159:221109
TITLE: Synthesis of vilazodone hydrochloride
AUTHOR(S): Wang, Qifa; Cheng, Qingfang; Chen, Na; Zheng, Guochuang; Shuai, Mei
CORPORATE SOURCE: Jiangsu Marine Resources Development Research Institute, Lianyungang, Jiangsu Province, 222001, Peop. Rep. China
SOURCE: Zhongguo Yiyao Gongye Zazhi (2013), 44(1), 3-5, 12
CODEN: ZYGZEA; ISSN: 1001-8255

PUBLISHER: Zhongguo Yiyao Gongye Zazhi Bianjibu
DOCUMENT TYPE: Journal
LANGUAGE: Chinese
IT 163521-08-2P, Vilazodone hydrochloride
RL: SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(synthesis of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



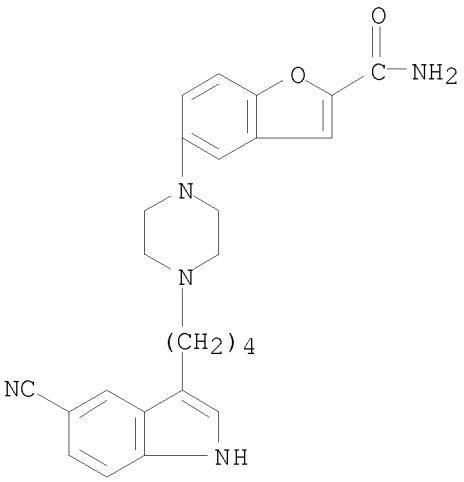
● HCl

L4 ANSWER 14 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:442123 CAPLUS
DOCUMENT NUMBER: 158:485086
TITLE: New 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamyl-benzofuran-5-yl)-piperazine hydrochloride crystal form x vii and its preparation
INVENTOR(S): Zou, Qiaogen; Ge, Min; Lan, Gongjian; Zhou, Huihong
PATENT ASSIGNEE(S): Nanjing Healthnice Medical Technology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 9pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102977083	A	20130320	CN 2012-10544322	20121217

PRIORITY APPLN. INFO.: CN 2012-10544322 20121217
IT 163521-08-2P
RL: PUR (Purification or recovery); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(new 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamyl-benzofuran-5-yl)-piperazine hydrochloride crystal form x vii and its preparation)

RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)

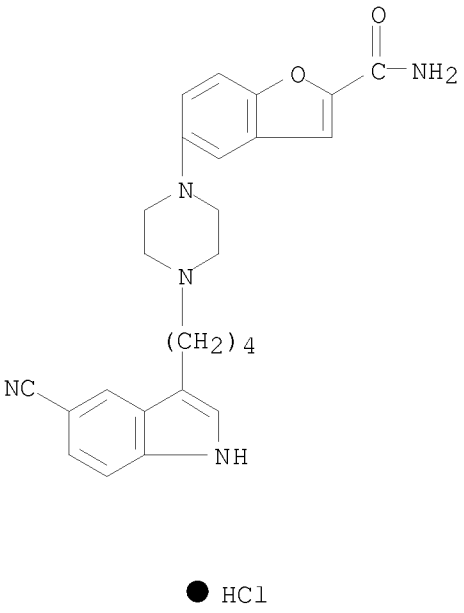


● HCl

L4 ANSWER 15 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:364799 CAPLUS
DOCUMENT NUMBER: 158:428633
TITLE: Sustained-release tablet of vilazodone hydrochloride
INVENTOR(S): Wang, Bo; Li, Hongqi; Ren, Xiaowen; Lian, Xiaoyan
PATENT ASSIGNEE(S): Tianjin Institute of Pharmaceutical Research, Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 11pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102949364	A	20130306	CN 2011-10251108	20110830

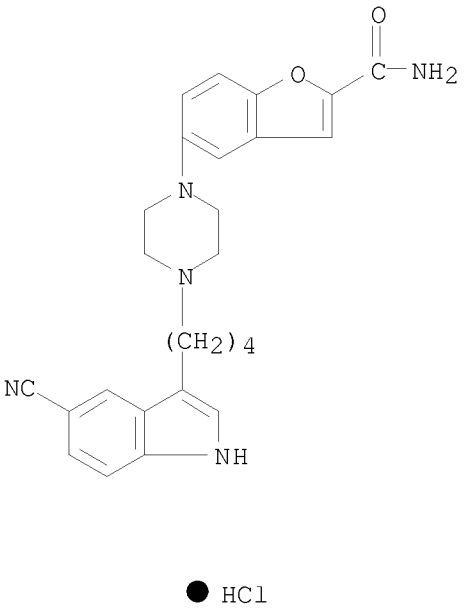
PRIORITY APPLN. INFO.: CN 2011-10251108 20110830
IT 163521-08-2, Vilazodone hydrochloride
RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(sustained-release tablet of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



L4 ANSWER 16 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:177615 CAPLUS
DOCUMENT NUMBER: 158:272823
TITLE: A process for preparing intermediates of vilazodone hydrochloride
INVENTOR(S): Liu, Fenggang
PATENT ASSIGNEE(S): Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 15pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102898346	A	20130130	CN 2012-10086935	20120328

PRIORITY APPLN. INFO.: CN 2012-10086935 20120328
OTHER SOURCE(S): MARPAT 158:272823
IT 163521-08-2P, Vilazodone hydrochloride
RL: IMF (Industrial manufacture); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(preparation of intermediates of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)

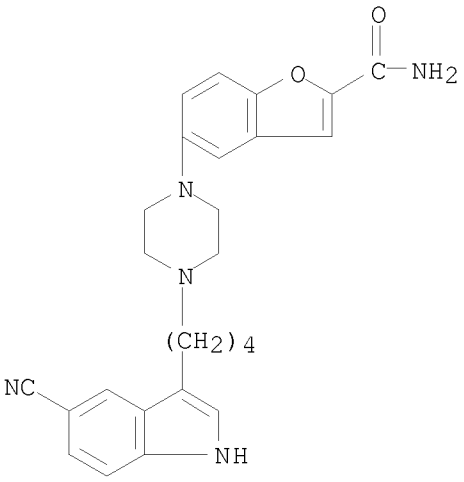


● HCl

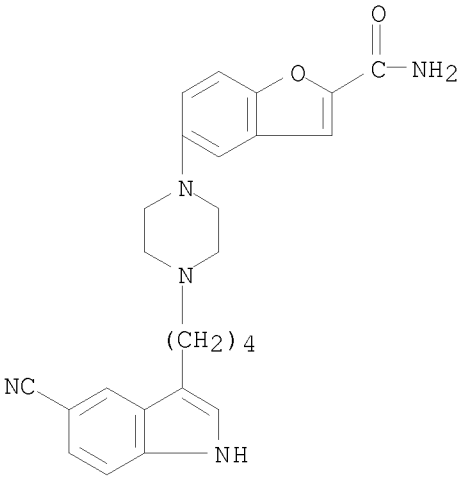
L4 ANSWER 17 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:102676 CAPLUS
DOCUMENT NUMBER: 158:216024
TITLE: Process for preparation of Vilazodone and its hydrochloride
INVENTOR(S): Li, Xiuping; Si, Chengtao
PATENT ASSIGNEE(S): Beijing Chengchuang Sida Pharmaceutical Science and Technology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 11pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102875538	A	20130116	CN 2012-10392499	20121016

PRIORITY APPLN. INFO.: CN 2012-10392499 20121016
IT 163521-12-8P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(process for preparation of Vilazodone and its hydrochloride)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P
RL: SPN (Synthetic preparation); PREP (Preparation)
(process for preparation of Vilazodone and its hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 18 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2013:63827 CAPLUS
DOCUMENT NUMBER: 158:177508
TITLE: Vilazodone hydrochloride compound preparation for treating severe depression
INVENTOR(S): Zhang, Li; Zhao, Enqia
PATENT ASSIGNEE(S): Beijing Chengchuang Sida Pharmaceutical Science and Technology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 5pp.
CODEN: CNXXEV

DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

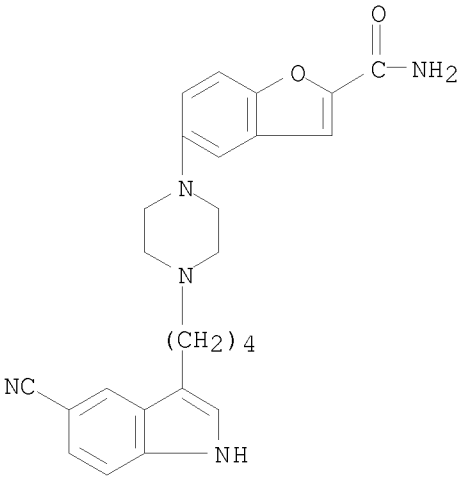
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102861022	A	20130109	CN 2012-10391287	20121016

PRIORITY APPLN. INFO.: CN 2012-10391287 20121016

IT 163521-08-2, Vilazodone hydrochloride
RL: ADV (Adverse effect, including toxicity); PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone hydrochloride compound preparation for treating severe depression)

RN 163521-08-2 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

L4 ANSWER 19 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN

ACCESSION NUMBER: 2013:62078 CAPLUS

DOCUMENT NUMBER: 158:197263

TITLE: Vilazodone hydrochloride rapid-release tablet and preparation method thereof

INVENTOR(S): Zhang, Li; Huo, Lili

PATENT ASSIGNEE(S): Beijing Chengchuang Sida Pharmaceutical Science and Technology Co., Ltd., Peop. Rep. China

SOURCE: Faming Zhuanli Shenqing, 8pp.
CODEN: CNXXEV

DOCUMENT TYPE: Patent

LANGUAGE: Chinese

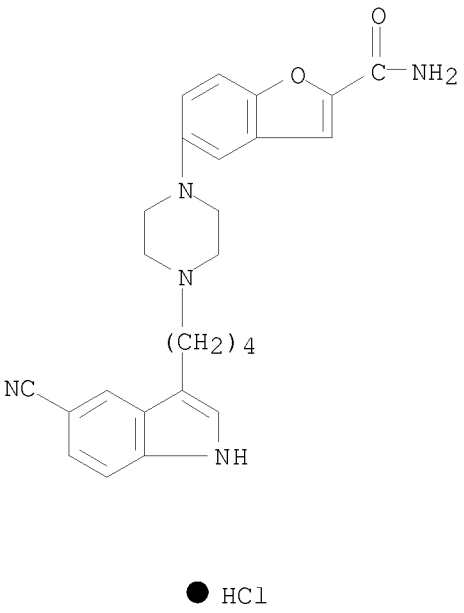
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

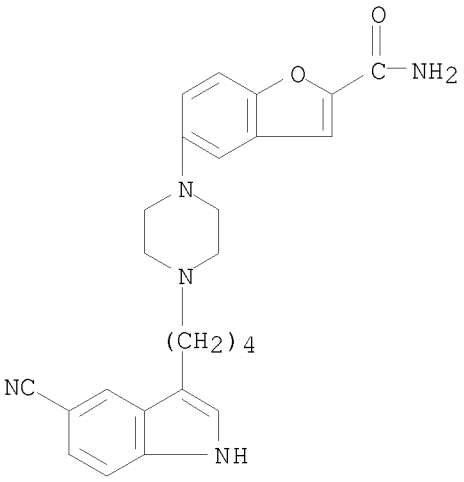
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102860993	A	20130109	CN 2012-10391649	20121016

PRIORITY APPLN. INFO.: CN 2012-10391649 20121016

IT 163521-08-2, Vilazodone hydrochloride
RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone hydrochloride rapid-release tablet for treating depression and manufacture method thereof)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



L4 ANSWER 20 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1467993 CAPLUS
DOCUMENT NUMBER: 158:600970
TITLE: Vilazodone: a novel antidepressant
AUTHOR(S): Choi, Elizabeth; Zmarlicka, Monika; Ehret, Megan J.
CORPORATE SOURCE: Northport Veterans Affairs Medical Center, Northport, NY, USA
SOURCE: American Journal of Health-System Pharmacy (2012), 69(18), 1551-1557
CODEN: AHSPEK; ISSN: 1079-2082
PUBLISHER: American Society of Health-System Pharmacists
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
IT 163521-12-8, Vilazodone
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(pharmacol. arid pharmacokinetics of antidepressant vilazodone for treatment of major depressive disorder)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

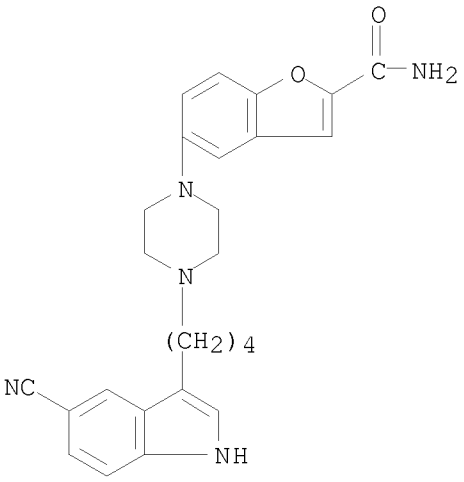


OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)
REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 21 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1465188 CAPLUS
DOCUMENT NUMBER: 157:615530
TITLE: Eutectics of vilazodone and saccharin and its preparation method
INVENTOR(S): Zhang, Ting; Zhao, Xiaojun; Luo, Yanan; Liu, Lei; Han, Bing; Su, Hongmin; Jia, Jiangtao
PATENT ASSIGNEE(S): Jilin Sanshanen Science and Technology Development Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 7pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102702180	A	20121003	CN 2012-10166749	20120525

PRIORITY APPLN. INFO.: CN 2012-10166749 20120525
IT 163521-12-8, Vilazodone
RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(eutectics of vilazodone and saccharin and its preparation method)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



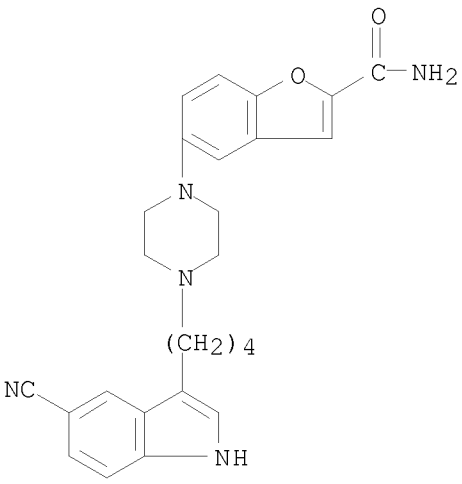
L4 ANSWER 22 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1438901 CAPLUS
DOCUMENT NUMBER: 157:558519
TITLE: Preparation of amorphous form of vilazodone hydrochloride
INVENTOR(S): Dwived, Shriprakash Dhar; Singh, Ramesh Chandra; Raval, Jigar Mukundbhai
PATENT ASSIGNEE(S): Cadila Healthcare Limited, India
SOURCE: PCT Int. Appl., 23pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2012131706	A1	20121004	WO 2012-IN182	20120316

W: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

RW: AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRIORITY APPLN. INFO.: IN 2011-MU167 A 20110320
IT 163521-08-2, Vilazodone hydrochloride
RL: PRP (Properties); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(preparation of amorphous form of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



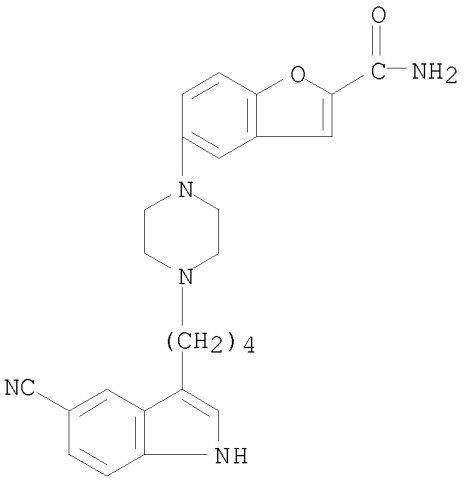
● HCl

OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)
REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

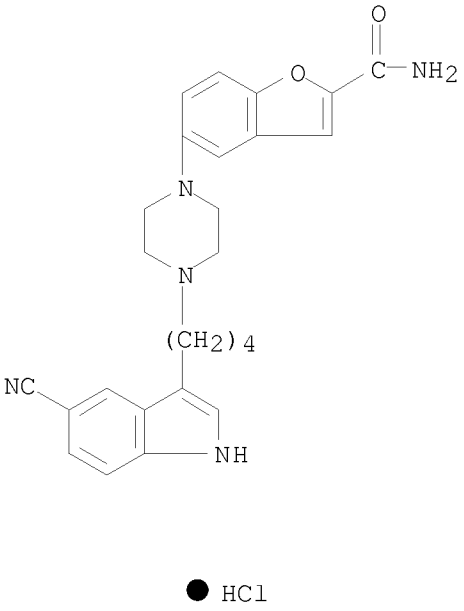
L4 ANSWER 23 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1344400 CAPLUS
DOCUMENT NUMBER: 157:438145
TITLE: A process for preparing 3-(4-chlorobutyl)-1H-indole-5-carbonitrile as intermediate for manufacturing vilazodone hydrochloride
INVENTOR(S): Chen, Hongxiang; Cai, Liefeng; Zhou, Junlin; Hong, Meilin; Liu, Yan
PATENT ASSIGNEE(S): Hangzhou Heze Pharmaceutical Technology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 12pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102659660	A	20120912	CN 2012-10144271	20120511
PRIORITY APPLN. INFO.:			CN 2012-10144271	20120511

IT 163521-12-8P, Vilazodone
RL: IMF (Industrial manufacture); RCT (Reactant); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)
(preparation of vilazodone hydrochloride and its intermediates)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

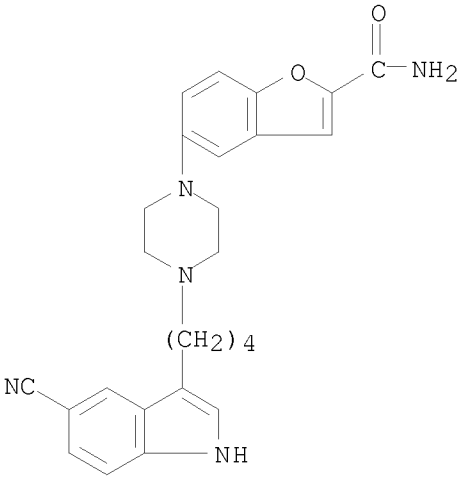


IT 163521-08-2P, Vilazodone hydrochloride
RL: IMF (Industrial manufacture); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(preparation of vilazodone hydrochloride and its intermediates)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



L4 ANSWER 24 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1282306 CAPLUS
DOCUMENT NUMBER: 157:465531
TITLE: Scale-Up Synthesis of Antidepressant Drug Vilazodone
AUTHOR(S): Hu, Bin; Song, Qiao; Xu, Yungen
CORPORATE SOURCE: Department of Medicinal Chemistry, China Pharmaceutical University, Nanjing, 210009, Peop. Rep. China

SOURCE: Organic Process Research & Development (2012), 16(9), 1552-1557
CODEN: OPRDFK; ISSN: 1083-6160
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal; (online computer file)
LANGUAGE: English
OTHER SOURCE(S): CASREACT 157:465531
IT 163521-12-8P, Vilazodone
RL: SPN (Synthetic preparation); PREP (Preparation)
(scale-up synthesis of antidepressant drug vilazodone)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



REFERENCE COUNT: 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 25 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2012:1051419 CAPLUS
DOCUMENT NUMBER: 157:250734
TITLE: Novel composition for treating metabolic syndrome and other conditions
INVENTOR(S): Chen, Chien-Hung
PATENT ASSIGNEE(S): USA
SOURCE: U.S. Pat. Appl. Publ., 36pp., Cont.-in-part of U.S. Ser. No. 14,932.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

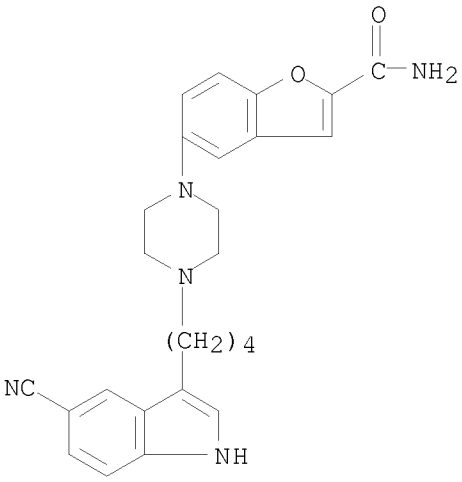
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20120183600	A1	20120719	US 2012-13343634	20120104
US 20080176822	A1	20080724	US 2008-14932	20080116
US 8431552	B2	20130430		
EP 2494967	A1	20120905	EP 2012-170283	20080116
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LI, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR				

PRIORITY APPLN. INFO.: US 2007-60885212 P 20070116
US 2008-14932 A2 20080116
EP 2008-727718 A3 20080116

IT 163521-12-8, Vilazodone
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(composition for treating metabolic syndrome and other conditions)

RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



L4 ANSWER 26 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN

ACCESSION NUMBER: 2011:1593752 CAPLUS

DOCUMENT NUMBER: 156:13746

TITLE: Method for preparing vilazodone or its hydrochloride

INVENTOR(S): Li, Jianqi; Wang, Guan; Wang, Chao; Huang, Lei

PATENT ASSIGNEE(S): Shanghai Institute of Pharmaceutical Industry, Peop. Rep. China

SOURCE: Faming Zhuanli Shenqing, 11pp.
CODEN: CNXXEV

DOCUMENT TYPE: Patent

LANGUAGE: Chinese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102267985	A	20111207	CN 2011-10161249	20110615

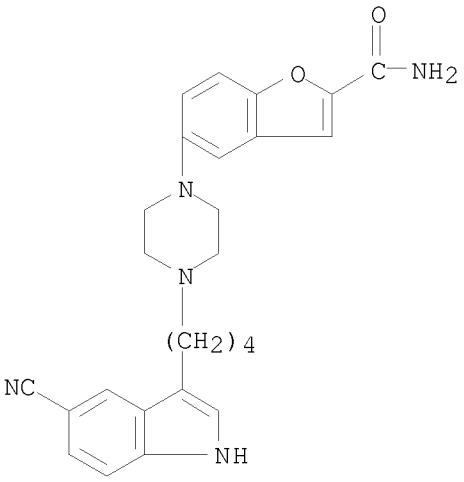
PRIORITY APPLN. INFO.: CN 2011-10161249 20110615

OTHER SOURCE(S): CASREACT 156:13746

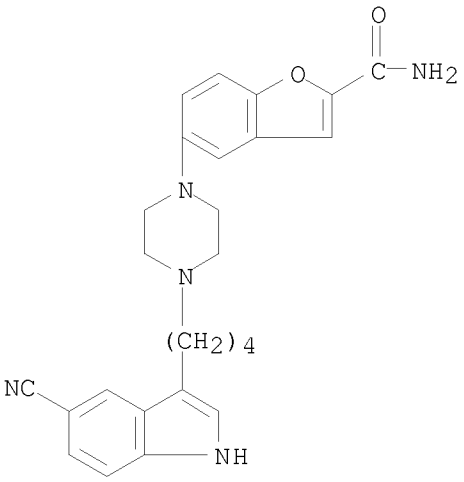
IT 163521-12-8P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(method for preparing vilazodone or its hydrochloride)

RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P
RL: IMF (Industrial manufacture); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(method for preparing vilazodone or its hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



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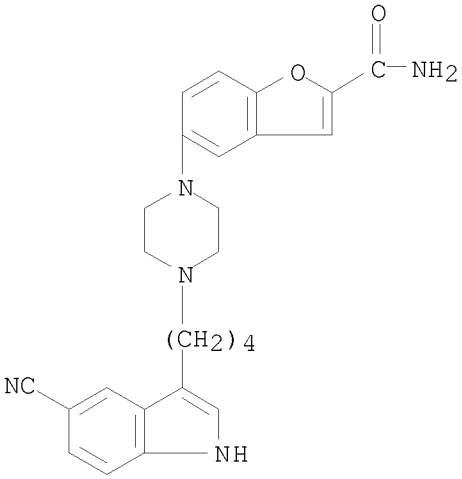
OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

L4 ANSWER 27 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2011:1347857 CAPLUS
DOCUMENT NUMBER: 155:599045
TITLE: Novel crystal form of vilazodone dihydrochloride with high solubility and its pharmaceutical composition
INVENTOR(S): Yan, Jie; Huang, Xin

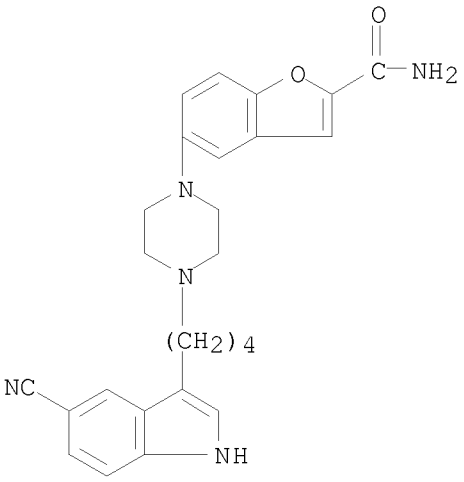
PATENT ASSIGNEE(S): Tianjin Hankang Pharmaceutical Biotechnology Co., Ltd., Peop. Rep. China
SOURCE: Faming Zhuanli Shenqing, 9pp.
CODEN: CNXXEV
DOCUMENT TYPE: Patent
LANGUAGE: Chinese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CN 102219783	A	20111019	CN 2011-10114656	20110505
CN 102219783	B	20130703		
PRIORITY APPLN. INFO.:			CN 2011-10114656	20110505

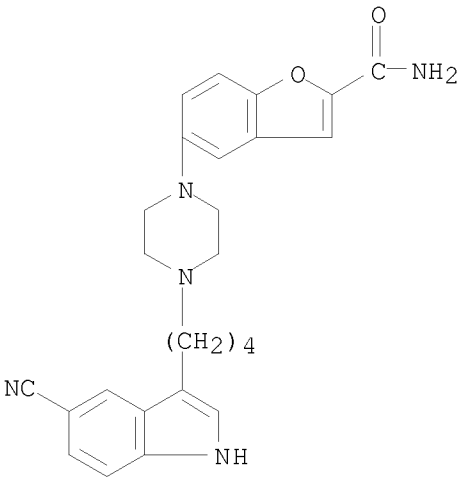
IT 163521-12-8DP, Vilazodone, dihydrochloride salt
RL: IMF (Industrial manufacture); PAC (Pharmacological activity); PRP (Properties); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(novel crystal form of vilazodone dihydrochloride with high solubility and its pharmaceutical composition)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-12-8, Vilazodone
RL: RCT (Reactant); RACT (Reactant or reagent)
(novel crystal form of vilazodone dihydrochloride with high solubility and its pharmaceutical composition)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



L4 ANSWER 28 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2011:1309382 CAPLUS
DOCUMENT NUMBER: 155:526435
TITLE: ACS Chemical Neuroscience Molecule Spotlight on Viibryd (Vilazodone)
AUTHOR(S): Hopkins, Corey R.
CORPORATE SOURCE: Department of Pharmacology and Chemistry and Vanderbilt Center for Neuroscience Drug Discovery, Vanderbilt University Medical Center, Vanderbilt University, Nashville, TN, 37232-6600, USA
SOURCE: ACS Chemical Neuroscience (2011), 2(10), 554
CODEN: ACNCDM; ISSN: 1948-7193
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal; General Review; (online computer file)
LANGUAGE: English
IT 163521-08-2, Vilazodone hydrochloride
RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(viibryd (vilazodone hydrochloride))
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



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REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

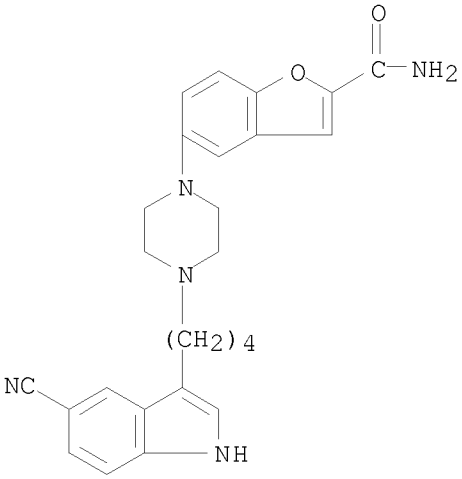
L4 ANSWER 29 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2011:235982 CAPLUS
DOCUMENT NUMBER: 154:251151
TITLE: Novel use of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine and its physiologically acceptable salts
INVENTOR(S): Bartoszyk, Gerd; Seyfried, Christoph; Van Amsterdam, Christoph; Boettcher, Henning; Sedman, Ewen
PATENT ASSIGNEE(S): Merck Patent Gesellschaft Mit Beschraenkter Haftung, Germany
SOURCE: Can., 40pp.
CODEN: CAXXA4
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
CA 2615271	C	20110215	CA 2000-2615271	20000516
CA 2615271	A1	20001207		
CA 2372668	A1	20001207	CA 2000-2372668	20000516
CA 2372668	C	20091103		
CA 2694866	A1	20001207	CA 2000-2694866	20000516
EP 1410800	A1	20040421	EP 2004-1441	20000516
EP 1410800	B1	20060823		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, CY				
CN 1679577	A	20051012	CN 2005-10054417	20000516
EP 1736158	A2	20061227	EP 2006-17231	20000516
EP 1736158	A3	20070103		
EP 1736158	B1	20090805		
R: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LI, LU, MC, NL, PT, SE, LT, LV, RO, SI				
CN 101869565	A	20101027	CN 2009-10113677	20000516

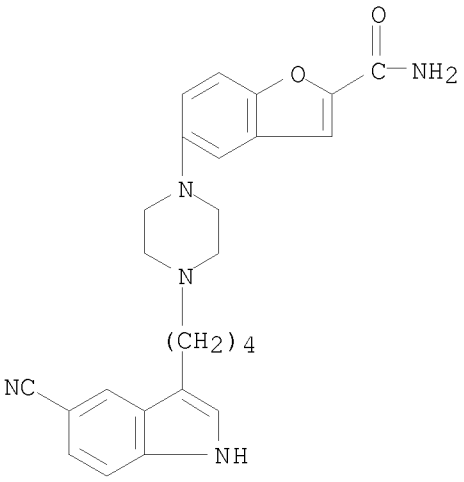
US 20080119484	A1	20080522	US 2007-946149		20071128
US 7642261	B2	20100105			
JP 2011148799	A	20110804	JP 2011-27903		20110210
PRIORITY APPLN. INFO.:			EP 1999-109295	A	19990527
			CA 2000-2372668	A3	20000516
			CA 2000-2615271	A3	20000516
			CN 2000-808135	A3	20000516
			EP 2000-935031	A3	20000516
			EP 2004-1441	A3	20000516
			JP 2000-620944	A3	20000516
			WO 2000-EP4376	W	20000516
			US 2002-979922	A3	20020408
			US 2004-994226	A3	20041123

IT 163521-12-8 163521-12-8D, salts
1266397-95-8, 1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(novel use of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine and physiol. acceptable salts)

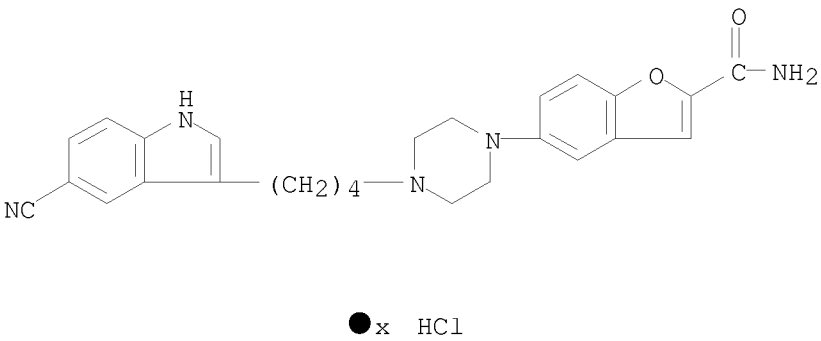
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



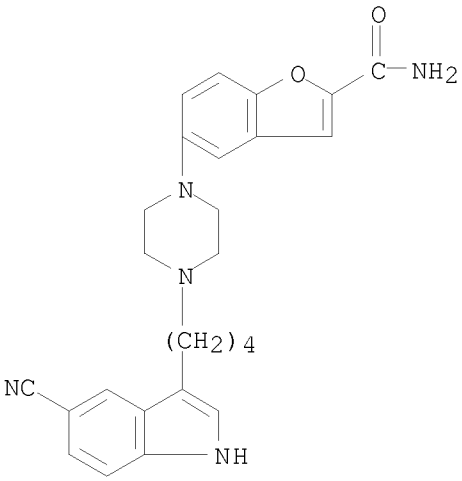
RN 1266397-95-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:?) (CA INDEX NAME)



L4 ANSWER 30 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2010:1127861 CAPLUS
DOCUMENT NUMBER: 153:440825
TITLE: Surface topographies for non-toxic bioadhesion control
INVENTOR(S): Brennan, Anthony B.; Long, Christopher James; Bagan, Joseph W.; Schumacher, James Frederick; Spiecker, Mark M.
PATENT ASSIGNEE(S): University of Florida, USA
SOURCE: U.S. Pat. Appl. Publ., 64pp., Cont.-in-part of U.S. Ser. No. 567,103.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 3
PATENT INFORMATION:

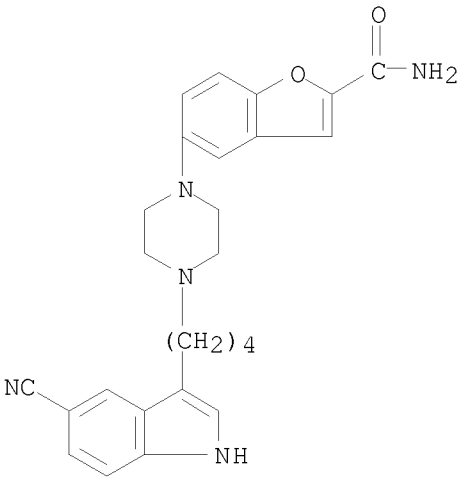
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20100226943	A1	20100909	US 2009-550870	20090831
US 20050178286	A1	20050818	US 2004-780424	20040217
US 7650848	B2	20100126	US 2006-567103	20061205
PRIORITY APPLN. INFO.:			US 2004-780424 A2	20040217

US 2005-202532 A2 20050812
US 2006-567103 A2 20061205
ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT
IT 163521-12-8, Vilazodone
RL: PRP (Properties); TEM (Technical or engineered material use); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(Surface topogs. for non-toxic bioadhesion control)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)

L4 ANSWER 31 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2009:688112 CAPLUS
DOCUMENT NUMBER: 152:25799
TITLE: Vilazodone: A 5-HT1A receptor agonist/serotonin transporter inhibitor for the treatment of affective disorders
AUTHOR(S): Dawson, Lee A.; Watson, Jeannette M.
CORPORATE SOURCE: Neurosciences Centre of Excellence for Drug Discovery, GlaxoSmithKline, Harlow, Essex, UK
SOURCE: CNS Neuroscience & Therapeutics (2009), 15(2), 107-117
CODEN: CNTNAB; ISSN: 1755-5930
PUBLISHER: Wiley-Blackwell
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
IT 163521-12-8, Vilazodone
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(vilazodone enhanced serotonergic output in prefrontal cortex, reduced anxiety in rat and was effective in patient with depression)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 25 THERE ARE 25 CAPLUS RECORDS THAT CITE THIS RECORD (25 CITINGS)
REFERENCE COUNT: 84 THERE ARE 84 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 32 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2007:999483 CAPLUS
DOCUMENT NUMBER: 147:357201
TITLE: Methods for regulating neurotransmitter systems by inducing counteradaptations
INVENTOR(S): Michalow, Alexander
PATENT ASSIGNEE(S): USA
SOURCE: PCT Int. Appl., 136pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 3
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2007100775	A2	20070907	WO 2007-US4959	20070227
WO 2007100775	A3	20081127		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW				
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AP, EA, EP, OA				
AU 2007221135	A1	20070907	AU 2007-221135	20070227
CA 2643802	A1	20070907	CA 2007-2643802	20070227
EP 2001495	A2	20081217	EP 2007-751698	20070227
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, AL, BA, HR, MK, RS				
JP 2009528289	T	20090806	JP 2008-556468	20070227

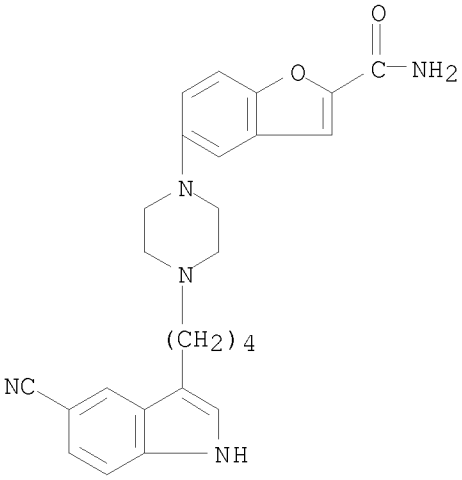
IN 2008KN03610	A	20090220	IN 2008-KN3610		20080903
CN 101432011	A	20090513	CN 2007-80015117		20081027
PRIORITY APPLN. INFO.:			US 2006-60777190	P	20060227
			US 2006-60858186	P	20061109
			WO 2007-US4959	W	20070227

OTHER SOURCE(S): MARPAT 147:357201

IT 163521-12-8, EMD-68843
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(neurotransmitter system regulation by induction of counteradaptation response)

RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2 CITINGS)

L4 ANSWER 33 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN

ACCESSION NUMBER: 2006:301807 CAPLUS

DOCUMENT NUMBER: 144:343618

TITLE: Methods for regulating neurotransmitter systems by inducing counteradaptations

INVENTOR(S): Michalow, Alexander

PATENT ASSIGNEE(S): USA

SOURCE: PCT Int. Appl., 97 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

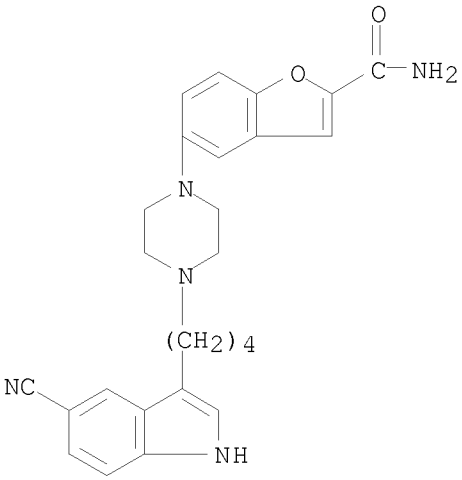
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006034343	A2	20060330	WO 2005-US33826	20050923
WO 2006034343	A3	20061005		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN,

YU, ZA, ZM, ZW
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

AU 2005286733	A1	20060330	AU 2005-286733		20050923
AU 2005286733	B2	20091105			
CA 2580694	A1	20060330	CA 2005-2580694		20050923
EP 1809104	A2	20070725	EP 2005-800810		20050923
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR					
CN 101065014	A	20071031	CN 2005-80040206		20050923
JP 2008514612	T	20080508	JP 2007-533610		20050923
IN 2007KN01043	A	20070713	IN 2007-KN1043		20070323
JP 2011137038	A	20110714	JP 2011-75964		20110330
US 20120088756	A1	20120412	US 2011-13231578		20110913
PRIORITY APPLN. INFO.:			US 2004-60612155	P	20040923
			JP 2007-533610	A3	20050923
			US 2005-234850	B1	20050923
			WO 2005-US33826	W	20050923
			US 2010-708240	B1	20100218

IT 163521-12-8, EMD-68843
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(regulating neurotransmitter systems by inducing counteradaptations by repeatedly administering neurotransmitter receptor ligands to treat mental and neurol. disorders and combination with other agents)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

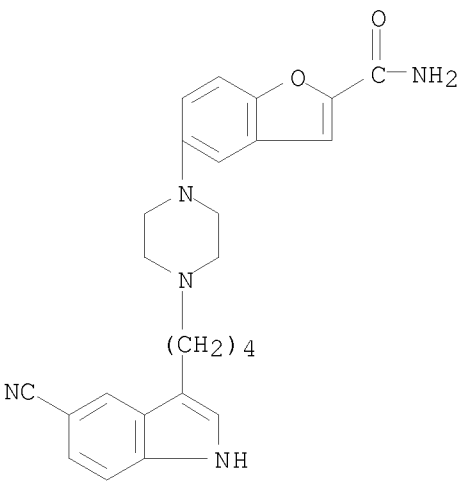
L4 ANSWER 34 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2005:1171443 CAPLUS
DOCUMENT NUMBER: 143:432676
TITLE: New pharmaceutical compositions for the treatment of sexual disorders
INVENTOR(S): Mendla, Klaus; Pyke, Robert; Eisenreich, Wolfram; Friedl, Thomas

PATENT ASSIGNEE(S): Boehringer Ingelheim International GmbH, Germany; Boehringer Ingelheim Pharmaceuticals, Inc.; Boehringer Ingelheim Pharma GmbHH & Co. KG
SOURCE: PCT Int. Appl., 71 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.		DATE
WO 2005102342	A1	20051103	WO 2005-EP4081		20050418
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW					
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG					
AU 2005235422	A1	20051103	AU 2005-235422		20050418
AU 2005235422	B2	20110811			
CA 2563743	A1	20051103	CA 2005-2563743		20050418
EP 1740181	A1	20070110	EP 2005-736586		20050418
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, AL, BA, HR, LV, MK, YU					
CN 1946404	A	20070411	CN 2005-80012692		20050418
BR 2005010074	A	20071016	BR 2005-10074		20050418
JP 2007533686	T	20071122	JP 2007-508810		20050418
NZ 551340	A	20101029	NZ 2005-551340		20050418
RU 2445095	C2	20120320	RU 2006-140962		20050418
IL 178730	A	20120830	IL 2005-178730		20050418
US 20050245539	A1	20051103	US 2005-110449		20050420
AR 48705	A1	20060517	AR 2005-101598		20050422
ZA 2006007463	A	20081029	ZA 2006-7463		20060906
IN 2006DN06048	A	20070427	IN 2006-DN6048		20061017
MX 2006012059	A	20070125	MX 2006-12059		20061018
PH 12006502099	B1	20130712	PH 2006-12006502099		20061021
KR 2007014184	A	20070131	KR 2006-7024443		20061121
US 20080103155	A1	20080501	US 2007-960957		20071220
US 20110105519	A1	20110505	US 2011-987388		20110110
US 20130203766	A1	20130808	US 2012-13654674		20121018
PRIORITY APPLN. INFO.:			US 2004-60564662	P	20040422
			US 2004-60631800	P	20041130
			WO 2005-EP4081	W	20050418
			US 2005-110449	A1	20050420
			US 2007-960957	A1	20071220
			US 2011-987388	A1	20110110

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT
OTHER SOURCE(S): MARPAT 143:432676
IT 163521-12-8, Vilazodone
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(new pharmaceutical compns. for treatment of sexual disorders)
RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



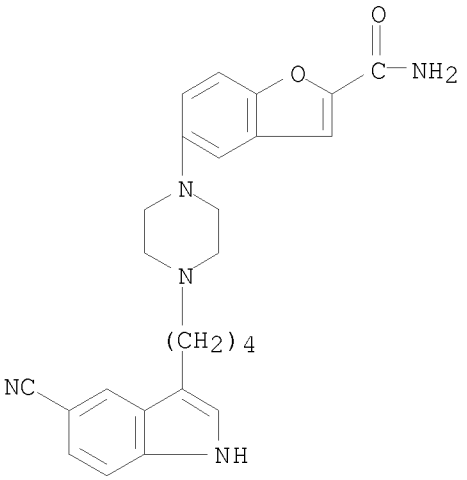
OS.CITING REF COUNT: 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (7 CITINGS)
REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 35 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2005:1004550 CAPLUS
DOCUMENT NUMBER: 143:311967
TITLE: Compositions for treating psychiatric disorders with COX-2 inhibitors alone and in combination with antidepressant agents
INVENTOR(S): Stephenson, Diane; Taylor, Duncan P.
PATENT ASSIGNEE(S): Pharmacia Corporation, USA
SOURCE: PCT Int. Appl., 200 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005084654	A2	20050915	WO 2005-US6818	20050302
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
CA 2556380	A1	20050915	CA 2005-2556380	20050302
EP 1725222	A2	20061129	EP 2005-724377	20050302
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR				
BR 2005008254	A	20070724	BR 2005-8254	20050302

JP 2007526328	T	20070913	JP 2007-501959		20050302
MX 2006009919	A	20061116	MX 2006-9919		20060831
PRIORITY APPLN. INFO.:			US 2004-60549281	P	20040302
			WO 2005-US6818	W	20050302

IT 163521-12-8, Vilazodone
RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(compns. for treating psychiatric disorders with COX-2 inhibitors alone and in combination with antidepressant agents)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)
REFERENCE COUNT: 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 36 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2004:1154699 CAPLUS
DOCUMENT NUMBER: 142:93856
TITLE: Preparation of indolylbutylpiperazinylbenzofurancarboxamides as serotonin receptor ligands and/or serotonin reuptake inhibitors
INVENTOR(S): Heinrich, Timo; Boettcher, Henning; Schiemann, Kai; Hoelzemann, Guenter; Van Amsterdam, Christoph; Bartoszyk, Gerd; Leibrock, Joachim; Seyfried, Christoph
PATENT ASSIGNEE(S): Merck Patent GmbH, Germany
SOURCE: PCT Int. Appl., 45 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: German
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004113326	A1	20041229	WO 2004-EP5547	20040524
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,				

LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,
NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,
AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE,
SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE,
SN, TD, TG

DE 10326939	A1	20050105	DE 2003-10326939	20030616
AU 2004249372	A1	20041229	AU 2004-249372	20040524
AU 2004249372	B2	20100429		
CA 2529299	A1	20041229	CA 2004-2529299	20040524
CA 2529299	C	20120703		
EP 1633741	A1	20060315	EP 2004-734515	20040524
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK				
CN 1805953	A	20060719	CN 2004-80016700	20040524
BR 2004011533	A	20060801	BR 2004-11533	20040524
JP 2006527707	T	20061207	JP 2006-515787	20040524
MX 2005013538	A	20060309	MX 2005-13538	20051213
US 20070099933	A1	20070503	US 2005-560734	20051215
US 7829565	B2	20101109		

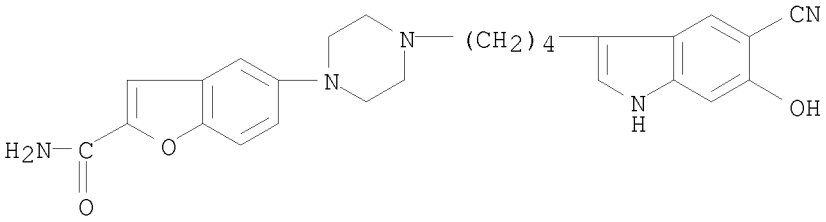
PRIORITY APPLN. INFO.: DE 2003-10326939 A 20030616
WO 2004-EP5547 W 20040524

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

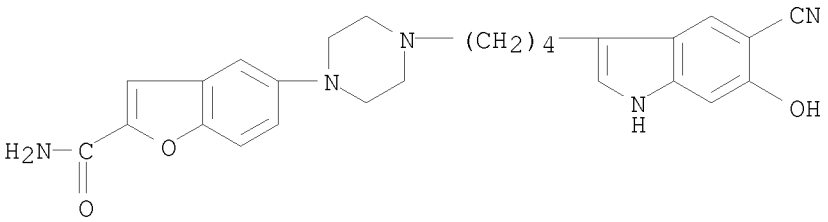
OTHER SOURCE(S): MARPAT 142:93856

IT 714950-70-6P 816438-39-8P
RL: PAC (Pharmacological activity); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(preparation of indolylbutylpiperazinylbenzofurancarboxamides as serotonin receptor ligands or reuptake inhibitors)

RN 714950-70-6 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

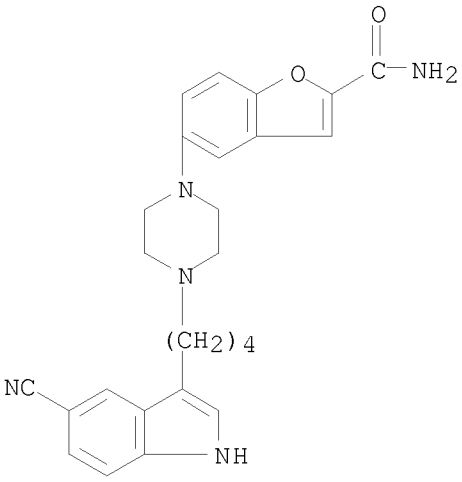


RN 816438-39-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-6-hydroxy-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:?) (CA INDEX NAME)

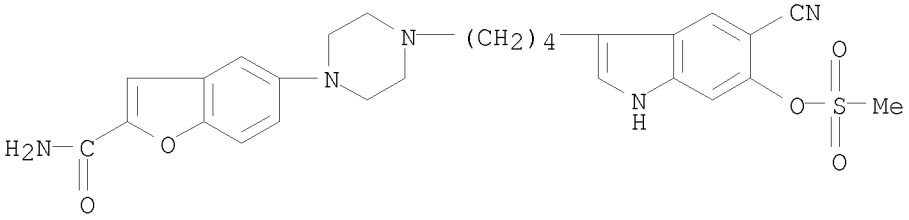


● x HCl

IT 163521-12-8 714950-88-6
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of indolylbutylpiperazinylbenzofurancarboxamides as serotonin receptor ligands or reuptake inhibitors)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)

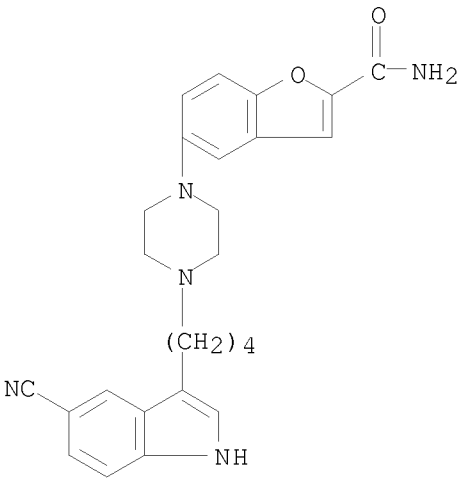


RN 714950-88-6 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-[5-cyano-6-[(methylsulfonyl)oxy]-1H-indol-3-yl]butyl]-1-piperazinyl]- (CA INDEX NAME)

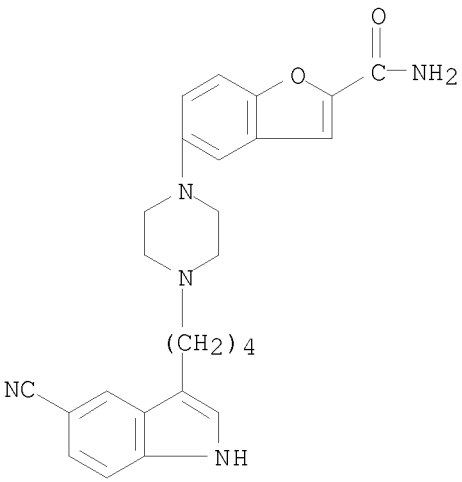


OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)
REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 37 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2004:641081 CAPLUS
DOCUMENT NUMBER: 141:314299
TITLE: Synthesis and Structure-Activity Relationship in a Class of Indolebutylpiperazines as Dual 5-HT1A Receptor Agonists and Serotonin Reuptake Inhibitors
AUTHOR(S): Heinrich, Timo; Boettcher, Henning; Gericke, Rolf; Bartoszyk, Gerd D.; Anzali, Soheila; Seyfried, Christoph A.; Greiner, Hartmut E.; van Amsterdam, Christoph
CORPORATE SOURCE: Preclinical Pharmaceutical Research, Merck KGaA, Darmstadt, 64293, Germany
SOURCE: Journal of Medicinal Chemistry (2004), 47(19), 4684-4692
CODEN: JMCMAR; ISSN: 0022-2623
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English
OTHER SOURCE(S): CASREACT 141:314299
IT 163521-12-8P
RL: PAC (Pharmacological activity); RCT (Reactant); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation); RACT (Reactant or reagent)
(preparation of [[(cyanoindolyl)butyl]piperazinyl]benzofurancarboxamide derivative and study of its activity as 5-HT1A receptor agonist and serotonin re-uptake inhibitor)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



IT 163521-08-2P, Vilazodone hydrochloride
RL: PAC (Pharmacological activity); SPN (Synthetic preparation); BIOL (Biological study); PREP (Preparation)
(preparation of [[(cyanoindolyl)butyl]piperazinyl]benzofurancarboxamide derivative and study of its activity as 5-HT1A receptor agonist and serotonin re-uptake inhibitor)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

OS.CITING REF COUNT: 46 THERE ARE 46 CAPLUS RECORDS THAT CITE THIS RECORD (46 CITINGS)
REFERENCE COUNT: 49 THERE ARE 49 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 38 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2003:1006815 CAPLUS
DOCUMENT NUMBER: 140:35974
TITLE: Treatment for depression and anxiety by the combination of a PDE IV inhibitor and an antidepressant or an anxiolytic agent
INVENTOR(S): Sobolov-Jaynes, Susan Beth; Schmidt, Christopher Joseph
PATENT ASSIGNEE(S): Pfizer Products Inc., USA
SOURCE: PCT Int. Appl., 62 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003105902	A1	20031224	WO 2003-IB2295	20030605
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 20030235631	A1	20031225	US 2003-387060	20030312
CA 2488138	A1	20031224	CA 2003-2488138	20030605
AU 2003233032	A1	20031231	AU 2003-233032	20030605
EP 1517707	A1	20050330	EP 2003-727833	20030605
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				

IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK

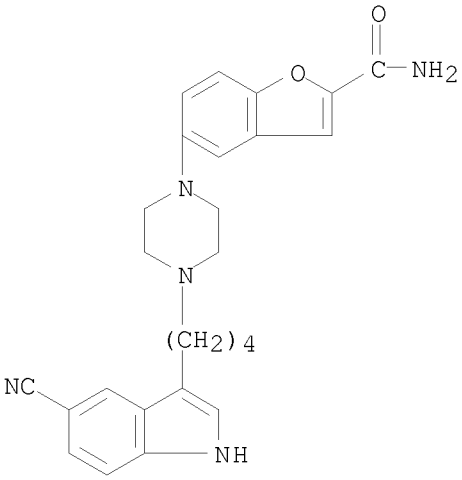
BR 2003011903	A	20050607	BR 2003-11903		20030605
JP 2005533788	T	20051110	JP 2004-512802		20030605
MX 2004011835	A	20050331	MX 2004-11835		20041126
IN 2004CN03177	A	20060303	IN 2004-CN3177		20041213
PRIORITY APPLN. INFO.:			US 2002-60389181	P	20020617
			WO 2003-IB2295	W	20030605

OTHER SOURCE(S): MARPAT 140:35974

IT 163521-12-8
RL: PAC (Pharmacological activity); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(treatment for depression and anxiety by combination of a PDE IV inhibitor and an antidepressant or an anxiolytic agent)

RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 1 THERE ARE 1 CAPLUS RECORDS THAT CITE THIS RECORD (1 CITINGS)

REFERENCE COUNT: 1 THERE ARE 1 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 39 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN

ACCESSION NUMBER: 2002:977808 CAPLUS

DOCUMENT NUMBER: 138:44671

TITLE: Polymorphic forms of 1-'4-(5-cyanoindol-3-yl)butyl-4-(2-carbamoylbenzofuran-5-yl)piperazine hydrochloride

INVENTOR(S): Bathe, Andreas; Helfert, Bernd; Neuenfeld, Steffen; Kniel, Heike; Bartels, Matthias; Rudolph, Susanne; Boettcher, Henning

PATENT ASSIGNEE(S): Merck Patent G.m.b.H., Germany

SOURCE: PCT Int. Appl., 103 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002102794	A2	20021227	WO 2002-EP6153	20020605

WO 2002102794 A3 20030220
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

CA 2451028	A1	20021227	CA 2002-2451028	20020605
CA 2451028	C	20120717		
CA 2683040	A1	20021227	CA 2002-2683040	20020605
CA 2683040	C	20120925		
CA 2782494	A1	20021227	CA 2002-2782494	20020605
CA 2782515	A1	20021227	CA 2002-2782515	20020605
CA 2782517	A1	20021227	CA 2002-2782517	20020605
CA 2782519	A1	20021227	CA 2002-2782519	20020605
CA 2782521	A1	20021227	CA 2002-2782521	20020605
CA 2782615	A1	20021227	CA 2002-2782615	20020605
CA 2782623	A1	20021227	CA 2002-2782623	20020605
CA 2782628	A1	20021227	CA 2002-2782628	20020605
CA 2782761	A1	20021227	CA 2002-2782761	20020605
CA 2782791	A1	20021227	CA 2002-2782791	20020605
CA 2782857	A1	20021227	CA 2002-2782857	20020605
CA 2782862	A1	20021227	CA 2002-2782862	20020605
CA 2782865	A1	20021227	CA 2002-2782865	20020605
CA 2782868	A1	20021227	CA 2002-2782868	20020605
AU 2002320822	A1	20030102	AU 2002-320822	20020605
AU 2002320822	B2	20071115		
EP 1397357	A2	20040317	EP 2002-754627	20020605
EP 1397357	B1	20090729		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

EE 2004000019	A	20040415	EE 2004-19	20020605
EE 5454	B1	20110815		
HU 2004000236	A2	20040628	HU 2004-236	20020605
HU 2004000236	A3	20100628		
CN 1516699	A	20040728	CN 2002-812226	20020605
CN 100384841	C	20080430		
BR 2002010495	A	20040817	BR 2002-10495	20020605
JP 2004534803	T	20041118	JP 2003-506267	20020605
JP 4624667	B2	20110202		
NZ 530642	A	20060929	NZ 2002-530642	20020605
RU 2303598	C2	20070727	RU 2004-100824	20020605
CN 101139345	A	20080312	CN 2007-10180229	20020605
CN 101139345	B	20120711		
AT 437871	T	20090815	AT 2002-754627	20020605
PT 1397357	E	20091103	PT 2002-754627	20020605
ES 2330314	T3	20091209	ES 2002-754627	20020605
PL 208708	B1	20110531	PL 2002-364576	20020605
IL 159426	A	20111229	IL 2002-159426	20020605
MX 2003011723	A	20040319	MX 2003-11723	20031216
US 20040147528	A1	20040729	US 2003-481270	20031219
US 7381726	B2	20080603		
IN 2004KN00031	A	20060407	IN 2004-KN31	20040109
IN 238699	A1	20100219		
ZA 2004000329	A	20050415	ZA 2004-329	20040115
HK 1066003	A1	20081031	HK 2004-108857	20041110
US 20090023749	A1	20090122	US 2008-110704	20080428
US 7834020	B2	20101116		
HK 1116165	A1	20130426	HK 2008-105432	20080516

US 20100016332	A1	20100121	US 2009-566835		20090925
US 7981894	B2	20110719			
JP 2010132687	A	20100617	JP 2010-25038		20100208
JP 2010132688	A	20100617	JP 2010-25039		20100208
US 20110183994	A1	20110728	US 2010-945260		20101112
US 20110190317	A1	20110804	US 2010-945272		20101112
US 8193195	B2	20120605			
US 20110312971	A1	20111222	US 2011-13085117		20110412
US 8318744	B2	20121127			
US 20110294824	A1	20111201	US 2011-13100911		20110504
US 20110294825	A1	20111201	US 2011-13100948		20110504
US 8236804	B2	20120807			
US 20130102616	A1	20130425	US 2012-13658088		20121023
PRIORITY APPLN. INFO.:			EP 2001-113647	A	20010619
			EP 2001-113674	A	20010619
			CA 2002-2451028	A3	20020605
			CN 2002-812226	A3	20020605
			JP 2003-506267	A3	20020605
			WO 2002-EP6153	W	20020605
			US 2003-481270	A3	20031219
			US 2008-110704	A3	20080428
			US 2009-566835	A1	20090925
			US 2011-13085117	A1	20110412

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

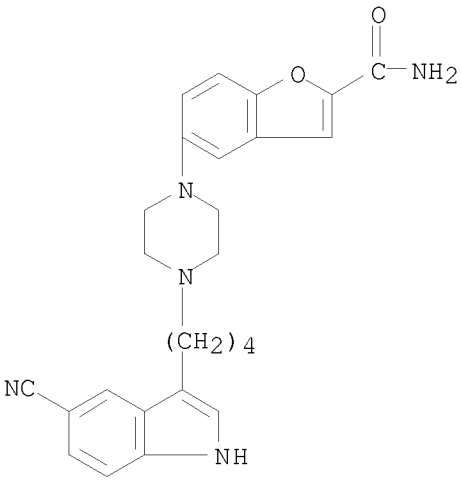
IT 478917-86-1P 478917-87-2P 478917-88-3P
478917-89-4P 478917-90-7P 478917-92-9P
478917-93-0P 478917-94-1P 478917-95-2P
478917-96-3P 478917-97-4P
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)
(preparation of polymorphic forms of
(cyanoindolyl)butylcarbamoylbenzofuranylpiperazine
hydrochloride)

RN 478917-86-1 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with 2-propanone (1:1:?) (CA INDEX NAME)

CM 1

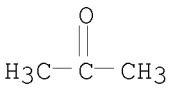
CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

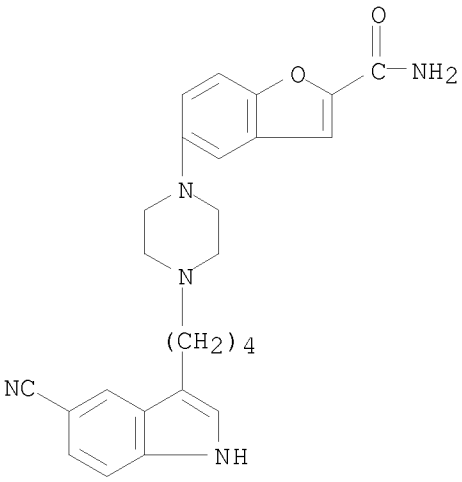
CRN 67-64-1
CMF C3 H6 O



RN 478917-87-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with tetrahydrofuran (1:1:1) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

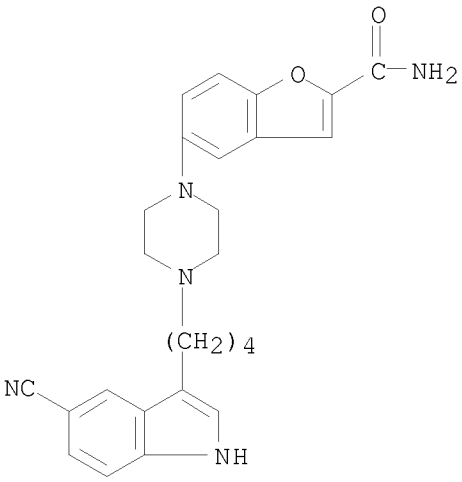
CM 2

CRN 109-99-9
CMF C4 H8 O

RN 478917-88-3 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with methanol (1:1:?) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

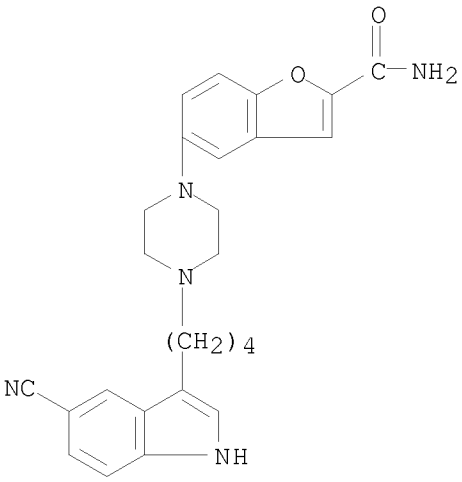
CRN 67-56-1
CMF C H4 O

H_3C-OH

RN 478917-89-4 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with heptane (1:1:?) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

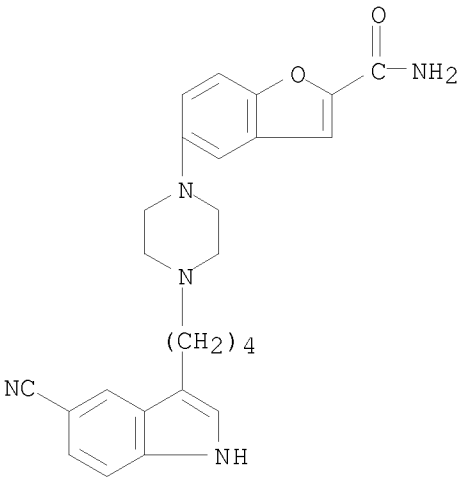
CRN 142-82-5
CMF C7 H16

Me—(CH2)5—Me

RN 478917-90-7 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (1:?) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H

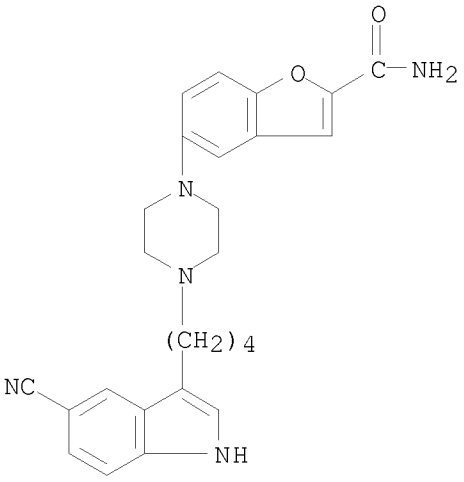


● HCl

RN 478917-92-9 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with tetrahydrofuran (2:1) (9CI) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

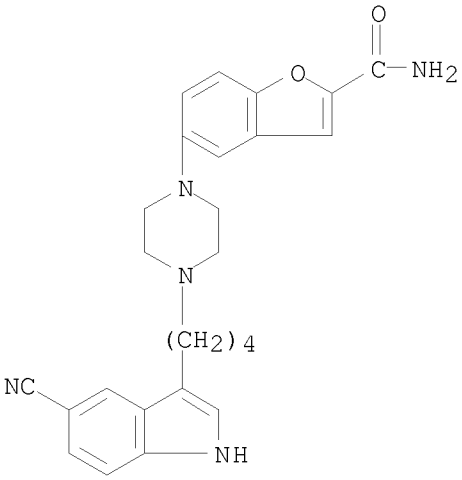
CRN 109-99-9

CMF C4 H8 O

RN 478917-93-0 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, monohydrochloride, compd. with methanol (1:1) (9CI) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

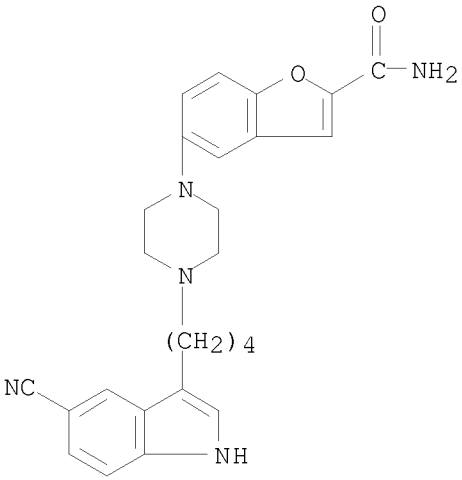
CRN 67-56-1
CMF C H4 O

H_3C-OH

RN 478917-94-1 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride, compd. with heptane (1:1:1) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

CM 2

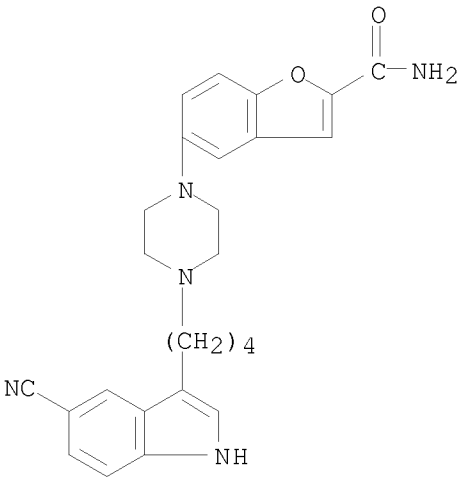
CRN 142-82-5
CMF C7 H16

Me—(CH2)5—Me

RN 478917-95-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (1:1) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H

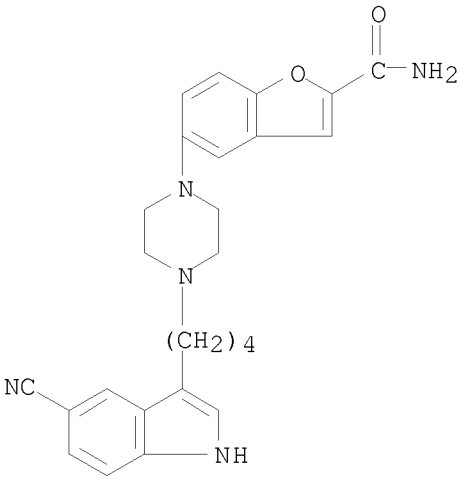


● HCl

RN 478917-96-3 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (2:3) (CA INDEX NAME)

CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H

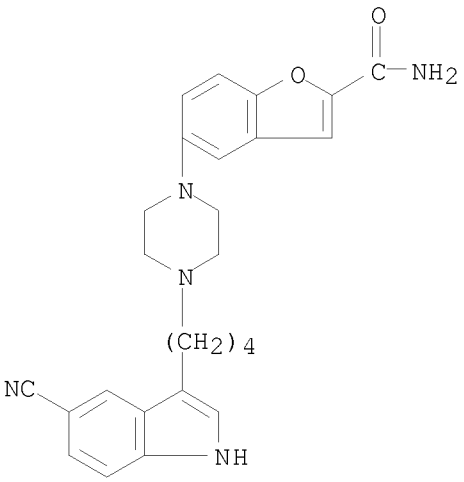


● HCl

RN 478917-97-4 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrate (2:1) (CA INDEX NAME)

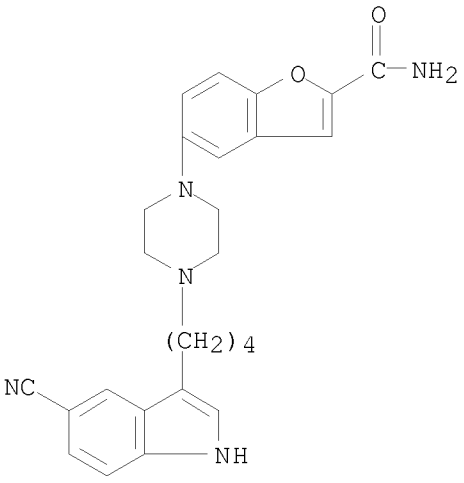
CM 1

CRN 163521-08-2
CMF C26 H27 N5 O2 . Cl H



● HCl

IT 163521-08-2P 478917-91-8P
RL: PRP (Properties); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(preparation of polymorphic forms of (cyanoindolyl)butylcarbamoylbenzofuranylpiperazine hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



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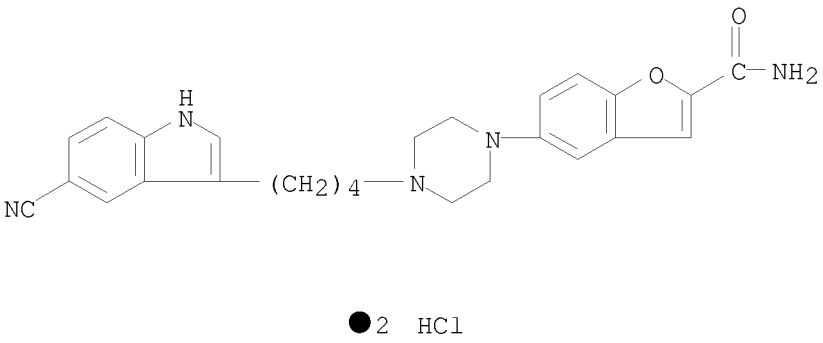
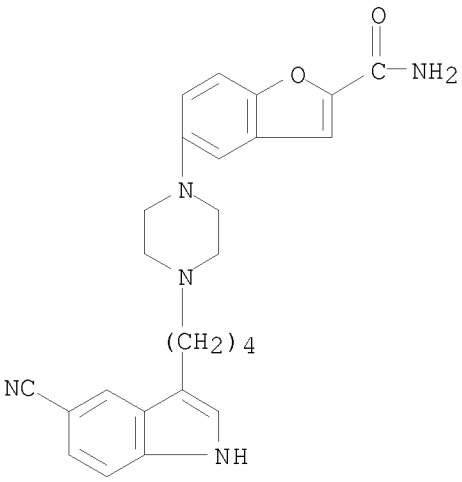
RN 478917-91-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:2) (CA INDEX NAME)



● 2 HCl

IT 163521-12-8
RL: RCT (Reactant); THU (Therapeutic use); BIOL (Biological study); RACT (Reactant or reagent); USES (Uses)
(preparation of polymorphic forms of (cyanoindolyl)butylcarbamoylbenzofuranylpiperazine hydrochloride)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)
REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 40 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2001:713135 CAPLUS
DOCUMENT NUMBER: 135:251988
TITLE: Compounds with 5-HT1a agonist activity useful for treating disorders of the outer retina
INVENTOR(S): Collier, Robert J., Jr.; Kapin, Michael A.; Hellberg, Mark R.; Dean, Thomas R.
PATENT ASSIGNEE(S): Alcon Universal Ltd., Switz.

SOURCE: PCT Int. Appl., 23 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 3
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001070222	A2	20010927	WO 2001-US5700	20010223
WO 2001070222	A3	20020725		
W: AU, BR, CA, CN, JP, KR, MX, PL, US, ZA				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
CA 2400639	A1	20010927	CA 2001-2400639	20010223
CA 2400639	C	20110816		
AU 2001045310	A	20011003	AU 2001-45310	20010223
EP 1263504	A2	20021211	EP 2001-918208	20010223
EP 1263504	B1	20030820		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
BR 2001009211	A	20030211	BR 2001-9211	20010223
AT 247507	T	20030915	AT 2001-918208	20010223
JP 2003527422	T	20030916	JP 2001-568420	20010223
JP 4789231	B2	20111012		
PT 1263504	E	20031231	PT 2001-918208	20010223
ES 2204848	T3	20040501	ES 2001-918208	20010223
AU 2001245310	B2	20050317	AU 2001-245310	20010223
CN 1198605	C	20050427	CN 2001-806764	20010223
PL 203709	B1	20091130	PL 2001-358306	20010223
TW 268777	B	20061221	TW 2001-106235	20010316
ZA 2002006350	A	20030808	ZA 2002-6350	20020808
US 20030207890	A1	20031106	US 2002-221070	20020909
KR 749191	B1	20070813	KR 2002-7012170	20020916
MX 2002009072	A	20030312	MX 2002-9072	20020917
HK 1051504	A1	20040423	HK 2003-103444	20030515
AU 2005202600	A1	20050707	AU 2005-202600	20050615
AU 2005202600	B2	20080731		
US 20050256129	A1	20051117	US 2005-187474	20050722
US 7763619	B2	20100727		
US 20100168121	A1	20100701	US 2010-719152	20100308
JP 2011037901	A	20110224	JP 2010-261857	20101124
JP 2011153158	A	20110811	JP 2011-108785	20110513

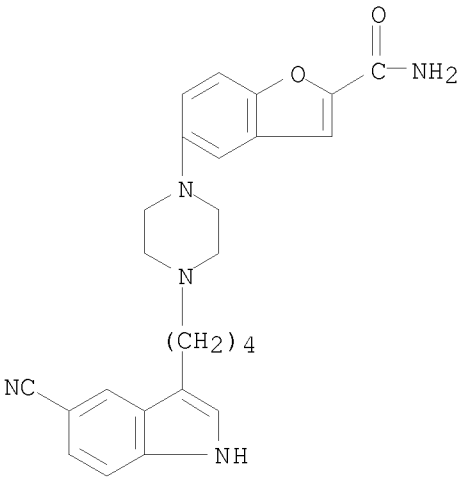
PRIORITY APPLN. INFO.:	US 2000-60190279	P	20000317
	AU 2001-245310	A3	20010223
	JP 2001-568420	A3	20010223
	WO 2001-US5700	W	20010223
	US 2002-221070	A1	20020909
	US 2005-187474	A1	20050722

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

IT 163521-12-8, EMD-68843
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(5-HT1a agonist for treating disorder of outer retina)

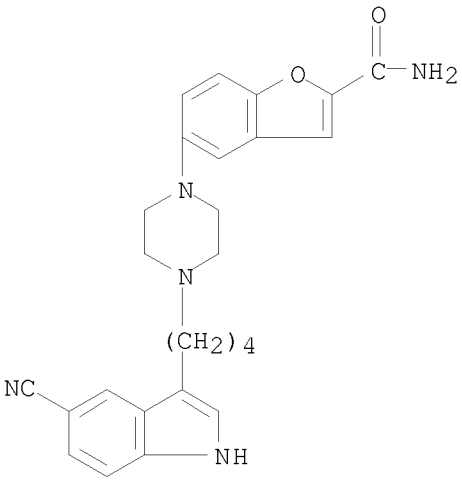
RN 163521-12-8 CAPLUS

CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)
REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

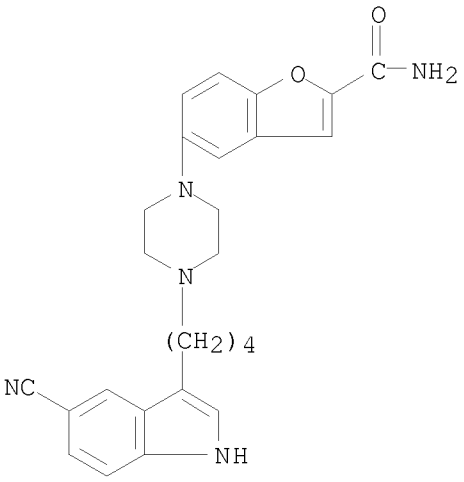
L4 ANSWER 41 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2001:463785 CAPLUS
DOCUMENT NUMBER: 135:297875
TITLE: Vilazodone hydrochloride. Antidepressant 5-HT1A partial agonist 5-HT reuptake inhibitor
AUTHOR(S): Sorbera, L. A.; Rabasseda, X.; Silvestre, J.; Castaner, J.
CORPORATE SOURCE: Prous Science, Barcelona, 08080, Spain
SOURCE: Drugs of the Future (2001), 26(3), 247-252
CODEN: DRFUD4; ISSN: 0377-8282
PUBLISHER: Prous Science
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English
IT 163521-08-2P, SB 659746A
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); SPN (Synthetic preparation); THU (Therapeutic use); BIOL (Biological study); PREP (Preparation); USES (Uses)
(antidepressant action of vilazodone hydrochloride)
RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

OS.CITING REF COUNT: 10 THERE ARE 10 CAPLUS RECORDS THAT CITE THIS RECORD (10 CITINGS)
REFERENCE COUNT: 48 THERE ARE 48 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 42 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2001:164199 CAPLUS
DOCUMENT NUMBER: 135:441
TITLE: Systemic EMD 68843 injections reduce anxiety in the shock-probe, but not the plus-maze test
AUTHOR(S): Treit, D.; Degroot, A.; Kashluba, S.; Bartoszyk, G. D.
CORPORATE SOURCE: Department of Psychology, University of Alberta, Edmonton, AB, T6G 2E9, Can.
SOURCE: European Journal of Pharmacology (2001), 414(2/3), 245-248
CODEN: EJPHAZ; ISSN: 0014-2999
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English
IT 163521-12-8, EMD 68843
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(systemic EMD 68843 injections reduce anxiety in shock-probe, but not plus-maze test)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 9 THERE ARE 9 CAPLUS RECORDS THAT CITE THIS RECORD (9 CITINGS)
REFERENCE COUNT: 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 43 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 2000:861478 CAPLUS
DOCUMENT NUMBER: 134:32976
TITLE: Novel use of cyanoindolylbutyl(carbamoylbenzofuranyl)-piperazine and its physiologically acceptable salts for treatment of anxiety and related disorders
INVENTOR(S): Bartoszyk, Gerd; Seyfried, Christoph; Van Amsterdam, Christoph; Bottcher, Henning; Sedman, Ewen
PATENT ASSIGNEE(S): Merck Patent G.m.b.H., Germany
SOURCE: PCT Int. Appl., 37 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000072832	A2	20001207	WO 2000-EP4376	20000516
WO 2000072832	A3	20011220		
W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
TW 518218	B	20030121	TW 1999-119882	19991115
CA 2372668	A1	20001207	CA 2000-2372668	20000516
CA 2372668	C	20091103		
AU 2000050663	A	20001218	AU 2000-50663	20000516
AU 771778	B2	20040401		
EP 1185272	A2	20020313	EP 2000-935031	20000516
EP 1185272	B1	20040407		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				

BR	2000010948	A	20020423	BR 2000-10948	20000516
TR	2001003361	T2	20020521	TR 2001-3361	20000516
CN	1361692	A	20020731	CN 2000-808135	20000516
CN	1198618	C	20050427		
HU	2002001275	A2	20020828	HU 2002-1275	20000516
HU	2002001275	A3	20040428		
HU	229059	B1	20130729		
JP	2003500441	T	20030107	JP 2000-620944	20000516
JP	4884588	B2	20120229		
AT	263564	T	20040415	AT 2000-935031	20000516
EP	1410800	A1	20040421	EP 2004-1441	20000516
EP	1410800	B1	20060823		
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PT	1185272	E	20040831	PT 2000-935031	20000516
RU	2237477	C2	20041010	RU 2001-133342	20000516
ES	2219342	T3	20041201	ES 2000-935031	20000516
US	6900212	B1	20050531	US 2001-979922	20000516
CZ	295623	B6	20050914	CZ 2001-4226	20000516
CN	1679577	A	20051012	CN 2005-10054417	20000516
AT	337008	T	20060915	AT 2004-1441	20000516
EP	1736158	A2	20061227	EP 2006-17231	20000516
EP	1736158	A3	20070103		
EP	1736158	B1	20090805		
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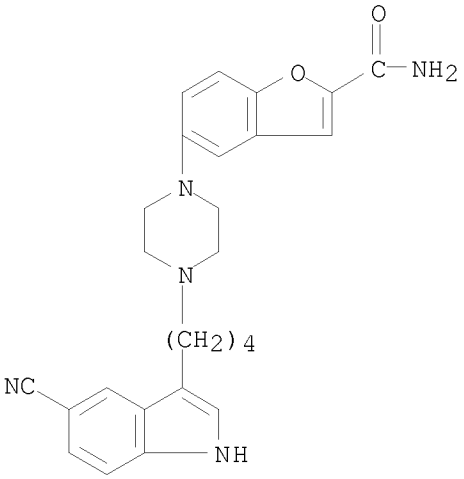
PT	1410800	E	20070131	PT 2004-1441	20000516
ES	2271707	T3	20070416	ES 2004-1441	20000516
IL	146707	A	20070603	IL 2000-146707	20000516
PL	199516	B1	20080930	PL 2000-352373	20000516
PL	199650	B1	20081031	PL 2000-383406	20000516
PL	200490	B1	20090130	PL 2000-383006	20000516
AT	438399	T	20090815	AT 2006-17231	20000516
PT	1736158	E	20091111	PT 2006-17231	20000516
ES	2330774	T3	20091215	ES 2006-17231	20000516
CN	101869565	A	20101027	CN 2009-10113677	20000516
SK	287851	B6	20120104	SK 2001-1646	20000516
NO	2001005746	A	20011126	NO 2001-5746	20011126
NO	322120	B1	20060814		
MX	2001012172	A	20020722	MX 2001-12172	20011127
ZA	2001010485	A	20030630	ZA 2001-10485	20011220
IN	2001KN01351	A	20050311	IN 2001-KN1351	20011221
HK	1048444	A1	20051209	HK 2003-100617	20030123
US	20050113386	A1	20050526	US 2004-994226	20041123
US	7371756	B2	20080513		
NO	2006001562	A	20011126	NO 2006-1562	20060406
NO	324230	B1	20070910		
US	20080119484	A1	20080522	US 2007-946149	20071128
US	7642261	B2	20100105		
US	20100063062	A1	20100311	US 2009-620049	20091117
JP	2011148799	A	20110804	JP 2011-27903	20110210
US	20120077825	A1	20120329	US 2011-13116680	20110526

PRIORITY APPLN. INFO.:	EP 1999-109295	A	19990527
	CN 2000-808135	A3	20000516
	EP 2000-935031	A3	20000516
	EP 2004-1441	A3	20000516
	JP 2000-620944	A3	20000516
	WO 2000-EP4376	W	20000516
	US 2002-979922	A3	20020408
	US 2004-994226	A3	20041123
	US 2007-946149	A1	20071128
	US 2009-620049	A1	20091117

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

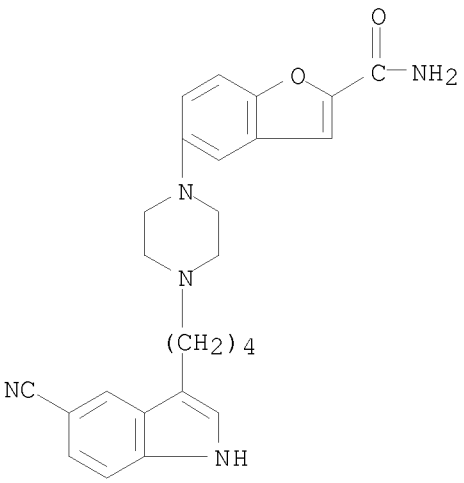
IT 163521-08-2 163521-12-8
RL: BAC (Biological activity or effector, except adverse); BSU (Biological study, unclassified); THU (Therapeutic use); BIOL (Biological study); USES (Uses)
(compns. of cyanoindolylbutyl(carbamoylbenzofuranyl)-piperazine and its salts for treatment of anxiety and related disorders)

RN 163521-08-2 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]-, hydrochloride (1:1) (CA INDEX NAME)



● HCl

RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD (4 CITINGS)
REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS

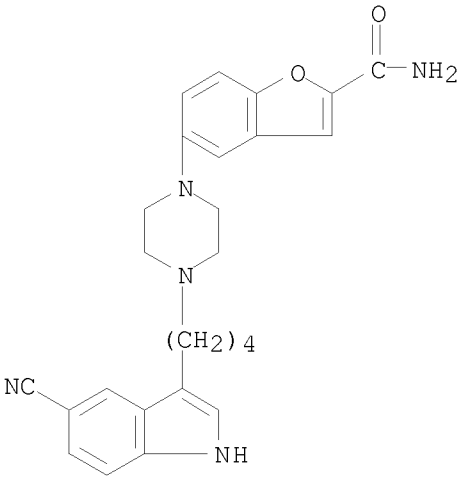
L4 ANSWER 44 OF 44 CAPLUS COPYRIGHT 2013 ACS on STN
ACCESSION NUMBER: 1996:689356 CAPLUS
DOCUMENT NUMBER: 125:328501
ORIGINAL REFERENCE NO.: 125:61535a,61538a
TITLE: Preparation of 5-aminobenzofuran-2-carboxylates as drug intermediates
INVENTOR(S): Bathe, Andreas; Helfert, Bernd; Boettcher, Henning; Schuster, Kurt
PATENT ASSIGNEE(S): Merck Patent Gmbh, Germany
SOURCE: Eur. Pat. Appl., 13 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: German
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 738722	A1	19961023	EP 1996-105701	19960411
EP 738722	B1	20030625		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LI, LU, NL, PT, SE				
DE 19514567	A1	19961024	DE 1995-19514567	19950420
EP 1215210	A2	20020619	EP 2002-6144	19960411
EP 1215210	A3	20020626		
EP 1215210	B1	20061018		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, PT, IE, SI, LT, LV				
AT 243689	T	20030715	AT 1996-105701	19960411
PT 738722	E	20031128	PT 1996-105701	19960411
ES 2201143	T3	20040316	ES 1996-105701	19960411
AT 342893	T	20061115	AT 2002-6144	19960411
PT 1215210	E	20070228	PT 2002-6144	19960411
ES 2275765	T3	20070616	ES 2002-6144	19960411
CN 1140171	A	19970115	CN 1996-104983	19960416
CN 1181067	C	20041222		
AU 9650734	A	19961031	AU 1996-50734	19960417
AU 704495	B2	19990422		
RU 2159238	C2	20001120	RU 1996-107419	19960417
SK 284862	B6	20060105	SK 1996-486	19960417
SK 285224	B6	20060907	SK 2003-117	19960417
CA 2174494	A1	19961021	CA 1996-2174494	19960418
CA 2174494	C	20090407		
NO 9601579	A	19961021	NO 1996-1579	19960419
ZA 9603155	A	19961025	ZA 1996-3155	19960419
JP 08291161	A	19961105	JP 1996-120781	19960419
JP 3874837	B2	20070131		
HU 9601033	A2	19971028	HU 1996-1033	19960419
HU 9601033	A3	19981028		
HU 226684	B1	20090629		
US 5723614	A	19980303	US 1996-634825	19960419
CZ 294697	B6	20050216	CZ 1996-1131	19960419
PL 189175	B1	20050630	PL 1996-313861	19960419
US 5977112	A	19991102	US 1997-960459	19971029
JP 2006290905	A	20061026	JP 2006-214860	20060807
JP 4795889	B2	20111019		

PRIORITY APPLN. INFO.:
DE 1995-19514567 A 19950420
EP 1996-105701 A3 19960411
JP 1996-120781 A3 19960419
US 1996-634825 A3 19960419

ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

OTHER SOURCE(S): MARPAT 125:328501
IT 163521-12-8P
RL: PNU (Preparation, unclassified); PREP (Preparation)
(preparation of 5-aminobenzofuran-2-carboxylates as drug intermediates)
RN 163521-12-8 CAPLUS
CN 2-Benzofurancarboxamide, 5-[4-[4-(5-cyano-1H-indol-3-yl)butyl]-1-piperazinyl]- (CA INDEX NAME)



OS.CITING REF COUNT: 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (7 CITINGS)

=>

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Andreas Bathe
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	120140-00110

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5521241		1996-05-28	Wu	
	2	5532241		1996-07-02	Bottcher et al.	
	3	5723614		1998-03-03	Bathe et al.	
	4	5977112		1999-11-02	Bathe et al.	
	5	7381726		2008-06-03	Bathe et al.	
	6	7834020		2010-11-16	Bathe et al.	
	7	7981894		2011-07-19	Bathe et al.	
	8	8193195		2012-06-05	Bathe et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.S./

Receipt date: 09/19/2013	Application Number	14032183 - GAU: 1626
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	9	8318744		2012-11-27	Bathe et al.	
	10	8236804		2012-08-07	Bathe et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110183994	A1	2011-07-28	Bathe et al.	
	2	20110294824	A1	2011-12-01	BATHE et al.	
	3	20130102616	A1	2013-04-25	BATHE et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	0648767	EP	A1	1995-04-19	Merck Patent Gmbh		☐
	2	0738722	EP	A1	1996-10-23	Merck Patent Gmbh		☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.S./

Receipt date: 09/19/2013	Application Number	14032183 - GAU: 1626
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	3	00/72832	WO	A2	2000-12-07	Merck Patent Gmbh		☐
	4	02/102794	WO	A2	2002-12-27	Merck Patent Gmbh		☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Summary of Facts Regarding US Clinical Trials Prior to Jun. 5, 2001.	☐
	2	Sorbera, L.A. et al. "Vilazodone Hydrochloride. Antidepressant 5-HT .sub.1A Partial Agonist 5-HT Reuptake Inhibitor" Drugs of the Future 2001, 26(3):247-252. (Mar. 2001).	☐
	3	Remington Farmacia Tomo 2 19.sup.a edicion. (1998).	☐
	4	Farmacotecnia Teorica Y Practica Tomo iV, Dr. Jose Helman. (1980).	☐
	5	Hungarian Search Report of May 10, 2010, citing HU P0201275 which corresponds to WO 00/72832.	☐
	6	Office Action for U.S. Appl. No. 12/945,260, date of mailing Aug. 17, 2011.	☐
	7	Office Action for U.S. Appl. No. 12/945,272, date of mailing Aug. 17, 2011.	☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.S./

Receipt date: 09/19/2013	Application Number	14032183 - GAU: 1626
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	8	Office Action for U.S. Appl. No. 13/100,911, date of mailing Nov. 9, 2011.	☐
	9	Office Action for U.S. Appl. No. 13/085,117, date of mailing Jan. 13, 2012.	☐
	10	Notice of Allowance for U.S. Appl. No. 12/945,272, date of mailing Mar. 19, 2012.	☐
	11	Corrected Notice of Allowance for U.S. Appl. No. 12/945,272, date of mailing Apr. 3, 2012.	☐
	12	Office Action for U.S. Appl. No. 13/100,911, date of mailing Mar. 23, 2012.	☐
	13	Office Action for U.S. Appl. No. 13/100,911, date of mailing Aug. 17, 2012.	☐
	14	Office Action for U.S. Appl. No. 13/085,117, date of mailing Apr. 3, 2012.	☐
	15	Notice of Allowance for U.S. Appl. No. 13/085,117, date of mailing Aug. 17, 2012.	☐
	16	Office Action for U.S. Appl. No. 13/100,948, date of mailing Nov. 18, 2011.	☐
	17	Office Action for U.S. Appl. No. 13/100,948, date of mailing Mar. 27, 2012.	☐
	18	Notice of Allowance for U.S. Appl. No. 13/100,948, date of mailing Jun. 4, 2012.	☐

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Receipt date: 09/19/2013	Application Number	14032183 - GAU: 1626
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	19	Office Action for U.S. Appl. No. 13/658,088, date of mailing May 23, 2012.	☐
	20	Morissette, et al. Advanced Drug Delivery Reviews, 56, 2004, p. 275-300.	☐

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

EXAMINER SIGNATURE

Examiner Signature	/Samantha Shterengarts/	Date Considered	12/02/2013

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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BIB DATA SHEET

CONFIRMATION NO. 2870

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/032,183	09/19/2013	544	1626	120140-00110

APPLICANTS

Merck Patentgesellschaft, Darmstadt, GERMANY, Assignee (with 37 CFR 1.172 Interest);

INVENTORS

Andreas Bathe, Darmstadt, GERMANY;
Bernd Helfert, Ober-Ramstadt, GERMANY;
Steffen Neuenfeld, Messel, GERMANY;
Heike Kniel, Heppenheim, GERMANY;
Matthias Bartels, Darmstadt, GERMANY;
Susanne Rudolph, Dieburg, GERMANY;
Henning Böttcher, Darmstadt, GERMANY;

**** CONTINUING DATA ***************************

This application is a CON of 13/658,088 10/23/2012
which is a CON of 13/085,117 04/12/2011 PAT 8318744
which is a CON of 12/566,835 09/25/2009 PAT 7981894
which is a DIV of 12/110,704 04/28/2008 PAT 7834020
which is a DIV of 10/481,270 12/19/2003 PAT 7381726
which is a 371 of PCT/EP2002/006153 06/05/2002

**** FOREIGN APPLICATIONS ***************************

EUROPEAN PATENT OFFICE (EPO) 01113674.0 06/19/2001

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

10/04/2013

Foreign Priority claimed	☑ Yes ☐ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☑ Yes ☐ No		GERMANY	23	15	4
Verified and Acknowledged	/SAMANTHA L SHTERENGARTS/ Examiner's Signature	Initials				

ADDRESS

MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110
UNITED STATES

TITLE

POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

FILING FEE RECEIVED		
2320	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue)

BIB (Rev. 05/07).

Docket No.: 120140-00110
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Andreas Bathe et al.

Application No.: Not Yet Assigned

Confirmation No.: Not Yet Assigned

Filed: Concurrently Herewith

Art Unit: Not Yet Assigned

For: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Examiner: Not Yet Assigned

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT (IDS)

Dear Madam:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement accompanies the new patent application submitted herewith.

The present application is a continuation of U.S. Serial No. 13/658,088, filed October 23, 2012 (Atty. Docket No. 120140-00109), which is a continuation of U.S. Patent Application No. 13/085,117, filed April 12, 2011, now U.S. Patent No. 8,318,744 (Atty. Docket No. 120140-00106),

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and relied upon in this application for an earlier filing date under 35 U.S.C. § 120. Certain references listed on the enclosed PTO Form SB/08 have been previously submitted to the Office in the prior application number 13/085,117, and, in accordance with 37 C.F.R. §1.98(d), copies of those references are not enclosed but will be provided upon request.

In accordance with 37 C.F.R. 1.97, Applicants wish to bring to the attention of the Examiner, the following commonly owned applications and patents:

Attorney Docket No.	US Patent Application No.	Filing Date	Status
120140-00101	10/481,270	19-Dec-2003	Granted as US Patent No. 7,381,726, issued 03-Jun-2008
120140-00102	12/110,704	28-Apr-2008	Granted as US Patent No. 7,834,020, issued 16-Nov-2010
120140-00103	12/566,835	25-Sep-2009	Granted as US Patent No. 7,981,894, issued 19-Jul-2011
120140-00104	12/945,260	12-Nov-2010	Abandoned; US Publication No. 2011/0183994 A1
120140-00105	12/945,272	12-Nov-2010	Granted as US Patent No. 8,193,195, issued 05-Jun-2012
120140-00106	13/085,117	12-Apr-2011	Granted as US Patent No. 8,318,744, issued 27-Nov-2012
120140-00107	13/100,911	04-May-2011	Abandoned; US Publication No. 2011/0294824 A1
120140-00108	13/100,948	04-May-2011	Granted as US Patent No. 8,236,804, issued 07-Aug-2012
120140-00109	13/658,088	23-Oct- 2012	Pending; US Publication No. 2013/0102616 A1

Patent numbers, Publication numbers, or Application numbers of the related applications are listed in the enclosed form PTO/SB/08. Applicants understand that papers from the prosecution of the above-identified cases may be accessed electronically via PAIR. Accordingly, copies of the foregoing applications or file histories thereof are not provided herein, but will be made available upon request.

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this

Application No.: Not Yet Assigned Docket No.: 120140-00110

Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-4876, under Order No. 120140-00110.

Dated: September 19, 2013

Respectfully submitted,

Electronic signature: /Danielle L. Herritt/
Danielle L. Herritt
Registration No.: 43,670
MCCARTER & ENGLISH, LLP
265 Franklin Street
Boston, Massachusetts 02110
(617) 449-6500
(617) 607-9200 (Fax)
Attorney/Agent For Applicant

/Samantha Shterengarts/ 12/02/2013

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PRIORITY DOCUMENT EXCHANGE

FAILURE STATUS REPORT

An attempt by the Office to electronically retrieve, under the Priority Document Exchange programs (PDX and DAS), 01113674.0 to which priority is claimed has FAILED on 10/22/2013.

For further questions or assistance, please contact our EBC Customer Support Center at

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MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston MA 02110

MAILED
OCT 21 2013
OFFICE OF PETITIONS

Doc Code: TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.: 14/032,183

1. THE REQUEST FILED September 19, 2013 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination

A. ☒ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;
B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
C. filing a **request for continued examination**;
D. filing a notice of appeal;
E. filing a request for suspension of action;
F. mailing of a notice of allowance;
G. mailing of a final Office action;
H. completion of examination as defined in 37 CFR 41.102; or
I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to JoAnne Burke at 571-272-4584. In his/her absence, calls may be directed to Brian Brown, 571-272-5338.

/JoAnne Burke/
[*Signature*]

Paralegal Specialist
(Title)

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/032,183	09/19/2013	1629	2320	120140-00110	15	4

CONFIRMATION NO. 2870

86738
MCCARTER & ENGLISH, LLP BOSTON
265 Franklin Street
Boston, MA 02110

FILING RECEIPT

OC000000064232693

Date Mailed: 10/11/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Andreas Bathe, Darmstadt, GERMANY;
Bernd Helfert, Ober-Ramstadt, GERMANY;
Steffen Neuenfeld, Messel, GERMANY;
Heike Kniel, Heppenheim, GERMANY;
Matthias Bartels, Darmstadt, GERMANY;
Susanne Rudolph, Dieburg, GERMANY;
Henning Bõttcher, Darmstadt, GERMANY;

Applicant(s)

Merck Patentgesellschaft, Darmstadt, GERMANY

Assignment For Published Patent Application

Merck Patentgesellschaft, Darmstadt, GERMANY

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 13/658,088 10/23/2012
which is a CON of 13/085,117 04/12/2011 PAT 8318744
which is a CON of 12/566,835 09/25/2009 PAT 7981894
which is a DIV of 12/110,704 04/28/2008 PAT 7834020
which is a DIV of 10/481,270 12/19/2003 PAT 7381726
which is a 371 of PCT/EP2002/006153 06/05/2002

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
EUROPEAN PATENT OFFICE (EPO) 01113674.0 06/19/2001

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

Request to Retrieve - This application either claims priority to one or more applications filed in an intellectual property Office that participates in the Priority Document Exchange (PDX) program or contains a proper **Request to Retrieve Electronic Priority Application(s)** (PTO/SB/38 or its equivalent). Consequently, the USPTO will attempt to electronically retrieve these priority documents.

If Required, Foreign Filing License Granted: 10/04/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/032,183**

Projected Publication Date: 01/23/2014

Non-Publication Request: No

Early Publication Request: No

Title

POLYMORPHIC FORMS OF
1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Preliminary Class

514

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/032,183

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	15 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 420 =	420
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2020

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

PTO/AIA/15 (03-13)
Approved for use through 01/31/2014. OMB 0651-0032
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UTILITY PATENT APPLICATION TRANSMITTAL

(ONLY FOR NEW NONPROVISIONAL APPLICATIONS UNDER 37 CFR 1.53(B))

Attorney Docket No.	120140-00110
First Named Inventor	Andreas Bathe
Title	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. [X] **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. [ ] **Applicant asserts small entity status.** See 37 CFR 1.27
3. [ ] **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. [X] **Specification** [*Total Pages* 57]
   Both the claims and abstract must start on a new page.
   (See MPEP § 608.01(a) for information on the preferred arrangement)
5. [X] **Drawing(s)** *(35 U.S.C. 113)* [*Total Sheets* 23]
6. **Inventor's Oath or Declaration** [*Total Pages* 6]
   (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))
   a. [ ] Newly executed (original or copy)
   b. [X] A copy from a prior application (37 CFR 1.63(d))
7. [X] **Application Data Sheet** **See note below.*
   See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. [ ] **CD-ROM or CD-R**
   In duplicate, large table, or Computer Program *(Appendix)*
   [ ] Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission**
   (if applicable, items a. – c. are required)
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or ii. [ ] Paper
   c. [ ] Statements verifying identity of above copies

ADDRESS TO: **Commissioner for Patents**
P.O. Box 1450
Alexandria, VA 22313-1450

ACCOMPANYING APPLICATION PARTS

10. [ ] **Assignment Papers**
    (cover sheet & document(s))
    Name of Assignee
11. [ ] **37 CFR 3.73(c) Statement** *(when there is an assignee)* [ ] **Power of Attorney**
12. [ ] **English Translation Document** *(if applicable)*
13. [X] **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    [X] Copies of citations attached
14. [X] **Preliminary Amendment**
15. [ ] **Return Receipt Postcard** *(MPEP § 503) (Should be specifically itemized)*
16. [ ] **Certified Copy of Priority Document(s)** *(if foreign priority is claimed)*
17. [ ] **Nonpublication Request** Under 35 U.S.C.122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. [x] Other: Certification and Request for Prioritized Exam

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

18. CORRESPONDENCE ADDRESS

[X] The address associated with Customer Number: 86738 ***OR*** [ ] Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature	/Danielle L. Herritt/	Date	September 19, 2013
Name (Print/Type)	Danielle L. Herritt	Registration No. (Attorney/Agent)	43,670

Docket No.: 120140-00110
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Andreas Bathe et al.

Application No.: Not Yet Assigned

Confirmation No.: Not Yet Assigned

Filed: Concurrently Herewith

Art Unit: Not Yet Assigned

For: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Examiner: Not Yet Assigned

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT (IDS)

Dear Madam:

Pursuant to 37 C.F.R. § 1.56, 1.97 and 1.98, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement accompanies the new patent application submitted herewith.

The present application is a continuation of U.S. Serial No. 13/658,088, filed October 23, 2012 (Atty. Docket No. 120140-00109), which is a continuation of U.S. Patent Application No. 13/085,117, filed April 12, 2011, now U.S. Patent No. 8,318,744 (Atty. Docket No. 120140-00106),

and relied upon in this application for an earlier filing date under 35 U.S.C. § 120. Certain references listed on the enclosed PTO Form SB/08 have been previously submitted to the Office in the prior application number 13/085,117, and, in accordance with 37 C.F.R. §1.98(d), copies of those references are not enclosed but will be provided upon request.

In accordance with 37 C.F.R. 1.97, Applicants wish to bring to the attention of the Examiner, the following commonly owned applications and patents:

Attorney Docket No.	US Patent Application No.	Filing Date	Status
120140-00101	10/481,270	19-Dec-2003	Granted as US Patent No. 7,381,726, issued 03-Jun-2008
120140-00102	12/110,704	28-Apr-2008	Granted as US Patent No. 7,834,020, issued 16-Nov-2010
120140-00103	12/566,835	25-Sep-2009	Granted as US Patent No. 7,981,894, issued 19-Jul-2011
120140-00104	12/945,260	12-Nov-2010	Abandoned; US Publication No. 2011/0183994 A1
120140-00105	12/945,272	12-Nov-2010	Granted as US Patent No. 8,193,195, issued 05-Jun-2012
120140-00106	13/085,117	12-Apr-2011	Granted as US Patent No. 8,318,744, issued 27-Nov-2012
120140-00107	13/100,911	04-May-2011	Abandoned; US Publication No. 2011/0294824 A1
120140-00108	13/100,948	04-May-2011	Granted as US Patent No. 8,236,804, issued 07-Aug-2012
120140-00109	13/658,088	23-Oct- 2012	Pending; US Publication No. 2013/0102616 A1

Patent numbers, Publication numbers, or Application numbers of the related applications are listed in the enclosed form PTO/SB/08. Applicants understand that papers from the prosecution of the above-identified cases may be accessed electronically via PAIR. Accordingly, copies of the foregoing applications or file histories thereof are not provided herein, but will be made available upon request.

In accordance with 37 C.F.R. § 1.97(g), the filing of this Information Disclosure Statement shall not be construed to mean that a search has been made or that no other material information as defined in 37 C.F.R. § 1.56(a) exists. In accordance with 37 C.F.R. § 1.97(h), the filing of this

Information Disclosure Statement shall not be construed to be an admission that any patent, publication or other information referred to therein is "prior art" for this invention unless specifically designated as such.

It is submitted that the Information Disclosure Statement is in compliance with 37 C.F.R. § 1.98 and the Examiner is respectfully requested to consider the listed references.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 50-4876, under Order No. 120140-00110.

Dated: September 19, 2013

Respectfully submitted,

Electronic signature: /Danielle L. Herritt/
Danielle L. Herritt
Registration No.: 43,670
MCCARTER & ENGLISH, LLP
265 Franklin Street
Boston, Massachusetts 02110
(617) 449-6500
(617) 607-9200 (Fax)
Attorney/Agent For Applicant

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (03-13)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Andreas Bathe	Nonprovisional Application Number (if known):	Not Yet Assigned
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid.
2. The application contains or is amended to contain no more than four independent claims and no more than thirty total claims, and no multiple dependent claims.
3. The applicable box is checked below:

I. [x] **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**

i (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii The executed inventor's oath or declaration is filed with the application. (37 CFR 1.63 and 1.64)

II. [ ] **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature	/Danielle L. Herritt/	Date	September 19, 2013
Name (Print/Typed)	Danielle L. Herritt	Practitioner Registration Number	43,670

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required*.*

[ ] *Total of 1 forms are submitted.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Andreas Bathe
Art Unit	N/A
Examiner Name	Not Yet Assigned
Attorney Docket Number	120140-00110

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5521241		1996-05-28	Wu	
	2	5532241		1996-07-02	Bottcher et al.	
	3	5723614		1998-03-03	Bathe et al.	
	4	5977112		1999-11-02	Bathe et al.	
	5	7381726		2008-06-03	Bathe et al.	
	6	7834020		2010-11-16	Bathe et al.	
	7	7981894		2011-07-19	Bathe et al.	
	8	8193195		2012-06-05	Bathe et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	9	8318744		2012-11-27	Bathe et al.	
	10	8236804		2012-08-07	Bathe et al.	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20110183994	A1	2011-07-28	Bathe et al.	
	2	20110294824	A1	2011-12-01	BATHE et al.	
	3	20130102616	A1	2013-04-25	BATHE et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	0648767	EP	A1	1995-04-19	Merck Patent Gmbh		☐
	2	0738722	EP	A1	1996-10-23	Merck Patent Gmbh		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	3	00/72832	WO	A2	2000-12-07	Merck Patent Gmbh		☐
	4	02/102794	WO	A2	2002-12-27	Merck Patent Gmbh		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Summary of Facts Regarding US Clinical Trials Prior to Jun. 5, 2001.	☐
	2	Sorbera, L.A. et al. "Vilazodone Hydrochloride. Antidepressant 5-HT .sub.1A Partial Agonist 5-HT Reuptake Inhibitor" Drugs of the Future 2001, 26(3):247-252. (Mar. 2001).	☐
	3	Remington Farmacia Tomo 2 19.sup.a edicion. (1998).	☐
	4	Farmacotecnia Teorica Y Practica Tomo iV, Dr. Jose Helman. (1980).	☐
	5	Hungarian Search Report of May 10, 2010, citing HU P0201275 which corresponds to WO 00/72832.	☐
	6	Office Action for U.S. Appl. No. 12/945,260, date of mailing Aug. 17, 2011.	☐
	7	Office Action for U.S. Appl. No. 12/945,272, date of mailing Aug. 17, 2011.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	8	Office Action for U.S. Appl. No. 13/100,911, date of mailing Nov. 9, 2011.	☐
	9	Office Action for U.S. Appl. No. 13/085,117, date of mailing Jan. 13, 2012.	☐
	10	Notice of Allowance for U.S. Appl. No. 12/945,272, date of mailing Mar. 19, 2012.	☐
	11	Corrected Notice of Allowance for U.S. Appl. No. 12/945,272, date of mailing Apr. 3, 2012.	☐
	12	Office Action for U.S. Appl. No. 13/100,911, date of mailing Mar. 23, 2012.	☐
	13	Office Action for U.S. Appl. No. 13/100,911, date of mailing Aug. 17, 2012.	☐
	14	Office Action for U.S. Appl. No. 13/085,117, date of mailing Apr. 3, 2012.	☐
	15	Notice of Allowance for U.S. Appl. No. 13/085,117, date of mailing Aug. 17, 2012.	☐
	16	Office Action for U.S. Appl. No. 13/100,948, date of mailing Nov. 18, 2011.	☐
	17	Office Action for U.S. Appl. No. 13/100,948, date of mailing Mar. 27, 2012.	☐
	18	Notice of Allowance for U.S. Appl. No. 13/100,948, date of mailing Jun. 4, 2012.	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

	19	Office Action for U.S. Appl. No. 13/658,088, date of mailing May 23, 2012.	☐
	20	Morissette, et al. Advanced Drug Delivery Reviews, 56, 2004, p. 275-300.	☐

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Andreas Bathe
	Art Unit	N/A
	Examiner Name	Not Yet Assigned
	Attorney Docket Number	120140-00110

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Danielle L. Herritt/	Date (YYYY-MM-DD)	2013-09-16
Name/Print	Danielle L. Herritt	Registration Number	43670

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Polymorphic forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoylbenzofuran-5-yl)piperazine hydrochloride

FIELD OF THE INVENTION

The present invention relates to novel compounds, to processes for preparing them and to their use in treating medical disorders.

BACKGROUND OF THE INVENTION

1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine, its physiologically acceptable salts thereof (US 5,532,241, column 7, lines 30 to 58), a process (US 5,532,241, Example 4) by which it/they can be prepared and their use in treating certain medical disorders are known from U.S. Patent US 5,532,241 and WO 00/72832.

Example 4 of US 5,532,241 describes the preparation of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride by reacting 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carboxybenzofuran-5-yl)piperazine at first with 2-chloro-1-methylpyridinium methanesulfonate in N-methylpyrrolidine and then with dried NH_3. Customary working up gives the free base 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carboxybenzofuran-5-yl)piperazine. 700 mg of the base are dissolved in 30 ml 2-propanol under heating and then treated with 0.1n 2-propanolic HCL-solution (Merck-Art. No. 1.00326) until precipitation of hydrochloride is complete. The precipitate was filtered off and washed with diethylether and dried at room temperature to yield 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride having a melting point of 269-272°C. There is no clear teaching elsewhere in the document of any alternative route or modification to the process which would generate new crystal modifications of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride or new solvates or hydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in different crystal modifications.

Former 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride having a melting point of 269-272°C was a mixture of amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, crystallized 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-

carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and the free base 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine.

Certain crystalline, i.e. morphological forms of pharmaceutical compounds may be of interest to those involved in the development of a suitable dosage form because if the morphological form is not held constant during clinical and stability studies, the exact dosage used or measured may not be comparable from one lot to the next. Once a pharmaceutical compound is produced for use, it is important to recognize the morphological form delivered in each dosage form to assure that the production process use the same form and that the same amount of drug is included in each dosage. Therefore, it is imperative to assure that either a single morphological form or some known combination of morphological forms is present. In addition, certain morphological forms may exhibit enhanced thermodynamic stability and may be more suitable than other morphological forms for inclusion in pharmaceutical formulations.

SUMMARY OF THE INVENTION

Methods for preparing pure crystals of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride have now been found. Furthermore, surprinsingly, 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride, six (five + dihydrochloride XIII) new forms of 1-[4-(5-Cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, three new forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate, six new forms of solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and pure amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride have been found as have processes for their preparation. These forms are hereinafter referred to as I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV and XVI respectively. Throughout the specification, the term “Form“ is generally used as a synonym for the term “modification“ or “crystalline modification“.

Accordingly, the present invention provides solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention furthermore provides 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrates in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention also provides 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrates in crystalline modifications and their use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention relates additionally to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in its crystalline modification and its use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct,

tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention relates additionally to pure amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride and its use for the treatment and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

BRIEF DESCRIPTION OF THE FIGURES

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Fig. 2 is an IR absorption spectra of Form II
Fig. 3 is an IR absorption spectra of Form XV
Fig. 4 is an IR absorption spectra of Form XI
Fig. 5 is an IR absorption spectra of Form XIV
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DETAILED DESCRIPTION OF THE INVENTION

It has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is able to form solvates in crystalline modifications. Examples of such solvates include solvates from water, solvates from alcohols such as methanol, ethanol, propan-1-ol or propan-2-ol; solvates from organic esters such as ethyl acetate; solvates from nitriles such as acetonitrile; solvates from ketones such as acetone and butanone; solvates from ethers such as tetrahydrofuran and solvates

from chlorinated hydrocarbons such as chloroform and solvates of hydrocarbons such as n-heptane or toluene. Preferred solvates are formed with polar solvents, preferably water, alcohols, organic esters, nitriles, ketones and ethers.

Preferably, 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride forms solvates with acetone, tetrahydrofuran, methanol, ethyl acetate or n-heptane in crystalline modifications that means the bound solvent together with 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride build the crystal structure. The molar ratio of the solvent to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride could vary as known to skilled persons in the art. Preferably, the molar ratio is between 0,25:1 to 2,5:1, more preferably between 0,5:1 to 1:1, most preferably 1:1. (n-heptan solvate 1/15 : 1)

It should be understood that the present solvates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of solvates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:

a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with acetone in Form I; (as hereinafter defined)

b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form II; (as hereinafter defined)

c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form XV; (as hereinafter defined)

d) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran in Form X; (as hereinafter defined)

e) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with methanol in Form XI; (as hereinafter defined)

f) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with n-heptane in Form XIV; (as hereinafter defined).

Generally, the specific crystalline forms of the present invention have certain advantages over the product obtained according to US 5,532,241. Among others, the most important advantages are:
reduced hygroscopicity,
better compressibility during the tablating process,
prolonged shelf life,
better thermodynamic stability, i.e. stabilty against heat and humidity,
better resitstance to sunlight, i.e. UV-light,
increased bulk density,
improved solubility,
bioavailability characteristics which are constant from one batch to the other,
better flow and handling properties in the tableting process,
improved color stabiltiy,
better filtration properties in the production process.

Therefore, by use of the crystalline forms of the present invention, it is possible to obtain galenic formulations having imporved homogenicity, stability, purity and uniformity from one batch to the other.

Form I according to the invention has the characteristic IR absorption spectra as shown in Fig. 1 and the characteristic X-ray diffraction pattern as shown in Fig. 12. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).
IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk. The spectra contains additionally a specific acetone absoption band at 1709cm^{-1}.

Form I can be further characterized with the aid of thermal analysis measured in the range of 30° to 350 °C. Fig. 28 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950)

measurements. Form I shows a desolvation process between 50°C and 180°C. Analysis by thermogravimetry showed the presence of 10 weight-% to 11 weight-% of acetone (theory of 1 : 1 solvate 10.82 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The molar ratio of acetone to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form I is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monoacetonate.

The invention also provides a process for preparing the above Form I according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in acetone
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 30°C and the boiling point of acetone, preferably between 40° C and 50°C
(3) precipitation of Form I at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

Alternatively, Form I can be prepared according to a process which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in acetone
(2) stirring at room temperature between a few hours or days, preferably 10 to 20 days,
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Form II according to the invention has the characteristic IR absorption spectra as shown in Fig. 2 and the characteristic X-ray diffraction pattern as shown in Fig. 13. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form II can be further characterized with the aid of thermal analysis measured in the range of 30° to 350°C. Fig. 29 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form II shows a desolvation process between 120°C and 180°C. Analysis by thermogravimetry showed the presence of 13 weight-% to 14 weight-% of THF (theory of 1 : 1 solvate 13.11 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The molar ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form II is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form II according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 60°C, preferably between 20° C and 30°C
(3) precipitation of Form II between -10°C and 10°C
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Alternatively, Form II can be prepared according to a process which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in tetrahydrofuran
(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

Form XV according to the invention has the characteristic IR absorption spectra as shown in Fig. 3 and the characteristic X-ray diffraction pattern as shown in Fig. 14. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XV can be further characterized with the aid of thermal analysis measured in the range of 30° to 350 °C. Fig. 39 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form XV shows a desolvation process between 75°C and 180°C. Analysis by thermogravimetry showed the presence of 13 weight-% to 14 weight-% of THF (theory of 1 : 1 solvate 13.11 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C. The molar ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in crystal modification of Form XV is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form XV according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between -10°C and 10°C, preferably between -5° C and +5°C
(3) precipitation of Form XV at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

Form X according to the invention has the characteristic X-ray diffraction pattern as shown in Fig. 15. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

The molar ratio of tetrahydrofuran to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 0,5:1, that means the compound of the invention in crystal modification of Form X is a hemisolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran.

The invention also provides a process for preparing the above Form X according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 40°C, preferably between 20° C and 30°C
(3) precipitation of Form X at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with

tetrahydrofuran by filtration, and drying at temperatures up to 80°C maximum.

Form XI according to the invention has the characteristic IR absorption spectra as shown in Fig. 4 and the characteristic X-ray diffraction pattern as shown in Fig. 16. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XI can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 37 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form XI shows a desolvation process between 75°C and 150°C. Analysis by thermogravimetry showed the presence of 6 weight-weight-% to 7 weight-weight-% of methanol (theory of 1 : 1 solvate 6.28 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C

The molar ratio of methanol to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is 1:1, that means the compound of the invention in the crystalline modification of Form XI is a monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with methanol.

The invention also provides a process for preparing the above Form XI according to the invention, which comprises:

(1) suspending Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in methanol at temperatures between 55°C and the boiling point of methanol

(2) cooling down the reaction mixture to temperatures between -40° and -10°C, preferably to -30°C

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate by filtration at room temperature, and drying in vacuo at room temperature.

Form XIV according to the invention has the characteristic IR absorption spectra as shown in Fig. 5 and the characteristic X-ray diffraction pattern as shown in Fig. 17. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. The spectra as shown in the figures were converted to transmission.

Form XIV can be further characterized with the aid of a thermal analysis measured in the range of 30°C and 350°C. Fig. 38 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Analysis by thermogravimetry showed the presence of 1 weight-% to 3 weight-% of n-heptane (theory of 15 : 1 solvate 1.37 weight-%, theory of 10 : 1 solvate 2.05 weight-%).

The molar ratio of n-heptane to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in said crystal modification is between 1:10 and 1:15, that means the compound of the invention in crystal modification of Form XIV is a solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane. The DSC measurement gives phase transitions between 80°C and 120°C and between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C

The invention also provides a process for preparing the above Form XIV according to the invention, which comprises:

(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in n-heptane
(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,

(3) recovering the precipitated solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane by filtration, and drying in vacuo at room temperature.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is able to form hydrates in crystalline modifications. Preferably, the molar ratio of water to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is between 0,25:1 to 2,5:1, more preferably between 0,5:1 to 1:1, most preferably 1:1.

It should be understood that the present hydrates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of hydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:
a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in Form V; (as hereinafter defined)
b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form VI; (as hereinafter defined)
c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate in Form VIII; (as hereinafter defined)

Form V according to the invention has the characteristic IR absorption spectra as shown in Fig. 6 and the characteristic X-ray diffraction pattern as shown in Fig. 18. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).
IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form V can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 32 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950)

measurements. Form V shows a dehydration process between 25°C and 100°C. Analysis by thermogravimetry showed the presence of 3 weight-% to 4 weight-% of water (theory of 1 : 1 solvate 3.63 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

Form V of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate according to the invention has surprising advantages with regard to its stability under conditions of high humidity. Form V according to the invention is obtained as colorless solid substance in form of well defined crystals.

The invention also provides a process for preparing the above Form V according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt
(3) precipitation of Form V at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

Alternatively, Form V can be prepared according to a process which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in water with an amount of 5 to 10 times more relating to Form IV
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature untill the forming of the monohydrate of Form V without excess of water.

Alternatively, Form V can be prepared according to a process which comprises:

(1) stirring of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride, which will be described later in detail, in water

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

Form VI according to the invention has the characteristic IR absorption spectra as shown in Fig. 7 and the characteristic X-ray diffraction pattern as shown in Fig. 19. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form VI can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 33 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form VI shows a dehydration process between 25°C and 100°C. Analysis by thermogravimetry showed the presence of 6 weight-% to 7 weight-% of water (theory of 1 : 1.75 solvate 6.19 weight-%). The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The invention also provides a process for preparing the above Form VI according to the invention, which comprises:

(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, which will be described later in detail, in water in which the relative proportions of salt to water are between 1:5 and 1:10

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature

Alternatively, Form VI can be prepared according to a process which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, in water for one hour

(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

Form VIII according to the invention has the characteristic IR absorption spectra as shown in Fig. 8 and the characteristic X-ray diffraction pattern as shown in Fig. 20. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form VIII can be further characterized with the aid of a thermal analysis measured in the range of 30°C to 350°C. Fig. 35 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. Form VIII shows a dehydration process between 25°C and 125°C. Analysis by thermogravimetry showed the presence of 1 weight-% to 2 weight-% of water (theory of 1 : 0.5 solvate 1.85 weight-%). The DSC measurement gives a melting of resulted form IX around 268°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

The invention also provides a process for preparing the above Form VIII according to the invention, which comprises:

(1) stirring of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, in water for more than 12 hours

(2) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

Alternatively, Form VIII can be prepared according to a process which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, in water for 12 hours

(2) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride form crystalline modifications as anhydrates.
It should be understood that the present anhydrates of the invention may contain unbound water that is to say water which is other than water of crystallization.

Preferred forms of anhydrates of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride include:
a) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form IV; (as hereinafter defined)
b) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form III; (as hereinafter defined)
c) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form VII; (as hereinafter defined)
d) 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in Form IX; (as hereinafter defined)

Form IV according to the invention has the characteristic IR absorption spectra as shown in Fig. 9 and the characteristic X-ray diffraction pattern as shown in Fig. 21. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form IV can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 31 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°C.

Owing to its crystalline properties, Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention has surprising advantages with regard to its solubility and for its pharmaceutical processing into solid dosage forms. The solubility of Form IV in water is 0,328 μg/ml. Form IV according to the invention is obtained as colorless solid substance in form of well defined crystals.
As shown in Figure 27, Form IV is the most stable form at higher temperatures, e.g. > 100°C.

The invention also provides a process for preparing the above Form IV according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C
(3) precipitation of Form V at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate Form V by filtration
(5) drying of Form V in vacuo at temperatures of 85° to 90°C to give Form IV.

Alternatively, Form IV can be prepared according to a process which comprises:

(1) drying of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate, as described above, at temperatures between 55° and 65°C to give Form IV.

This particular polymorphic form (herein designated "Form IV") has superior properties over other crystalline forms and is more suitable for inclusion in pharmaceutical formulations.

Form III according to the invention has the characteristic IR absorption spectra as shown in Fig. 10 and the characteristic X-ray diffraction pattern as shown in Fig. 22. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form III can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 30 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives a phase transition to form VII between 200°C and 260°C. The thermoanalytically resulting form VII melts between 280°C and 290°.

Owing to its crystalline properties, Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention is the most stable form at room temperature, that means the thermodynamically stable form at room temperature (Fig. 27). Form III according to the invention is obtained as colorless solid substance in form of well defined crystals.

The invention also provides a process for preparing the above Form III according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 40°C, preferably between 20° C and 30°C

(3) precipitation of Form II at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration

(5) drying of Form II in vacuo at temperatures of at least 100°C to give Form III.

Form VII according to the invention has the characteristic IR absorption spectra as shown in Fig. 11 and the characteristic X-ray diffraction pattern as shown in Fig. 23. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

IR absorption spectra were measured in the spectral range 4000 - 400 cm^{-1} on a Bruker IFS48. Spectral resolution was 2 cm^{-1}. Sample preparation was performed generally as KBr disk.

Form VII can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C. Fig. 34 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement indicates the melting point of the pure Form VII at 288°C.

Form VII is the high temperature form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to the invention. Form VII according to the invention is obtained as colorless solid substance in form of well defined crystals.

The invention also provides a process for preparing the above Form VII according to the invention, which comprises:

(1) tempering Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, at temperatures of at least 200°C, preferably at 250°C, for 30 minutes.

Form IX according to the invention has the characteristic X-ray diffraction pattern as shown in Fig. 24. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

Form IX can be further characterized with the aid of a thermal analysis measured in the range of 30° to 350 °C Fig. 36 shows the DSC (TA Instruments DSC 2920) and TGA (TA Instruments TGA 2950) measurements. The DSC measurement gives of the melting of form IX at 267°C followed by a recrystallisation to form VII. The thermoanalytically resulting form VII melts between 280°C and 290°C.

Form IX according to the invention is obtained as colorless solid substance in form of well defined crystals.

The invention also provides a process for preparing the above Form IX according to the invention, which comprises:

(1) drying of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride, as described above, at temperatures between 90°C and 110°C to give Form IX.

Additionally, it has been found that 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride form crystalline modifications.
It should be understood that the present dihydrochlorides of the invention may contain unbound water that is to say water which is other than water of crystallization.

A preferred form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in Form XIII; (as hereinafter defined).

Form XIII (dihydrochloride) according to the invention has the characteristic X-ray diffraction pattern as shown in Fig. 25. XRD pattern were recorded

using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

Form XIII according to the invention is obtained as colorless solid substance in form of well defined crystals.

The invention also provides a process for preparing the above Form XIII according to the invention, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in an organic solvent chosen from the group consisting of tetrahydrofuran, ethanol, isopropanol or mixtures thereof with water
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 2N or concentrated hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C
(3) precipitation of Form XIII at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII by filtration
(5) drying of Form XIII in vacuo at room temperature.

Preferably, the solvates of the present invention are in a form having a dense crystalline structure which enables the raw active ingredient to be easily formulated into final dosage form.

Additionally, Form XVI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride has been found.

Form XVI according to the invention has the characteristic X-ray diffraction pattern as shown in Fig. 26. XRD pattern were recorded using a x-ray powder diffractometer (Bruker AXS D5000) in transmission mode (Cu K alpha 1, PSD).

The invention also provides a process for preparing the above Form XVI according to the invention, which comprises:

(1) dissolving 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in acetonitrile and water in the molar ratio 1:1
(2) freeze-drying or spray-driying overnight to give Form XVI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

Similarly, the freeze-dry process can be performed in other mixtures of water miscible organic solvent (tetrahydrofuran, alcohols, N-methylpyrrolidon) with water.

Additionally, a pure amorphous Form of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride has been found.

It has been found that due to the solubility and bioavailability properties, Form II and Form VIII are useful as an ingredient of extended release formulations. Form II is especially useful as an ingredient of extended release formulations.

These Forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride or dihydrochloride, as referred to as Forms I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV and XVI respectively and all of which are hereinafter referred to as the "products of the invention" can be used to treat and prevent the disorders:
depressive disorders, including the sub-type disorders major depressive disorder and dysthymic disorder, adolescent depression, anxiety disorders, including the sub-type anxiety disorders chosen from the sub-types panic disorder with and/or without agoraphobia, agoraphobia, obsessive-compulsive spectrum disorders, social phobia, specific phobia including neophobia, posttraumatic stress disorder, acute stress indication or generalized-anxiety disorder, bipolar disorders, mania, dementia, including Alzheimer's disease and multi-infarct, substance-related disorders, sexual dysfunctions including premature ejaculation, eating disorders including anorexia nervosa and bulimia nervosa and/or obesity, fibromyalgia, chronic pain, sleeping disorders including dyssomnias and narcolepsy, psychiatric disorders like psychoses, schizophrenia or schizoaffective disorder,

cerebral infarct like stroke and cerebral ischemia, CNS disorders such as tension.
They are also useful for the therapy of side-effects in the treatment of hypertension (e.g. with α-methyldopa) and for the prophylaxis and therapy of cerebral disorders, in endocrinology and gynecology, e.g. for the treatment of acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome or undesired puerperal lactation.

These disorders are herein after referred to as "the Disorders".

The present invention further provides pharmaceutical compositions or medicaments comprising a Product of the Invention. The pharmaceutical composition may comprise additionally one or more conventional auxiliary substances and/or carriers.

Thus, the Products of the Invention can be formulated into the conventional forms of administration, including peroral and parenteral forms of administration. Tablets or capsules are preferred formulations. They can be produced by conventional mixing processes and with the use of conventional auxiliary substances and carriers, as well as binders, disintegrants, flavorings and the like. The dose corresponds to that mentioned in US 5,532,241.

Additionally, the invention relates to the use of a pharmaceutical composition containing at least one product of the invention for the treatment of the Disorders.

The following compositions are prefered:
A Composition comprising Form IV and Form V.
A Composition comprising Form IV and Form V in a molar ratio of about 100 to 1 to 10 to 1.
A Pharmaceutical preparation comprising an active ingredient consisting essentially of a mixture of Form IV and Form V.
A Pharmaceutical preparation comprising an active ingredient consisting essentially of a mixture of Form IV and Form V in a molar ratio of about 100 to 1 to 10 to 1.

An extended release formulation comprising Form I and/or Form III and/or form VIII is also preferred.

Furthermore, the present invention relates to the use of Products of the Invention for the manufacture of a medicament for the treatment of and prevention of the Disorders, such as depressive disorders, adolescent depression, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, chronic pain, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

The present invention further provides a method for treating and/or preventing any one or more of the Disorders by administering an effective and/or prophylactic amount of the Products of the Invention to a patient in need thereof.

Preferably, the Disorders which are treated are depression, anxiety disorders, more preferably social anxiety disorder, panic disorder generalised anxiety disorder, posttraumatic stress disorder and/or obsessive compulsive disorder.

Accordingly, the present invention is further concerned with pharmaceutical formulations comprising this polymorphic form as an active ingredient, and the use of this polymorphic form and its formulations in the treatment of certain disorders.

For the treatment of certain conditions it may be desirable to employ the specific crystalline forms of the present invention in conjunction with another pharmacologically active agent. It will be appreciated that the compound of the present invention may be presented together with another therapeutic agent as a combined preparation for simultaneous, separate or

sequential use for the relief of emesis. Such combined preparations may be, for example, in the form of a twin pack.

Without further elaboration, it is believed that one skilled in the art can, using the preceding description, utilize the present invention to its fullest extent. The preferred specific embodiments and examples are, therefore, to be construed as merely illustrative, and not limitative to the remainder of the disclosure in any way whatsoever.
The entire disclosures of all applications, patents, and publications cited above and below, are hereby incorporated by reference.

Examples

Example 1:

Production of Form I of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 80 ml of acetone. The temperature of the solution is allowed to come to 50°C and 0,5 ml of 1N hydrochloric acid is added to the reaction mixture. After stirring for 2 to 3 minutes the reaction mixture is cooled to room temperature and precipitation occurs. Suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate Form I.

Method 2:

2,25 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 200 ml of acetone. After stirring for 14 days the precipitated crystals are recovered by filtration, and drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate Form I which present the IR absorption spectra of Fig. 1 and the x-ray diffraction spectrum of Fig. 12.

Example 2:

Production of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 46,6 g tetrahydrofuran and 2,2 g 1N hydrochloric acid is added to the reaction mixture. After precipitation and stiring for 30 minutes suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to the monosolvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form II which present the IR absorption spectra of Fig. 2 and the x-ray diffraction spectrum of Fig. 13.

Method 2:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 400 ml of tetrahydrofuran. After stirring for 20 days the precipitated crystals are recovered by filtration. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form II.

Example 3:

Production of Form XV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

10 ml of 1N hydrochlorid acid are added to a solution of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in tetrahydrofuran [200 ml] (molar ratio base to tetrahydrofuran = 1:48) at 0°C. After stirring for 30 min the precipitated crystals are recovered by filtration. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form XV which present the IR absorption spectra of Fig. 3 and the x-ray diffraction spectrum of Fig. 14.

Example 4:

Production of Form X of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

8,6 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in tetrahydrofuran and 19,4 ml 1N hydrochloric acid and 7,4 ml water are added within 30 minutes to this solution at 35-37°C. After stirring of five hours, precipitation occurs and suction filtration is effected. Drying in vacuo at room temperature to constant weight leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with tetrahydrofuran of Form X which present the x-ray diffraction spectrum of Fig. 15.

Example 5:

Production of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form IV are dispersed in 500 ml of methanol at 60°C. The reaction mixture is cooled to -30°C and precipitation occurs. Suction filtration of the prepcipitated crystals is effected at room temperature. Drying in vacuo to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate of Form XI which present the IR absorption spectra of Fig. 4 and the x-ray diffraction spectrum of Fig. 16.

Example 6:

Production of Form XIV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

3,6 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form III are dispersed in 75 ml of n-heptane. After stirring for three weeks suction filtration of the prepcipitated crystals is effected at room temperature. Drying in vacuo to constant weight at room temperature leads to the solvate of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride with n-heptane of

Form XIV which present the IR absorption spectra of Fig. 5 and the x-ray diffraction spectrum of Fig. 17.

Example 7:

Production of Form V of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

To a solution of 1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in 32,6 g tetrahydrofuran 2,1 g hydrochloric acid (37weight-%) are added. After stirring suction filtration of the precipitated crystals is effected. Drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V which present the IR absorption spectra of Fig. 6 and the x-ray diffraction spectrum of Fig. 18.

Method 2:

2,25 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form IV are dispersed in 10 bis 20 g water. After stirring for 24 to 48 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V.

Method 3:

10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII are dispersed in 1 l water. After stirring for 48 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form V.

Example 8:

Production of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 2:
10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form II are dispersed in 100 ml water. After stirring for 1 hour the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VI.

Example 9:
Production of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:
1 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form VI are dispersed in 10 ml water. After stirring for 12 hours the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VIII which present the IR absorption spectra of Fig. 8 and the x-ray diffraction spectrum of Fig. 20.

Method 2:
10 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride Form II are dispersed in 10 to 20 g water. After stirring for more than 1 hour the crystals are recovered by filtration, and drying in vacuo to constant weight at room temperature leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate of Form VIII. (After stirring for about 1 hour Form VI ocurrs as an intermediate which is subsequently converted into Form VIII)

Example 10:
Production of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1:

Drying of Form V prepared according to example 7 in vacuo to constant weight at 85° to 90°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV which present the IR absorption spectra of Fig. 9 and the x-ray diffraction spectrum of Fig. 21.

Method 2:
Drying of Form XI prepared according to example 5 in vacuo to constant weight at 60°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV.

Example 11:
Production of Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Drying of Form II prepared according to example 2 in vacuo to constant weight at 100° to 110°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form III which present the IR absorption spectra of Fig. 10 and the x-ray diffraction spectrum of Fig. 22.

Example 12:
Production of Form VII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Tempering of Form IV prepared according to example 10 for 10 minutes at 250°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form VII which present the IR absorption spectra of Fig. 11 and the x-ray diffraction spectrum of Fig. 23.

Example 13:
Production of Form IX of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Drying of Form VIII prepared according to example 9 in vacuo to constant weight at 100° to 110°C leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-

carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IX which present the x-ray diffraction spectrum of Fig. 24.

Example 14:

Production of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride:

3 g of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine is dissolved in 100 ml of tetrahydrofuran and 10 ml of 2N or concentrated hydrochloric acid. After stirring for 2 to 3 minutes suction filtration of the precipitated crystals is effected. Drying in vacuo at room temperature to constant weight leads to 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride of Form XIII which present the characteristic x-ray diffraction spectrum of Fig. 25.

Example 15:

Production of Form XVI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride:

Method 1: Freeze-dry

500 mg of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, III, VII or IX are dissolved in a mixture of 100 ml acetonitril and 100 ml water. The solution is freeze-dried over night to yield 500 mg of a white powder which present the characteristic x-ray diffraction spectrum of Fig. 26.

Advantage: 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride is better soluble in the solvent mixture than in each solvent alone. Similarly the freeze-dry process can be performed in other mixtures of water miscible organic solvent (tetrahydrofuran, alcohols, N-methylpyrrolidon) with water.

Method 2:

b) Spray-dry

500 mg 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, III, VII or IX are dissolved in a mixture

of 100 ml acetonitril and 100 ml water. The solution is spray-dried to yield Form XVI.

Example 16:

Solubility data of Forms II, III, IV, V, VI and VIII are measured according to Alex Avdeef et al, Pharm. Pharmacol. Commun. 1998, 4, 165-178 and Alex Avdeef et al, Pharmaceutical Research 2000, 17, 85-89 via potentiometric titration.

The pSOLTM solubility profiler, automatically collects potentiometric data, calculates the pH-solubility profiles, and prints the values at 0.1 pH unit intervals. Intrinsic solubilities in the milli-, micro- and nanogram levels can be determined. Also presented are two new concepts, the Flux Factor Profile and Dose Limit Profile. Both concepts follow the guidelines consistent with the BioPharmaceutics Classification Scheme.

Table II:
Solubility data in μg/ml

Form I	Form II	Form III	Form IV	Form V	Form VI	Form VIII
0.08	0,03	0,12	0,33	0,18	0,23	0,10

Below are given the most relevant peaks of the IR-spectra of the individual Forms:
Form I
3459 (m), 3335 (w), 3271 (m), 3252 (w), 3202 (m), 3180 (m), 3148 (m), 3039 (w), 3009 (w), 2941 (m), 2868 (m), 2847 (m), 2660 (m), 2579 (m), 2487 (w), 2451 (m), 2212 (m), 1761 (w), 1711 (s), 1673 (s), 1617 (m), 1597 (s), 1577 (m), 1473 (m), 1468 (m), 1444 (m), 1423 (w), 1400 (m), 1364 (s), 1319 (w), 1302 (w), 1279 (w), 1265 (m), 1244 (w), 1225 (s), 1197 (w), 1184 (m), 1171 (m), 1136 (w), 1115 (m), 1100 (m), 1093 (sh), 1034 (w), 1013 (w), 973 (w), 956 (m), 939 (m), 925 (w), 881 (m), 864 (m), 841 (w), 832 (w), 821 (m), 801 (m), 762 (m), 738 (m), 730 (w), 689 (sh), 673 (m), 644 (m), 622 (w), 607 (w), 580 (w), 543 (w), 534 (w), 508 (m), 500 (m), 491 (m), 471 (w), 454 (w).

Form II

3458 (m), 3424 (sh), 3348 (w), 3277 (w), 3204 (m), 3184 (m), 3036 (w), 3008 (w), 2972 (sh), 2938 (m), 2863 (m), 2659 (m), 2597 (m), 2579 (m), 2556 (m), 2459 (m), 2210 (m), 1736 (w), 1677 (s), 1618 (m), 1601 (s), 1578 (m), 1552 (sh), 1474 (m), 1446 (m), 1402 (m), 1376 (m), 1368 (m), 1320 (m), 1302 (w), 1275 (w), 1262 (m), 1250 (m), 1221 (m), 1198 (w), 1186 (m), 1169 (m), 1156 (w), 1131 (w), 1116 (w), 1101 (w), 1065 (m), 1034 (w), 1011 (w), 974 (w), 955 (m), 941 (m), 925 (w), 913 (w), 881 (m), 859 (w), 833 (w), 817 (w), 809 (w), 800 (m), 762 (w), 739 (w), 694 (w), 676 (w), 640 (m), 607 (w), 583 (w), 542 (w), 506 (w), 495 (w), 455 (w).

Form III

3460 (m), 3337 (w), 3269 (m), 3257 (m), 3177 (m), 3145 (m), 3061 (m), 3033 (m), 3001 (w), 2936 (m), 2922 (sh), 2865 (m), 2837 (w), 2787 (w), 2655 (m), 2591 (m), 2457 (m), 2218 (m), 1674 (s), 1618 (m), 1598 (s), 1577 (m), 1473 (m), 1463 (m), 1453 (sh), 1445 (m), 1402 (m), 1380 (m), 1368 (m), 1356 (m), 1329 (m), 1320 (m), 1304 (w), 1284 (w), 1265 (m), 1256 (m), 1240 (m), 1226 (m), 1215 (m), 1186 (m), 1172 (m), 1124 (m), 1097 (m), 1088 (sh), 1059 (w), 1035 (w), 987 (w), 955 (m), 941 (m), 924 (w), 918 (sh), 879 (m), 853 (w), 835 (w), 809 (m), 800 (m), 784 (w), 762 (m), 736 (w), 677 (w), 659 (w), 629 (m), 608 (w), 581 (w), 544 (w), 495 (w), 478 (m), 454 (w).

Form IV

3437 (m), 3328 (w), 3273 (w), 3030 (m), 3006 (m), 2987 (m), 2938 (m), 2915 (m), 2875 (m), 2845 (m), 2660 (m), 2459 (m), 2222 (s), 1899 (w), 1670 (s), 1602 (s), 1577 (s), 1475 (m), 1444 (s), 1370 (s), 1320 (m), 1304 (m), 1281 (m), 1275 (m), 1249 (m), 1227 (s), 1186 (m), 1162 (m), 1141 (w), 1131 (w), 1112 (m), 1099 (w), 1082 (w), 1032 (w), 971 (w), 951 (m), 942 (m), 909 (w), 881 (m), 854 (w), 822 (m), 768 (w), 733 (w), 691 (w), 660 (w), 642 (w), 628 (w), 607 (w), 581 (w), 526 (m), 502 (w), 493 (w), 471 (w), 461 (w).

Form V

3483 (s), 3460 (s), 3222 (s), 3192 (m), 3007 (w), 2947 (m), 2864 (w), 2838 (w), 2784 (w), 2682 (m), 2606 (m), 2478 (w), 2461 (w), 2219 (m), 1669 (s), 1604 (s), 1575 (m), 1474 (m), 1461 (m), 1444 (m), 1402 (m), 1382 (m),

1371 (sh), 1362 (m), 1321 (w), 1304 (w), 1271 (m), 1263 (sh), 1247 (m), 1226 (m), 1185 (m), 1160 (m), 1137 (w), 1113 (m), 1101 (w), 1091 (w), 1082 (w), 1058 (w), 1048 (w), 1030 (w), 1008 (w), 972 (w), 954 (m), 942 (m), 917 (w), 883 (w), 857 (w), 822 (m), 815 (m), 767 (w), 739 (w), 682 (w), 661 (w), 641 (w), 624 (w), 591 (w), 583 (w), 529 (m), 499 (w).

Form VI

3410 (s), 3334 (sh), 3271 (s), 3217 (s), 3188 (s), 3172 (s), 3032 (sh), 2938 (m), 2915 (m), 2846 (m), 2675 (m), 2581 (m), 2539 (sh), 2449 (m), 2216 (s), 1670 (s), 1603 (s), 1593 (s), 1577 (s), 1470 (m), 1444 (s), 1397 (m), 1381 (s), 1369 (sh), 1350 (m), 1323 (m), 1304 (m), 1272 (m), 1247 (m), 1219 (s), 1187 (m), 1164 (m), 1132 (m), 1120 (m), 1099 (m), 1030 (w), 1008 (w), 983 (w), 960 (m), 942 (m), 920 (w), 887 (m), 854 (w), 838 (w), 815 (m), 776 (sh), 767 (w), 739 (w), 727 (sh), 677 (w), 655 (w), 635 (m), 607 (w), 542 (w), 530 (w), 499 (w), 472 (w), 426 (w).

Form VII

3480 (sh), 3459 (s), 3166 (m), 3146 (m), 3031 (m), 3007 (m), 2926 (m), 2870 (sh), 2853 (m), 2664 (m), 2570 (m), 2540 (sh), 2460 (m), 2221 (m), 1673 (s), 1613 (sh), 1592 (s), 1578 (sh), 1552 (m), 1475 (m), 1445 (m), 1398 (m), 1366 (m), 1319 (m), 1303 (m), 1275 (m), 1248 (m), 1226 (m), 1187 (m), 1177 (m), 1161 (m), 1133 (w), 1114 (w), 1101 (w), 1033 (w), 1009 (w), 973 (w), 952 (m), 942 (m), 925 (w), 919 (w), 882 (m), 855 (w), 823 (m), 815 (m), 769 (w), 735 (w), 690 (w), 642 (m), 627 (w), 608 (w), 581 (w), 571 (w), 559 (w), 547 (w), 501 (w).

Form VIII

3379 (m), 3342 (m), 3298 (m), 3234 (m), 3188 (s), 3141 (s), 3027 (w), 2938 (m), 2866 (w), 2844 (m), 2787 (w), 2729 (w), 2679 (m), 2598 (m), 2210 (s), 1658 (s), 1611 (s), 1576 (w), 1556 (m), 1472 (m), 1464 (m), 1443 (s), 1404 (s), 1385 (sh), 1369 (m), 1331 (sh), 1321 (m), 1302 (w), 1286 (w), 1264 (w), 1249 (m), 1230 (s), 1177 (m), 1162 (m), 1128 (w), 1117 (w), 1099 (w), 1084 (w), 1033 (w), 1008 (w), 971 (w), 958 (m), 941 (m), 926 (w), 917 (w), 898 (w), 882 (w), 870 (w), 857 (w), 836 (w), 826 (w), 803 (s), 767 (w), 733 (w), 687 (m), 655 (w), 641 (m), 618 (w), 599 (w), 554 (w), 535 (w), 503 (w), 493 (w), 470 (w), 439 (w).

Form XI

3415 (s), 3290 (m), 3282 (m), 3234 (s), 3196 (s), 3176 (s), 3005 (m), 2993 (m), 2938 (m), 2849 (m), 2678 (m), 2629 (m), 2592 (m), 2473 (m), 2457 (m), 2217 (s), 1680 (s), 1673 (s), 1608 (s), 1594 (sh), 1576 (s), 1474 (m), 1457 (sh), 1440 (s), 1427 (sh), 1401 (m), 1372 (m), 1365 (m), 1354 (m), 1321 (m), 1304 (sh), 1281 (m), 1263 (w), 1247 (m), 1236 (m), 1222 (s), 1185 (m), 1175 (m), 1169 (m), 1160 (sh), 1128 (m), 1121 (m), 1100 (m), 1086 (m), 1032 (w), 1019 (w), 978 (w), 958 (m), 942 (m), 921 (w), 893 (w), 884 (m), 856 (m), 813 (m), 775 (w), 764 (w), 739 (w), 731 (w), 699 (w), 673 (m), 658 (w), 634 (m), 608 (m), 567 (m), 544 (m), 535 (w), 502 (w), 492 (w), 476 (w), 466 (w), 455 (w).

Form XIV

3458 (s), 2923 (m), 2853 (m), 2696 (w), 2595 (w), 2456 (w), 2218 (m), 1674 (s), 1617 (m), 1598 (s), 1580 (sh), 1559 (sh), 1472 (m), 1445 (m), 1401 (m), 1383 (m), 1369 (m), 1321 (m), 1304 (w), 1263 (sh), 1240 (m), 1226 (m), 1216 (m), 1186 (m), 1169 (m), 1159 (m), 1123 (m), 1096 (m), 1057 (w), 1034 (w), 986 (w), 956 (m), 941 (m), 924 (w), 883 (w), 864 (w), 853 (m), 810 (m), 801 (m), 762 (m), 735 (m), 641 (w), 629 (m), 501 (m).

Form XV

3458 (s), 3281 (m), 3227 (m), 3187 (sh), 2935 (m), 2925 (sh), 2866 (w), 2701 (w), 2594 (w), 2455 (w), 2217 (m), 1675 (s), 1617 (m), 1598 (m), 1578 (m), 1472 (m), 1444 (m), 1401 (m), 1380 (m), 1369 (m), 1357 (sh), 1320 (w), 1303 (w), 1265 (m), 1241 (m), 1227 (m), 1215 (m), 1203 (w), 1186 (w), 1172 (m), 1123 (w), 1097 (w), 1087 (w), 1032 (w), 986 (w), 956 (w), 941 (m), 924 (w), 882 (w), 853 (w), 835 (w), 812 (w), 802 (w), 762 (w), 736 (w), 676 (w), 641 (w), 630 (w).

Below are given the most relevant peaks of the Raman-spectra of the individual Forms with an estimated accuracy of +/- 5 cm^{-1}:

Form I:

3128 (m), 3071 (m), 3044 (w), 3011 (w), 2993 (m), 2975 (m), 2956 (m), 2912 (m), 2868 (m), 2849 (m), 2214 (s), 1674 (m), 1618 (m), 1594 (s), 1578 (s), 1553 (m), 1475 (w), 1446 (m), 1400 (w), 1367 (m), 1347 (m), 1337 (m),

1322 (m), 1303 (m), 1282 (m), 1267 (m), 1244 (s), 1229 (m), 1184 (m), 1174 (m), 1138 (m), 1097 (m), 1052 (m), 1033 (m), 1014 (m), 974 (w), 957 (w), 940 (m), 925 (w), 914 (w), 881 (m), 836 (w), 818 (m), 794 (w), 783 (w), 767 (w), 753 (w), 729 (w), 693 (w), 674 (w), 658 (w), 644 (w), 625 (w), 608 (w), 587 (w), 581 (w), 540 (w), 503 (w), 492 (w), 477 (w), 443 (w), 438 (w), 407 (w), 380 (w), 328 (w), 298 (w), 268 (w), 252 (w), 230 (w), 211 (w).

Form II:
3128 (w), 3113 (w), 3068 (m), 3040 (w), 3031 (w), 2992 (m), 2974 (m), 2957 (m), 2905 (m), 2865 (m), 2850 (m), 2222 (m), 2210 (s), 1679 (m), 1617 (m), 1603 (s), 1579 (s), 1552 (m), 1476 (w), 1447 (m), 1404 (w), 1369 (m), 1358 (m), 1347 (m), 1323 (m), 1304 (m), 1277 (m), 1266 (m), 1245 (m), 1233 (w), 1220 (w), 1186 (m), 1176 (m), 1134 (w), 1102 (w), 1051 (m), 1033 (m), 1010 (w), 974 (w), 957 (w), 942 (m), 927 (w), 917 (w), 882 (m), 862 (w), 846 (w), 830 (m), 819 (m), 786 (w), 767 (w), 755 (w), 735 (w), 695 (w), 679 (w), 661 (w), 641 (w), 632 (w), 608 (w), 586 (w), 541 (w), 506 (w), 495 (w), 477 (w), 447 (w), 438 (w), 405 (w), 379 (w), 330 (w), 298 (w), 270 (w), 255 (w), 228 (w), 212 (m).

Form III:
3128 (w), 3087 (sh), 3061 (m), 2995 (m), 2984 (m), 2966 (m), 2957 (m), 2939 (m), 2916 (m), 2867 (m), 2790 (w), 2220 (s), 1675 (m), 1619 (s), 1595 (s), 1579 (s), 1554 (m), 1476 (w), 1446 (m), 1404 (w), 1376 (w), 1352 (m), 1328 (m), 1303 (m), 1285 (m), 1272 (m), 1266 (m), 1247 (s), 1228 (w), 1215 (w), 1170 (m), 1137 (w), 1098 (m), 1058 (w), 1034 (w), 989 (w), 957 (m), 942 (m), 924 (m), 884 (m), 858 (w), 839 (m), 826 (m), 783 (w), 752 (w), 731 (w), 702 (w), 678 (w), 659 (w), 628 (w), 609 (w), 581 (w), 563 (w), 546 (w), 496 (w), 482 (w), 469 (w), 444 (w), 409 (m), 367 (w), 352 (w), 328 (w), 285 (w), 264 (w), 249 (w), 212 (m).

Form IV:
3160 (w), 3145 (w), 3109 (m), 3073 (m), 3008(w), 2987 (m), 2973 (m), 2959 (w), 2936 (w), 2910 (m), 2870 (w), 2849 (m), 2797 (w), 2226 (s), 1665 (w), 1622 (m), 1588 (s), 1549 (m), 1478 (m), 1445 (m), 1410 (w), 1355 (m), 1346 (m), 1322 (m), 1277 (m), 1252 (m), 1189 (m), 1144 (w), 1116 (m), 1049 (w), 1034 (w), 1005 (w), 973 (w), 943 (m), 927 (w), 916 (w), 883 (m),

831 (m), 817 (w), 770 (w), 757 (w), 736 (w), 695 (w), 685 (w), 661 (w), 642 (w), 628 (w), 610 (w), 587 (w), 536 (w), 504 (w), 493 (w), 475 (w), 460 (w), 439 (w), 409 (w), 390 (w), 344 (w), 317 (w), 277 (w), 248 (w), 223 (w).

Form V::
3112 (w), 3091 (m), 3074 (m), 3028 (w), 3004 (w), 2081 (m), 2933 (w), 2919 (m), 2866 (w), 2841 (w), 2787 (w), 2222 (s), 1663 (w), 1618 (m), 1607 (m), 1577 (s), 1552 (m), 1478 (m), 1440 (m), 1406 (w), 1381 (m), 1358 (m), 1342 (m), 1321 (m), 1307 (m), 1276 (m), 1252 (m), 1235 (m), 1189 (m), 1143 (w), 1105 (w), 1092 (w), 1052 (w), 1012 (w), 974 (w), 944 (m), 927 (w), 918 (w), 885 (m), 860 (w), 847 (w), 830 (m), 771 (m), 757 (w), 736 (w), 696 (w), 684 (w), 660 (w), 642 (w), 626 (w), 610 (w), 583 (w), 541 (m), 501 (w), 478 (w), 441 (w), 410 (w), 381 (w), 323 (w), 302 (w), 282 (w), 239 (w), 226 (w).

Form XI:
3133 (m), 3094 (w), 3078 (m), 3060 (m), 3004 (w), 2989 (m), 2968 (m), 2943 (m), 2923 (w), 2897 (m), 2871 (w), 2852 (w), 2835 (w), 2221 (s), 1676 (m), 1613 (s), 1578 (s), 1544 (m), 1473 (m), 1447 (m), 1424 (m), 1401 (w), 1375 (m), 1353 (m), 1342 (m), 1325 (m), 1302 (m), 1279 (m), 1264 (m), 1246 (m), 1233 (m), 1222 (w), 1197 (w), 1186 (w), 1171 (m), 1130 (w), 1102 (w), 1078 (m), 1049 (w), 1018 (w), 983 (w), 959 (w), 942 (m), 923 (m), 886 (m), 857 (w), 838 (m), 817 (m), 765 (w), 749 (w), 733 (w), 698 (w), 673 (w), 658 (w), 634 (w), 627 (w), 609 (w), 566 (w), 546 (w), 535 (w), 503 (w), 492 (w), 481 (w), 467 (w), 440 (w), 432 (w), 406 (m), 366 (w), 354 (w), 327 (w), 285 (w), 241 (w).

Form XIV:
3128 (w), 3061 (m), 3002 (m), 2995 (m), 2983 (w), 2966 (m), 2957 (m), 2938 (m), 2914 (m), 2867 (m), 2219 (s), 1675 (m), 1619 (s), 1596 (s), 1579 (s), 1554 (m), 1475 (w), 1446 (m), 1404 (w), 1374 (w), 1352 (m), 1329 (w), 1322 (w), 1303 (m), 1285 (m), 1273 (m), 1265 (m), 1247 (m), 1228 (w), 1216 (w), 1204 (w), 1187 (w), 1170 (m), 1137 (w), 1098 (m), 1058 (w), 1034 (w), 989 (w), 958 (w), 942 (m), 924 (m), 884 (m), 858 (w), 840 (m), 825 (w), 782 (w), 752 (w), 732 (w), 701 (w), 678 (w), 657 (w), 629 (w), 609 (w), 581

(w), 563 (w), 546 (w), 536 (w), 496 (w), 482 (w), 469 (w), 443 (w), 409 (m), 397 (w), 367 (w), 328 (w), 319 (w), 286 (w), 265 (w), 248 (w), 212 (w).

Table III:

Data of powder-XRD-pattern of polymorphic Forms.

(10 characteristic peaks of each polymorph have been taken for evaluation. The XRD instrument is controlled for 2Theta ±0.1 °).

Form I:

No.	d (Å)	2θ	I/I_0
1	8,501	10,40	21
2	7,898	11,19	17
3	6,606	13,39	31
4	6,532	13,54	25
5	6,416	13,79	26
6	5,590	15,84	28
7	4,210	21,09	63
8	3,761	23,64	18
9	3,632	24,49	100
10	3,452	25,79	26

Form II:

No.	d (Å)	2θ	I/I_0
1	8,426	10,49	29
2	7,541	11,73	25
3	6,742	13,12	41
4	6,119	14,46	33
5	5,455	16,24	39
6	4,592	19,32	30
7	4,425	20,05	26
8	4,083	21,75	54

9	3,782	23,50	100
10	3,380	26,35	37

Form III:

No.	d (Å)	2θ	I/I_0
1	15,165	5,82	32
2	8,034	11,00	27
3	5,944	14,89	27
4	5,224	16,96	23
5	5,089	17,41	15
6	4,932	17,97	18
7	4,195	21,16	23
8	4,029	22,05	35
9	3,520	25,28	100
10	3,181	28,03	16

Form IV:

No.	d (Å)	2θ	I/I_0
1	9,732	9,08	22
2	6,885	12,85	10
3	6,102	14,50	22
4	5,246	16,89	9
5	4,695	18,89	100
6	4,344	20,43	20
7	4,088	21,72	12
8	3,615	24,61	67
9	3,258	27,35	17
10	3,164	28,18	12

Form V:

No.	d (Å)	2θ	I/I_0
1	9,466	9,34	14
2	8,166	10,83	15
3	6,807	13,00	20
4	6,569	13,47	12
5	4,742	18,70	16
6	4,563	19,44	100
7	4,416	20,09	32
8	4,231	20,98	12
9	3,503	25,41	64
10	3,408	26,13	14

Form VI:

No.	d (Å)	2θ	I/I_0
1	9,762	9,05	29
2	8,841	10,00	17
3	6,780	13,05	52
4	4,250	20,89	42
5	4,177	21,26	100
6	3,888	22,85	37
7	3,846	23,11	20
8	3,766	23,61	41
9	3,724	23,87	17
10	3,594	24,76	20

Form VII:

No.	d (Å)	2θ	I/I_0
1	8,472	10,43	18
2	6,336	13,97	10
3	5,476	16,17	10

4	4,893	18,12	9
5	4,664	19,01	100
6	4,236	20,96	30
7	3,676	24,19	10
8	3,609	24,65	71
9	3,561	24,99	8
10	3,071	29,05	16

Form VIII:

No.	d (Å)	2θ	I/I_0
1	7,656	11,55	18
2	6,672	13,26	34
3	6,538	13,53	20
4	5,721	15,48	20
5	5,244	16,89	54
6	4,700	18,87	25
7	4,475	19,82	45
8	4,330	20,49	34
9	3,745	23,74	100
10	3,240	27,50	20

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Form IX:

No.	d (Å)	2θ	I/I_0
1	7,044	12,56	31
2	6,712	13,18	22
3	5,487	16,14	40
4	5,218	16,98	30
5	4,897	18,10	46
6	4,714	18,81	42
7	4,445	19,96	67
8	3,554	25,04	100

9	3,333	26,72	32
10	3,173	28,10	31

Form X:

No.	d (Å)	2θ	I/I_0
1	15,817	5,58	31
2	9,123	9,69	23
3	8,280	10,68	27
4	7,953	11,12	28
5	6,561	13,48	42
6	6,440	13,74	36
7	5,507	16,08	35
8	4,167	21,30	98
9	4,132	21,49	49
10	3,576	24,88	100

Form XI:

No.	d (Å)	2θ	I/I_0
1	10,348	8,54	39
2	7,077	12,50	25
3	6,717	13,17	28
4	4,778	18,56	23
5	4,599	19,28	34
6	4,490	19,76	100
7	4,239	20,94	51
8	4,186	21,21	18
9	3,504	25,40	66
10	3,391	26,26	69

Form XIII:

No.	d (Å)	2θ	I/I_0
1	6,579	13,45	85
2	6,121	14,46	63
3	5,424	16,33	28
4	5,047	17,56	47
5	4,884	18,15	21
6	4,344	20,43	64
7	4,301	20,63	25
8	4,181	21,24	100
9	3,414	26,08	45
10	3,145	28,36	23

Form XIV:

No.	d (Å)	2θ	I/I_0
1	15,012	5,88	29
2	7,980	11,08	20
3	5,182	17,10	24
4	4,886	18,14	100
5	4,189	21,19	20
6	3,999	22,21	24
7	3,494	25,47	64
8*			
9*			
10*			

* Further peaks exhibit intensities < 3*noise.

Form XV:

No.	d (Å)	2θ	I/I_0
1	16,422	5,38	27
2	9,225	9,58	55

3	8,281	10,68	38
4	6,430	13,76	66
5	5,541	15,98	44
6	3,985	22,29	65
7	3,782	23,50	43
8	3,592	24,77	60
9	3,389	26,28	100
10	3,358	26,52	30

Form XVI:

No.	d (Å)	2θ	I/I_0
1	11,249	7,85	36
2	10,139	8,71	46
3	8,348	10,59	100
4	4,555	19,47	31
5	4,201	21,13	51
6	3,955	22,46	50
7	3,749	23,72	40
8	3,629	24,51	87
9	3,325	26,79	44
10	2,817	31,74	44

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Claims

1. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate in its crystalline modification.

2. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monoacetonate in crystalline modification I.

3. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride as monosolvate with tetrahydrofuran in crystalline modification II.

4. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monosolvate with tetrahydrofuran in crystalline modification XV.

5. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemisolvate with tetrahydrofuran in crystalline modification X.

6. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate in crystalline modification XI.

7. A solvate according to claim 1 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monosolvate with n-heptane in crystalline modification XIV.

8. A pharmaceutical composition comprising a compound according to any one of claims 1 to 7.

9. Use of compounds according to any one of claims 1 to 7 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania,

dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

10. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hydrate in its crystalline modification.

11. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in crystalline modification V.

12. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate in crystalline modification VI.

13. A hydrate according to claim 10 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate in crystalline modification VIII.

14. A pharmaceutical composition comprising a compound according to any one of claims 10 to 13.

15. Use of compounds according to any one of claims 10 to 13 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

16. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrate in its crystalline modification.

17. A compound according to claim 16 in crystalline modification IV.

18. A compound according to claim 16 in crystalline modification III.

19. A compound according to claim 16 in crystalline modification VII.

20. A compound according to claim 16 in crystalline modification IX.

21. A pharmaceutical composition comprising a compound according to any one of claims 16 to 20.

22. Use of compounds according to any one of claims 16 to 20 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

23. A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in its crystalline modification.

24. A dihydrochloride according to claim 23 as 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride in crystalline modification XIII.

25. A pharmaceutical composition comprising a compound according to claim 23 or 24.

26. Use of compounds according to claims 23 or 24 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

27. A compound which is amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

28. A pharmaceutical composition comprising a compound according to claim 27.

29. Use of compounds according to claim 27 for the manufacture of a medicament for the treatment of and prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

30. Process for preparing Form I according to claim 2, which comprises:

(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in acetone

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 30°C and the boiling point of acetone, preferably between 40° C and 50°C

(3) precipitation of Form I at room temperature

(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

31. Process for preparing Form I according to claim 2 which comprises:
(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 18 in acetone
(2) stirring at room temperature between a few hours or days, preferably 10 to 20 days,
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

32. Process for preparing Form II according to claim 3, which comprises:
(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 60°C
(3) precipitation of Form II at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

33. Process for preparing Form II according to claim 3 which comprises:
(1) suspending Form III of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 18 in tetrahydrofuran
(2) stirring at room temperature between a few hours or days, preferably 15 to 30 days,
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride acetonate by filtration, and drying in vacuo at room temperature.

34. Process for preparing Form XV according to claim 4, which comprises:
(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between -10°C and 10°C
(3) precipitation of Form XV at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying in vacuo at room temperature.

35. Process for preparing Form X according to claim 5, which comprises:
(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 1N hydrochloric acid into the hydrochloride salt at temperatures between 10°C and 40°C
(3) precipitation of Form II at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride solvate with tetrahydrofuran by filtration, and drying at temperatures up to 80°C maximum.

36. Process for preparing Form XI according to claim 6, which comprises:
(1) suspending Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 12 in methanol methanol at temperatures between 55°C and the boiling point of methanol
(2) cooling down the reaction mixture to temperatures between -40° and -10°C
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride methanolate by filtration at room temperature, and drying in vacuo at room temperature.

37. Process for preparing Form V according to claim 11, which comprises:
(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in tetrahydrofuran

(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of aqueous hydrochloric acid into the hydrochloride salt
(3) precipitation of Form V at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

38. Process for preparing Form V according to claim 11, which comprises:
(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 in water with an amount of 5 to 10 times more relating to Form IV
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature untill the forming of the monohydrate of Form V without excess of water.

39. Process for preparing Form V according to claim11, which comprises:
(1) stirring of Form XIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride according to claim 24 in water
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate by filtration, and drying in vacuo at room temperature.

40. Process for preparing VI according to claim 12, which comprises:
(1) stirring of Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 in water in which the relative proportions of salt to water are between 1:5 and 1:10
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

41. Process for preparing Form VI according to claim 12, which comprises:

(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 2 in water for at least one hour
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate by filtration, and drying in vacuo at room temperature.

42. Process for preparing Form VIII according to claim 13, which comprises:
(1) stirring of Form VI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride sesquihydrate according to claim 12 in water for more than 12 hours
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

43. Process for preparing Form VIII according to claim 13, which comprises:
(1) stirring of Form II of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 2 in water for 12 hours
(3) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride hemihydrate by filtration, and drying in vacuo at room temperature.

44. Process for preparing Form IV according to claim 17, which comprises:
(1) drying of Form V according to claim 11 in vacuo at temperatures of 85° to 90°C.

45. Process for preparing Form IV according to claim 17, which comprises:
(1) drying of Form XI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monomethanolate according to claim 6 at temperatures between 55° and 65°C.

45. Process for preparing Form III according to claim 18, which comprises:
(1) drying of Form II according to claim 3 in vacuo at temperatures of at least 100°C.

46. Process for preparing Form VII according to claim 19, which comprises:
(1) tempering Form IV of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 17 at temperatures of at least 200°C.

47. Process for preparing Form IX according to claim 20, which comprises:
(1) drying of Form VIII of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride according to claim 13 at temperatures between 90°C and 110°C.

48. Process for preparing Form XIII according to claim 24, which comprises:
(1) dispersing 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine in an organic solvent chosen from the group consisting of tetrahydrofuran, ethanol, isopropanol or mixtures thereof with water
(2) converting the 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine base, by addition of 2N or concentrated hydrochloric acid into the hydrochloride salt at temperatures between 20° and 30°C
(3) precipitation of Form XIII at room temperature
(4) recovering the precipitated 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine dihydrochloride Form XIII by filtration
(5) drying of Form XIII in vacuo at room temperature.

49. Process for preparing Form XVI according to claim 27, which comprises:
(1) dissolving 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride of Form IV, II, VII or IX in acetonitrile and water in the molar ratio 1:1
(2) freeze-drying or spray-driying overnight to give Form XVI of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

50. Composition comprising Form IV according to claim 17 and Form V according to claim 11.

51. Composition comprising Form IV according to claim 17 and Form V according to claim 11 in a molar ratio of about 100 to 1 to 10 to 1.

52. Pharmaceutical preparation comprising an active ingredient consisting essentially of a mixture of Form IV according to claim 17 and Form V according to claim 11.

53. Pharmaceutical preparation comprising an active ingredient consisting essentially of a mixture of Form IV according to claim 17 and Form V according to claim 11 in a molar ratio of about 100 to 1 to 10 to 1.

54. Use of a composition according to claims 50 and/or 51 for the manufacture of a medicament.

55. Extended release formulation comprising Form I according to claim 2 and/or Form III according to claim 18 and/or form VIII according to claim 13.

Abstract

The invention relates to new crystalline modifications of the hydrochloride of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine, crystalline modification of the dihydrochloride of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine and amorphous 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride which are suitable in particular for the preparation of solid medicaments for the treatment or prevention of depressive disorders, anxiety disorders, bipolar disorders, mania, dementia, substance-related disorders, sexual dysfunctions, eating disorders, obesity, fibromyalgia, sleeping disorders, psychiatric disorders, cerebral infarct, tension, for the therapy of side-effects in the treatment of hypertension, cerebral disorders, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Filer:	Danielle L. Herritt/Gitrada Harmon
Attorney Docket Number:	120140-00110

Filed as Large Entity

Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Request for Prioritized Examination	1817	1	4000	4000
Pages:				
Claims:				
Independent claims in excess of 3	1201	1	420	420
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
		Total in USD ($)		**6460**

Electronic Acknowledgement Receipt

EFS ID:	16905177
Application Number:	14032183
International Application Number:	
Confirmation Number:	2870
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Customer Number:	86738
Filer:	Danielle L. Herritt/Gitrada Harmon
Filer Authorized By:	Danielle L. Herritt
Attorney Docket Number:	120140-00110
Receipt Date:	19-SEP-2013
Filing Date:	
Time Stamp:	23:16:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$6460
RAM confirmation Number	7540
Deposit Account	504876
Authorized User	

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Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	_Preliminary_Amendment_1.pdf	33499 c5c8cedf7b1ff204d6a08a72bceb076aa86ce04e	no	6
Warnings:					
Information:					
2	Application Data Sheet	Application_Data_Sheet_Fillable_PDF_2.PDF	1256238 d7e5335ea7e1b886f8f880028957d71b93702a7b	no	9
Warnings:					
Information:					
3	Drawings-only black and white line drawings	120140_00110_Drawings_2013SEP19_3.PDF	6795063 01117c64abdc91ac71654ad29cb900010a179f79	no	23
Warnings:					
Information:					
4	Oath or Declaration filed	120140_00110_Copy_AIA_Declaration_parent_5.PDF	510448 4a8617223408711b29cde00356bab4043025632a	no	6
Warnings:					
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Information:					
5	Transmittal of New Application	-Transmittal_form_6.pdf	33445 3d8f22e053dca64382e64e3d62c1eae1b439d0d8	no	1
Warnings:					
Information:					
6	Non Patent Literature	Morissette_et_al_2004_Advanced_Drug_Delivery_Reviews_24.PDF	7488697 90511f84ea737850aba86774032899f628bd0311	no	26
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Information:					
7	Transmittal Letter	_Information_Disclosure_Statement_29.pdf	23178 e517139761a419738b06f18d7ed762d690f8bec6	no	3
Warnings:					
Information:					

8	TrackOne Request	120140_00110_Certification_for_Prioritized_Exam_30.PDF	30443 5453131cf0255357486765559c7688ba287373a5	no	1
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Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	120140_00110_SB08.PDF	641186 c602f5d990c96cf1f8f0347518e1cfbd94768d84	no	7
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Information:					
10	Non Patent Literature	13085117_OA_dtd_13JAN2012.PDF	272310 e5b1c8212e979059d086058c08688f3ed7023aa4	no	8
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Information:					
12	Non Patent Literature	13085117_NOA_dtd_17AUG2012.PDF	390718 07a0417571929647b8a12d60ebc678bf30b4ba43	no	7
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Information:					
13	Non Patent Literature	13100911_OA_dtd_17AUG21012.PDF	533614 9491ea10de09bf1d723fa5fedb4533cca1062886	no	15
Warnings:					
Information:					
14	Non Patent Literature	13658088_OA_23MAY2013.PDF	296433 6e219086577c8f3f0d75c1413cf49cace566dcf6	no	8
Warnings:					
Information:					
15	Specification	120140_00110_Specification_2013SEP19.PDF	239042 afc17866d0335c15956cc6a13f3345e3c554655d	no	57
Warnings:					
Information:					
16	Fee Worksheet (SB06)	fee-info.pdf	42175 c6bbbd2a2f5a9d7928bd010d47e498e3d93eda23	no	2
Warnings:					
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New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	16905177
Application Number:	14032183
International Application Number:	
Confirmation Number:	2870
Title of Invention:	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE
First Named Inventor/Applicant Name:	Andreas Bathe
Customer Number:	86738
Filer:	Danielle L. Herritt/Gitrada Harmon
Filer Authorized By:	Danielle L. Herritt
Attorney Docket Number:	120140-00110
Receipt Date:	19-SEP-2013
Filing Date:	
Time Stamp:	23:16:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$6460
RAM confirmation Number	7540
Deposit Account	504876
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	_Preliminary_Amendment_1.pdf	33499 c5c8cedf7b1ff204d6a08a72bceb076aa86ce04e	no	6
Warnings:					
Information:					
2	Application Data Sheet	Application_Data_Sheet_Fillable_PDF_2.PDF	1256238 d7e5335ea7e1b886f8f880028957d71b93702a7b	no	9
Warnings:					
Information:					
3	Drawings-only black and white line drawings	120140_00110_Drawings_2013SEP19_3.PDF	6795063 01117c64abdc91ac71654ad29cb900010a179f79	no	23
Warnings:					
Information:					
4	Oath or Declaration filed	120140_00110_Copy_AIA_Declaration_parent_5.PDF	510448 4a8617223408711b29cde00356bab4043025632a	no	6
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
5	Transmittal of New Application	-Transmittal_form_6.pdf	33445 3d8f22e053dca64382e64e3d62c1eae1b439d0d8	no	1
Warnings:					
Information:					
6	Non Patent Literature	Morissette_et_al_2004_Advanced_Drug_Delivery_Reviews_24.PDF	7488697 90511f84ea737850aba86774032899f628bd0311	no	26
Warnings:					
Information:					
7	Transmittal Letter	_Information_Disclosure_Statement_29.pdf	23178 e517139761a419738b06f18d7ed762d690f8bec6	no	3
Warnings:					
Information:					

8	TrackOne Request	120140_00110_Certification_for_Prioritized_Exam_30.PDF	30443 5453131cf0255357486765559c7688ba287373a5	no	1
Warnings:					
Information:					
9	Information Disclosure Statement (IDS) Form (SB08)	120140_00110_SB08.PDF	641186 c602f5d990c96cf1f8f0347518e1cfbd94768d84	no	7
Warnings:					
Information:					
10	Non Patent Literature	13085117_OA_dtd_13JAN2012.PDF	272310 e5b1c8212e979059d086058c08688f3ed7023aa4	no	8
Warnings:					
Information:					
11	Non Patent Literature	13085117_OA_dtd_3APR_2012.PDF	292210 42ef84d96c66818d99c16beb9b890625fa7a7385	no	9
Warnings:					
Information:					
12	Non Patent Literature	13085117_NOA_dtd_17AUG2012.PDF	390718 07a0417571929647b8a12d60ebc678bf30b4ba43	no	7
Warnings:					
Information:					
13	Non Patent Literature	13100911_OA_dtd_17AUG21012.PDF	533614 9491ea10de09bf1d723fa5fedb4533cca1062886	no	15
Warnings:					
Information:					
14	Non Patent Literature	13658088_OA_23MAY2013.PDF	296433 6e219086577c8f3f0d75c1413cf49cace566dcf6	no	8
Warnings:					
Information:					
15	Specification	120140_00110_Specification_2013SEP19.PDF	239042 afc17866d0335c15956cc6a13f3345e3c554655d	no	57
Warnings:					
Information:					
16	Fee Worksheet (SB06)	fee-info.pdf	42175 c6bbbd2a2f5a9d7928bd010d47e498e3d93eda23	no	2
Warnings:					
Information:					

Total Files Size (in bytes):	18878699

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Docket No.: 120140-00110
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Utility Application of:
Andreas Bathe et al.

Application No.: Not Yet Assigned

Confirmation No.: N/A

Filed: Concurrently Herewith

Art Unit: N/A

For: POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

Examiner: Not Yet Assigned

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT UNDER 37 C.F.R. 1.115

Dear Madam:

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin at page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins at page 3 of this paper.

Remarks/Arguments begin at page 6 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please insert the following new paragraph after the Title of the invention on page 1, line 3:

RELATED APPLICATIONS

This application is a continuation application of U.S. Patent Application No. 13/658,088, filed on October 23, 2012, which is a continuation of U.S. Patent Application No. 13/085,117, filed April 12, 2011, now U.S. Patent No. 8,318,744, issued November 27, 2012, which is a continuation application of U.S. Patent Application No. 12/566,835, filed September 25, 2009, now U.S. Patent No. 7,981,894, issued July 19, 2011, which is a divisional application of U.S. Patent Application No. 12/110,704, filed April 28, 2008, now U.S. Patent No. 7,834,020, issued November 16, 2010, which is a divisional application of U.S. Patent Application No. 10/481,270, filed December 19, 2003, now U.S. Patent No. 7,381,726, issued June 3, 2008, which is a national phase application of International Application No. PCT/EP2002/006153, filed June 5, 2002, which claims priority to European Patent Application No. 01113647.0, filed June 19, 2001. The entire contents of each of the foregoing applications and patents are hereby incorporated by reference.

AMENDMENTS TO THE CLAIMS

This listing of the claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1.- 55. **(Cancelled)**

56. **(New)** A compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride in its crystalline modification, wherein the compound is an anhydrate, hydrate, solvate or dihydrochloride.

57. **(New)** The compound of claim 56, wherein the compound is an anhydrate in crystalline modification III.

58. **(New)** The compound of claim 56, wherein the compound is an anhydrate in crystalline modification VII.

59. **(New)** The compound of claim 56, wherein the compound is a solvate in crystalline modification XI.

60. **(New)** A pharmaceutical composition comprising 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrate in its crystalline modification IV and one or more hydrated forms of 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride.

61. **(New)** A pharmaceutical composition according to claim 60, wherein the composition comprises 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in its crystalline modification Form V.

62. **(New)** A pharmaceutical composition according to claim 61, wherein Form IV and Form V are in a molar ratio of about 100 to 1 to 10 to 1.

63. **(New)** A pharmaceutical composition according to claim 61 comprising an active ingredient consisting essentially of a mixture of Form IV and Form V.

64. **(New)** A pharmaceutical composition according to claim 63, wherein Form IV and Form V are in a molar ratio of about 100 to 1 to 10 to 1.

65. **(New)** A method of treating a patient suffering from a depressive disorder, an anxiety disorder, a bipolar disorder, mania, dementia, a substance-related disorder, a sexual dysfunction, an eating disorder, obesity, fibromyalgia, a sleeping disorder, a psychiatric disorder, cerebral infarct, tension, side-effects in the treatment of hypertension, a cerebral disorder, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation, or combinations thereof, comprising administering to the patient in need thereof the pharmaceutical composition of claim 61.

66. **(New)** A pharmaceutical composition comprising a compound which is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride anhydrate in its crystalline modification IV, and one or more conventional auxiliary substances and /or carriers.

67. **(New)** A method of treating a patient suffering from a depressive disorder, an anxiety disorder, a bipolar disorder, mania, dementia, a substance-related disorder, a sexual dysfunction, an eating disorder, obesity, fibromyalgia, a sleeping disorder, a psychiatric disorder, cerebral infarct, tension, side-effects in the treatment of hypertension, a cerebral disorder, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation, or combinations thereof, comprising administering to the patient in need thereof the pharmaceutical composition of claim 66.

68. **(New)** A method of treating a patient suffering from a depressive disorder, an anxiety disorder, a bipolar disorder, mania, dementia, a substance-related disorder, a sexual dysfunction, an eating disorder, obesity, fibromyalgia, a sleeping disorder, a psychiatric disorder, cerebral infarct, tension, side-effects in the treatment of hypertension, a cerebral disorder, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation, or combinations thereof, comprising administering to the patient in need thereof an effective amount of a compound, wherein the compound is 1-[4-(5-cyanoindol-3-yl)butyl]-4-(2-carbamoyl-benzofuran-5-yl)-piperazine hydrochloride monohydrate in its crystalline modification (V).

69. **(New)** A method of treating a patient suffering from a depressive disorder, an anxiety disorder, a bipolar disorder, mania, dementia, a substance-related disorder, a sexual dysfunction, an eating disorder, obesity, fibromyalgia, a sleeping disorder, a psychiatric disorder, cerebral infarct, tension, side-effects in the treatment of hypertension, a cerebral disorder, chronic pain, acromegaly, hypogonadism, secondary amenorrhea, premenstrual syndrome and undesired puerperal lactation, or combinations thereof, comprising administering to the patient in need thereof an effective amount of a compound of claim 56.

70. **(New)** A pharmaceutical composition comprising a compound according to claim 56, and one or more conventional auxiliary substances and/or carriers.

REMARKS

Pursuant to 37 C.F.R. §1.78(a), the specification has been amended to include a cross reference to the Related Applications. *No new matter has been added.*

Claims 1–55 are canceled. Claims 56-70 are new. Support for claims 56-70 is found in the specification and in the claims as originally filed. Upon entry of the claim amendments set forth above, claims 56-70 will be pending in the application. *No new matter has been added.*

Claims 60-64 are similar to claims 58-62 of abandoned application 12/945,260 (published as U.S. 2011/0183994) filed on November 12, 2010. Applicants respectfully point out that claims 58-62 of patent application 12/945,260 were indicated as allowable during prosecution, prior to abandonment of the application. *See, Non-Final Office Action of Application No.: 12/945,260, mailed August 17, 2011, at page 17, second paragraph, thereof.* In view of the foregoing, allowance of the subject claims is respectfully requested.

If a telephone conversation with Applicants' attorney would help expedite the prosecution of the instant application, the Examiner is urged to call Applicants' attorney/agent at (617) 449-6500. The Commissioner is hereby authorized to charge any fees associated with the filing of this communication to our Deposit Account No. 50-4876, under Order No. 120140-00110 from which the undersigned is authorized to draw.

Dated: September 19, 2013

Respectfully submitted,

Electronic signature: /Danielle L. Herritt/
Danielle L. Herritt
Registration No.: 43,670
MCCARTER & ENGLISH, LLP
265 Franklin Street
Boston, Massachusetts 02110
(617) 449-6500
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Attorney/Agent For Applicant

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Andreas		Bathe	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

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Mr.	Bernd		Helfert	

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Postal Code	64372	**Country** i	DE

Inventor 3 Remove

Legal Name

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Steffen		Neuenfeld	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

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Postal Code	64409	**Country** i	DE

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Heike		Kniel	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Heppenheim	Country of Residence i	DE

Mailing Address of Inventor:

Address 1	Konigsbergerstrasse 9		
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Postal Code	64646	**Country** i	DE

Inventor 5 Remove

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Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Matthias		Bartels	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Darmstadt	Country of Residence i	DE

Mailing Address of Inventor:

Address 1	Carsonweg 92		
Address 2			
City	Darmstadt	**State/Province**	
Postal Code	64289	**Country** i	DE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Inventor 6 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Ms.	Susanne		Rudolph	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Dieburg	Country of Residence i	DE

Mailing Address of Inventor:

Address 1	Pfarrgasse 15		
Address 2			
City	Dieburg	**State/Province**	
Postal Code	64807	**Country** i	DE

Inventor 7 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
Mr.	Henning		Bottcher	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Darmstadt	Country of Residence i	DE

Mailing Address of Inventor:

Address 1	Stiftstrasse 12		
Address 2			
City	Darmstadt	**State/Province**	
Postal Code	64287	**Country** i	DE

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	86738		
Email Address	docket@mccarter.com	Add Email	Remove Email

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Application Information:

Title of the Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE		
Attorney Docket Number	120140-00110	**Small Entity Status Claimed** ☐	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	23	**Suggested Figure for Publication (if any)**	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	86738		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	13658088	2012-10-23
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13658088	Continuation of	13085117	2011-04-12	8318744	2012-11-27
Prior Application Status	Patented				Remove

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13085117	Continuation of	12566835	2009-09-25	7981894	2011-07-19
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12566835	Division of	12110704	2008-04-28	7834020	2010-11-16
Prior Application Status	Patented			Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12110704	Division of	10481270	2003-12-19	7381726	2008-06-03
Prior Application Status				Remove	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
10481270	a 371 of international	PCT/EP2002/006153	2002-06-05

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
01113674.0	EP	2001-06-19	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. ☒

Organization Name	Merck Patentgesellschaft		
Mailing Address Information:			
Address 1	Frankfurter Str. 250		
Address 2			
City	Darmstadt	**State/Province**	
Country [i]	DE	Postal Code	64293
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Non-Applicant Assignee Information:

Providing assignment information in this section does not subsitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section only if non-applicant assignee information is desired to be included on the patent application publication in accordance with 37 CFR 1.215(b). Do not include in this section an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest), as the patent application publication will include the name of the applicant(s).

Remove

If the Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	120140-00110
	Application Number	
Title of Invention	POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE	

Mailing Address Information:			
Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Danielle L. Herritt/			Date (YYYY-MM-DD)	2013-09-19
First Name	Danielle	Last Name	Herritt	Registration Number	43670

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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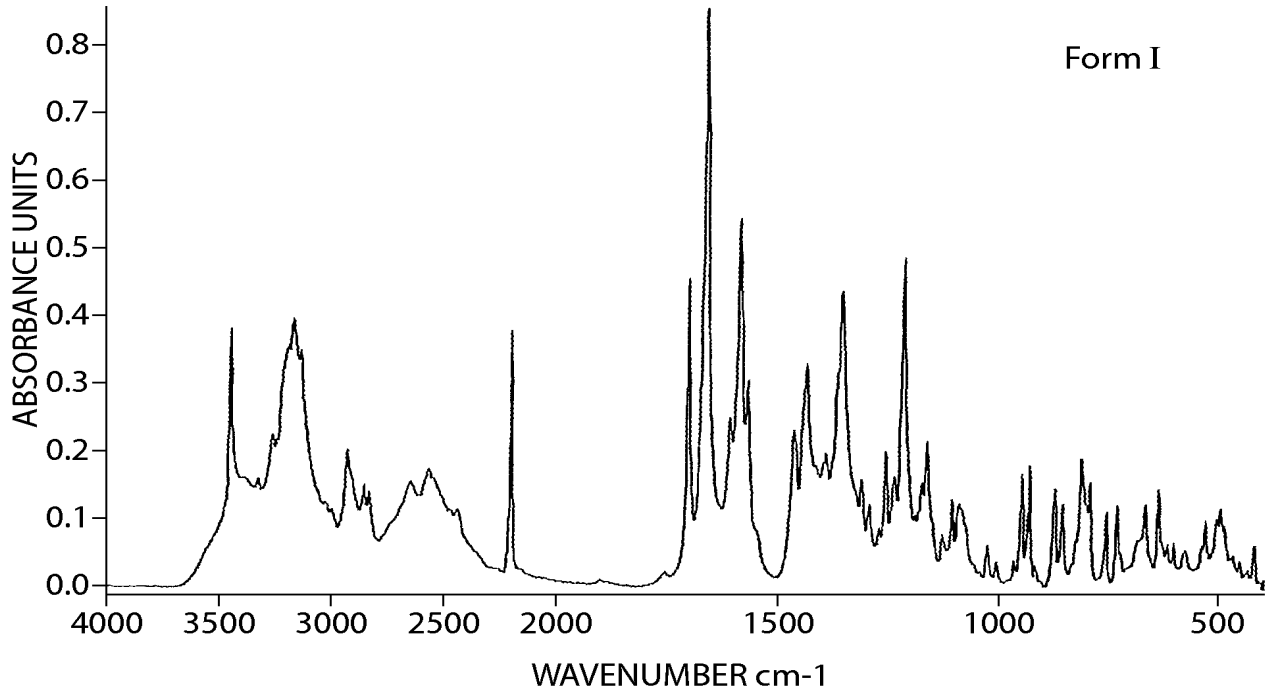
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.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0.3
0.4
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0.6
0.7
0.8
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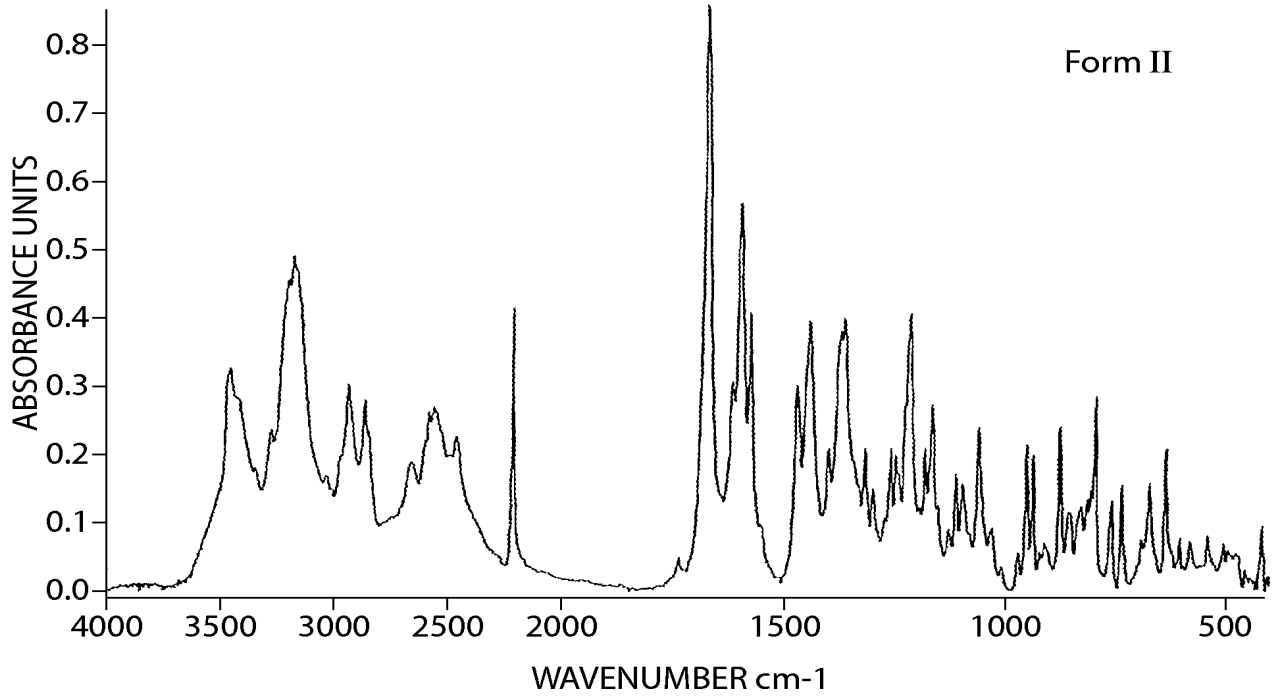
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 1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0.7
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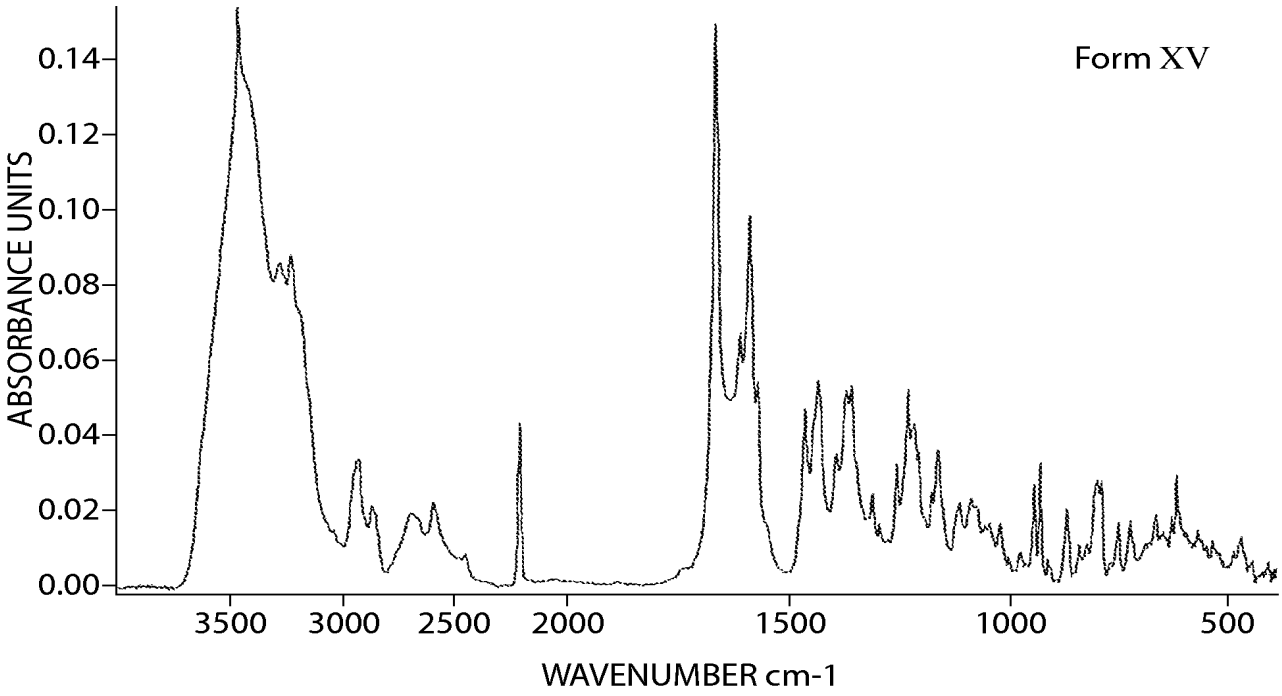
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 2


Form XV
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0.10
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0.04
0.02
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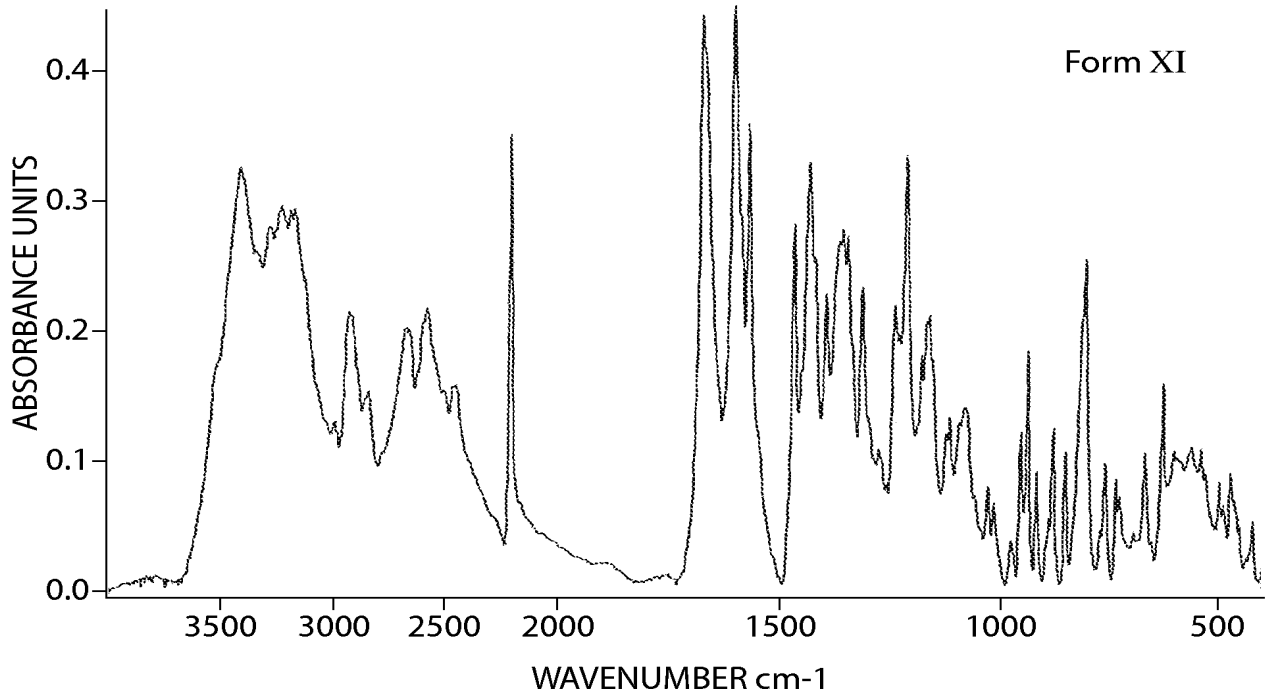
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 3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ABSORBANCE UNITS
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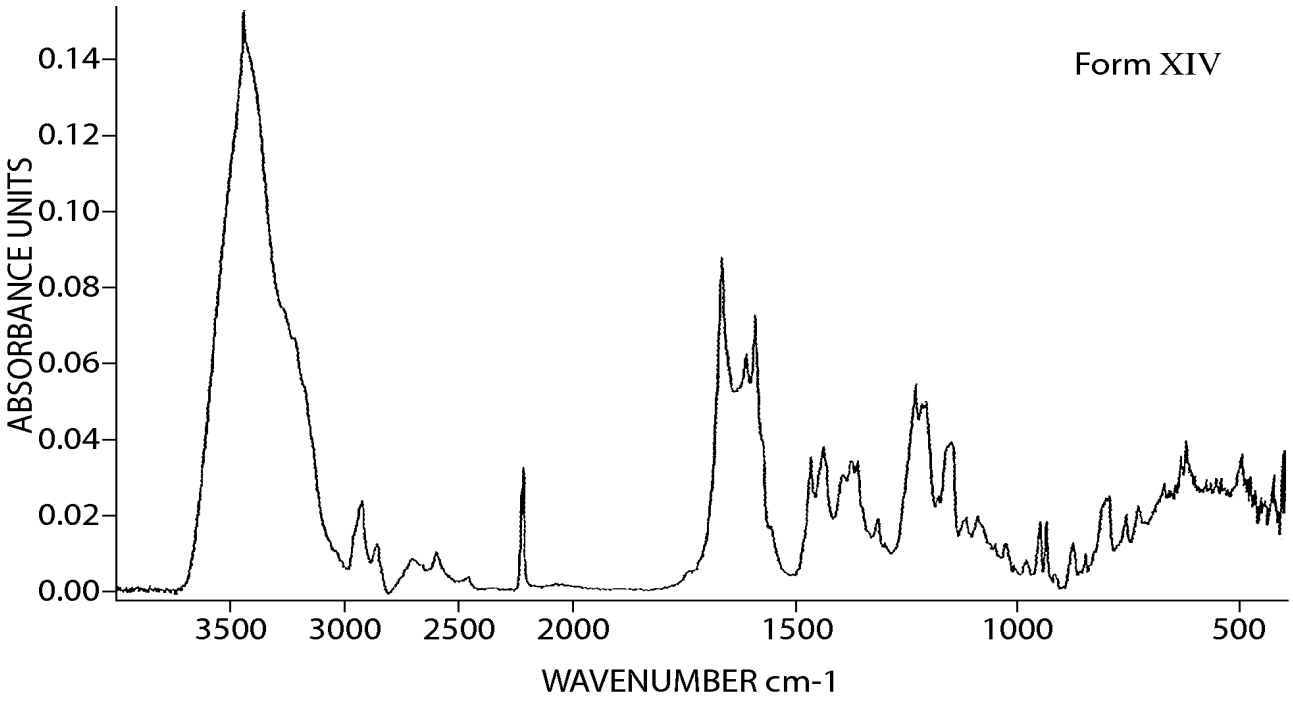
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 4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ABSORBANCE UNITS
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0.10
0.08
0.06
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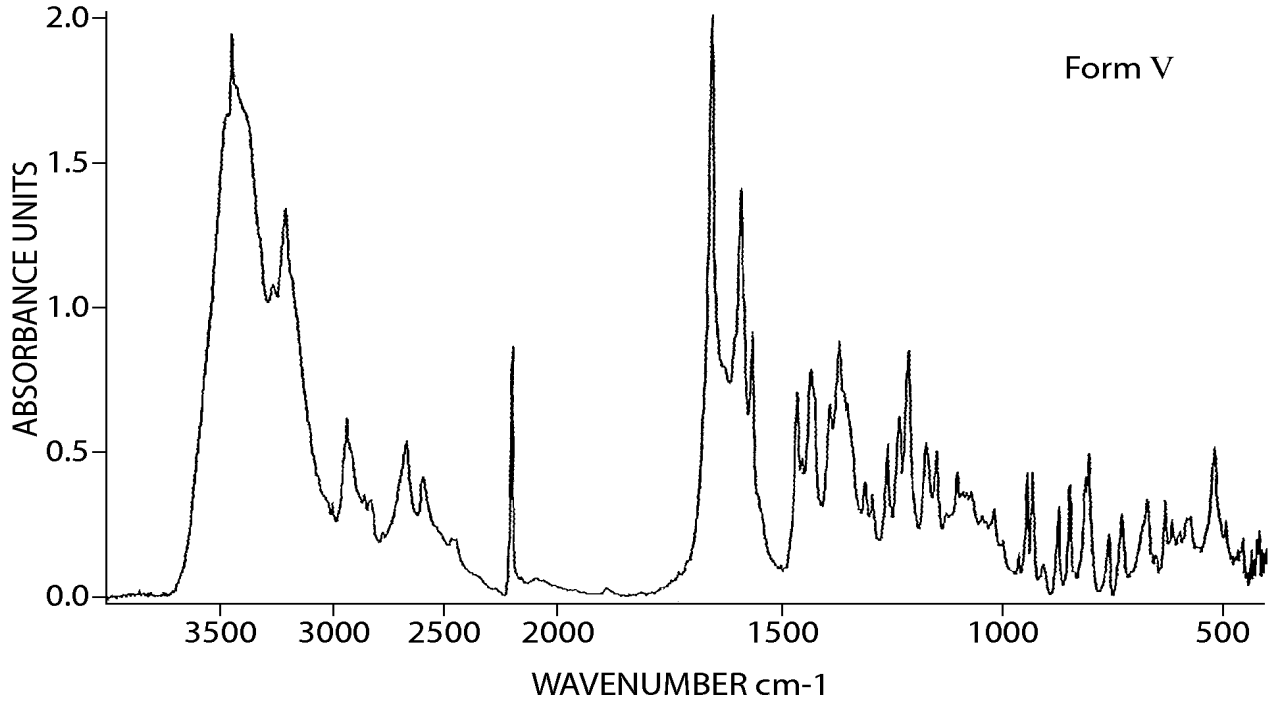
0.00
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 5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ABSORBANCE UNITS
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1.5
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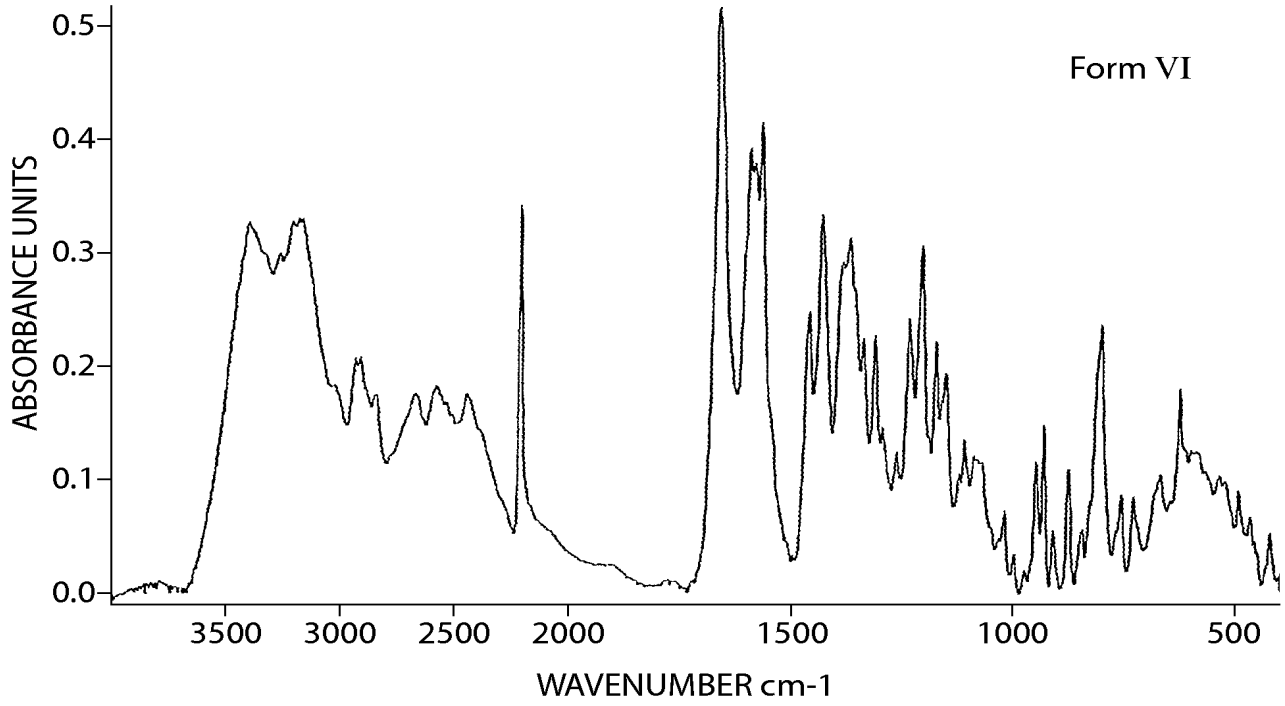
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 6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ABSORBANCE UNITS
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0.4
0.3
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0.0
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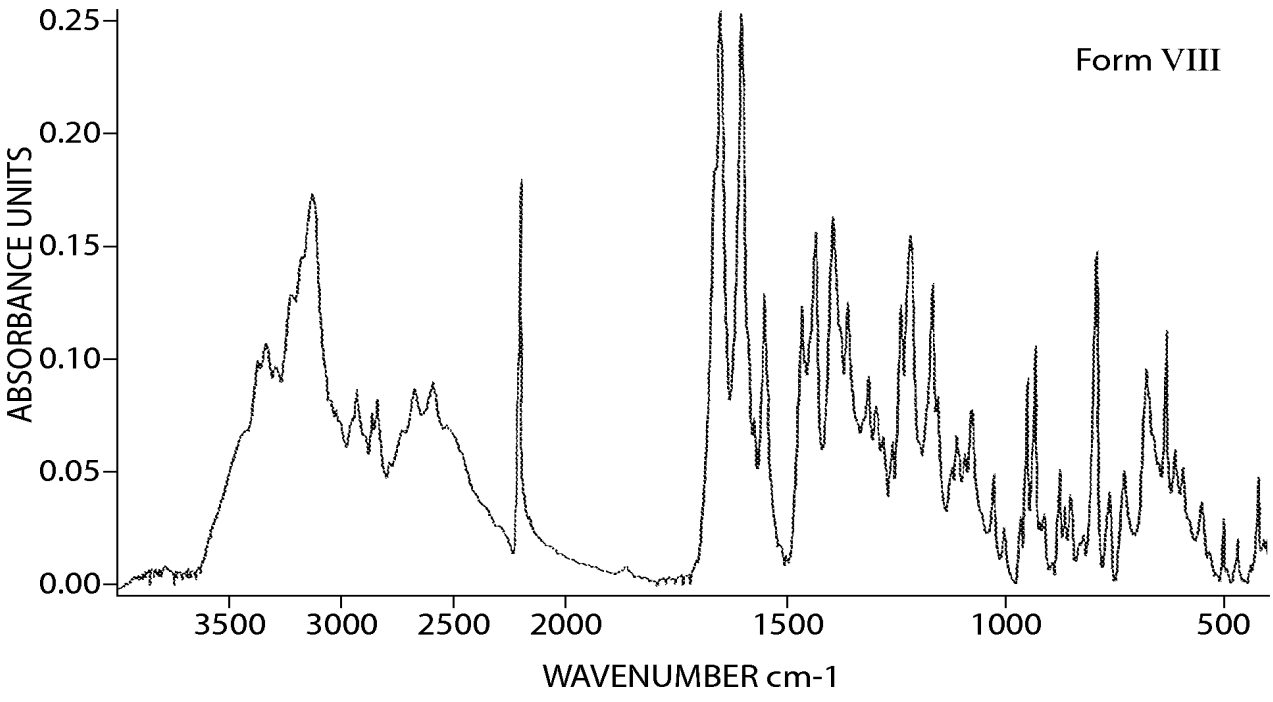
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 7


Form VIII
ABSORBANCE UNITS
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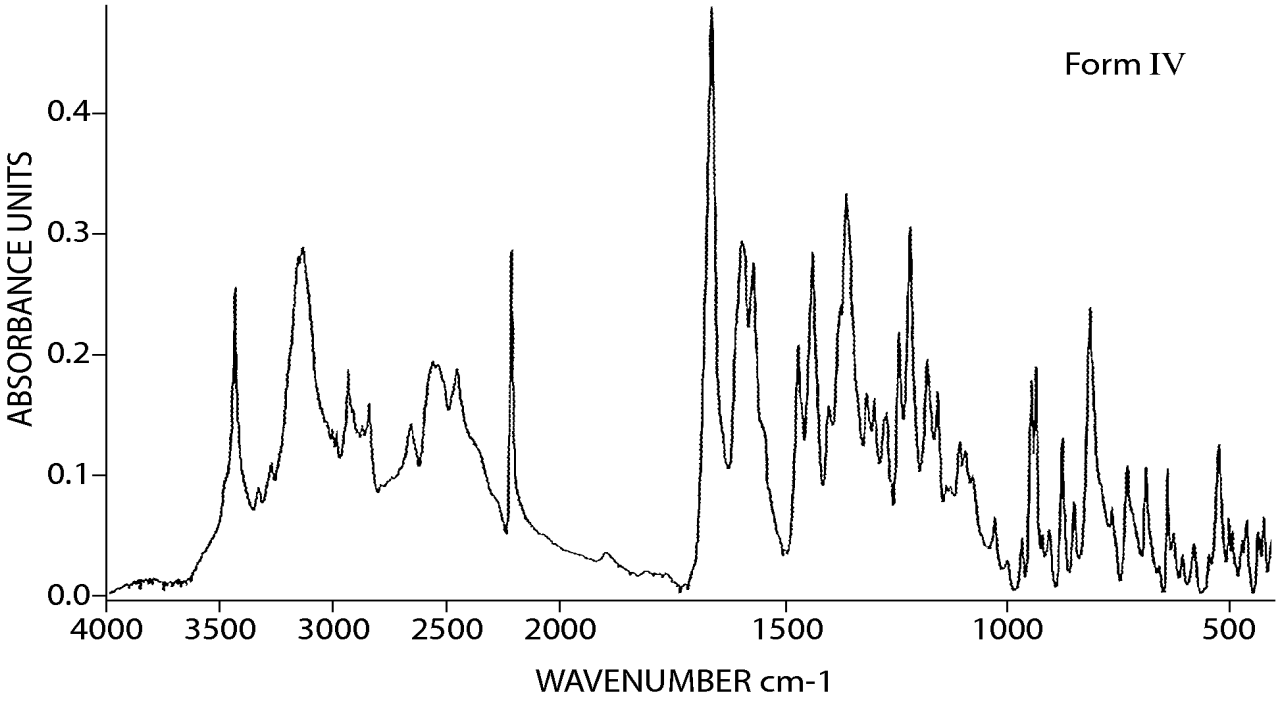
0.05
0.00
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 8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ABSORBANCE UNITS
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0.1
0.2
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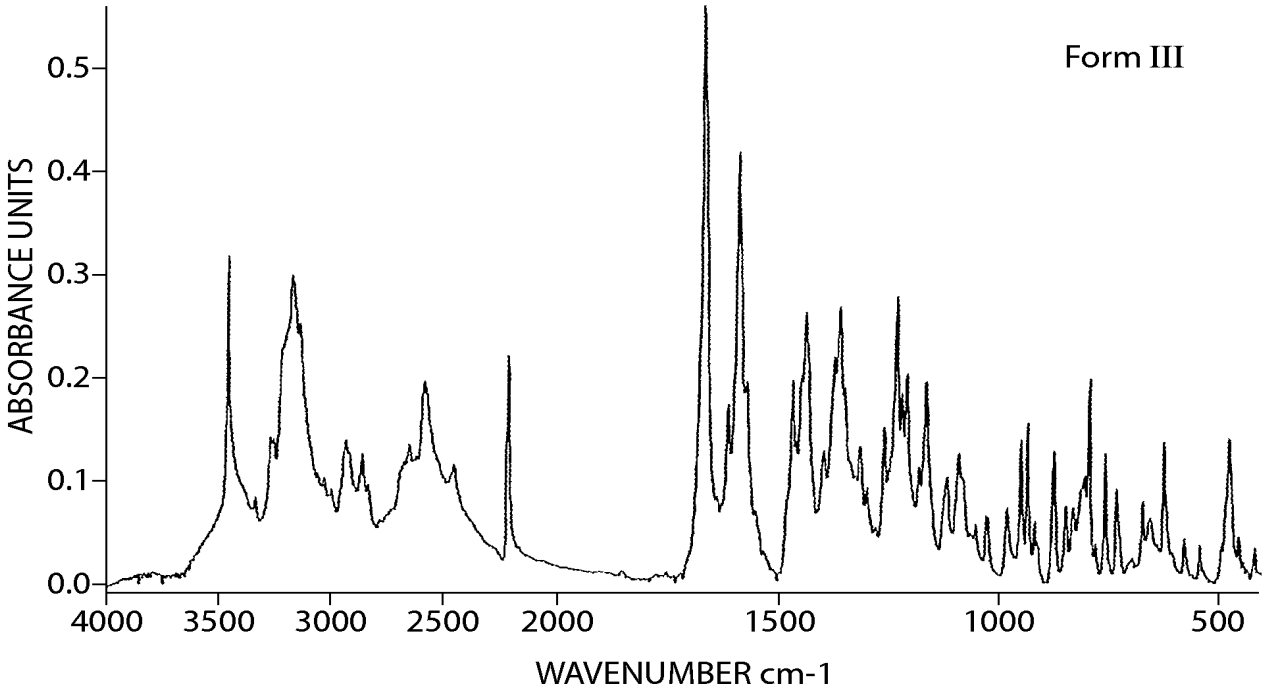
0.4
4000
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 9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ABSORBANCE UNITS
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0.1
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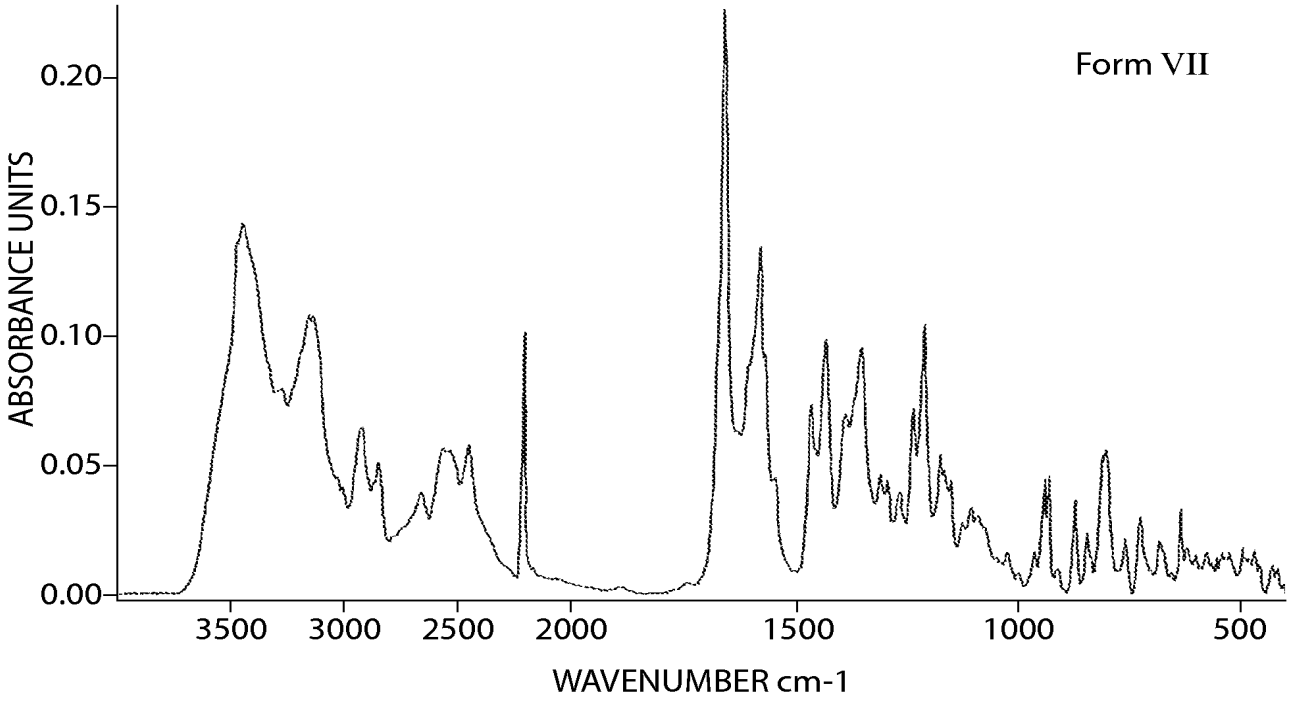
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 10


Form VII
ABSORBANCE UNITS
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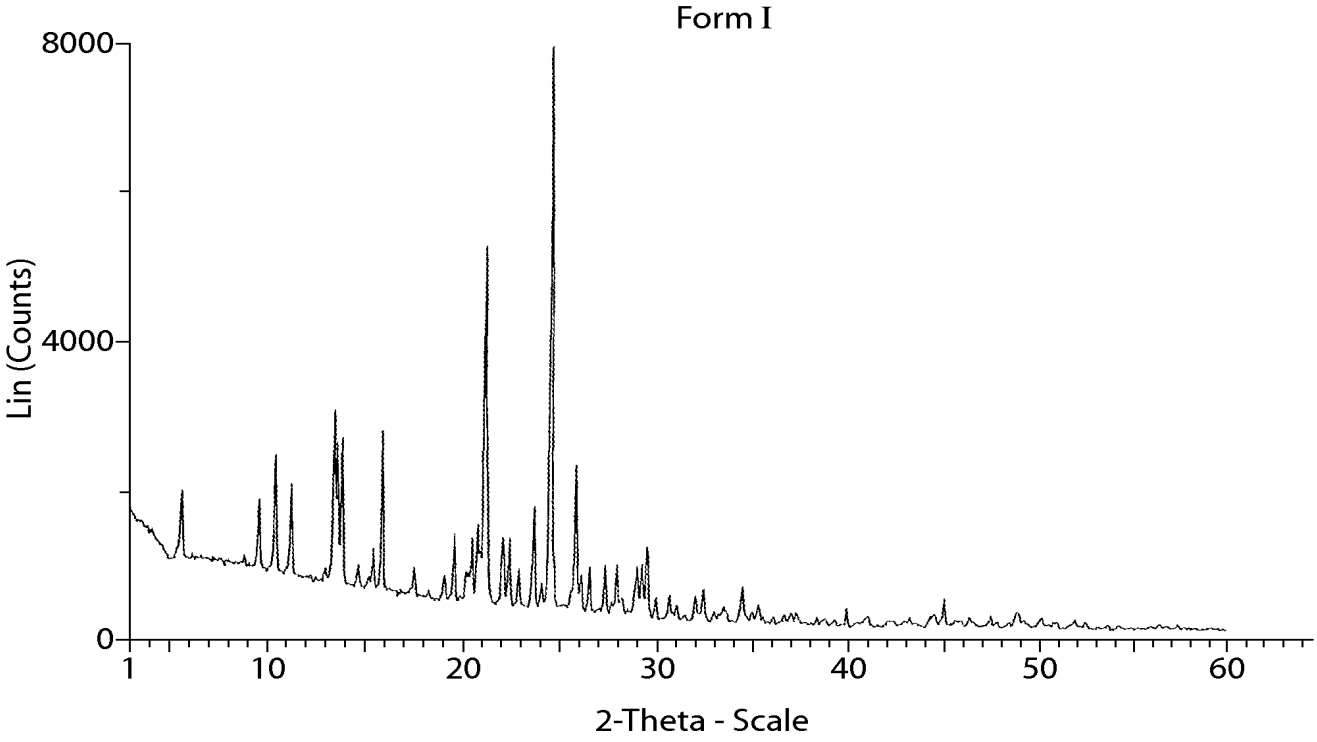
0.05
0.00
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 11


Form I
Lin (Counts)
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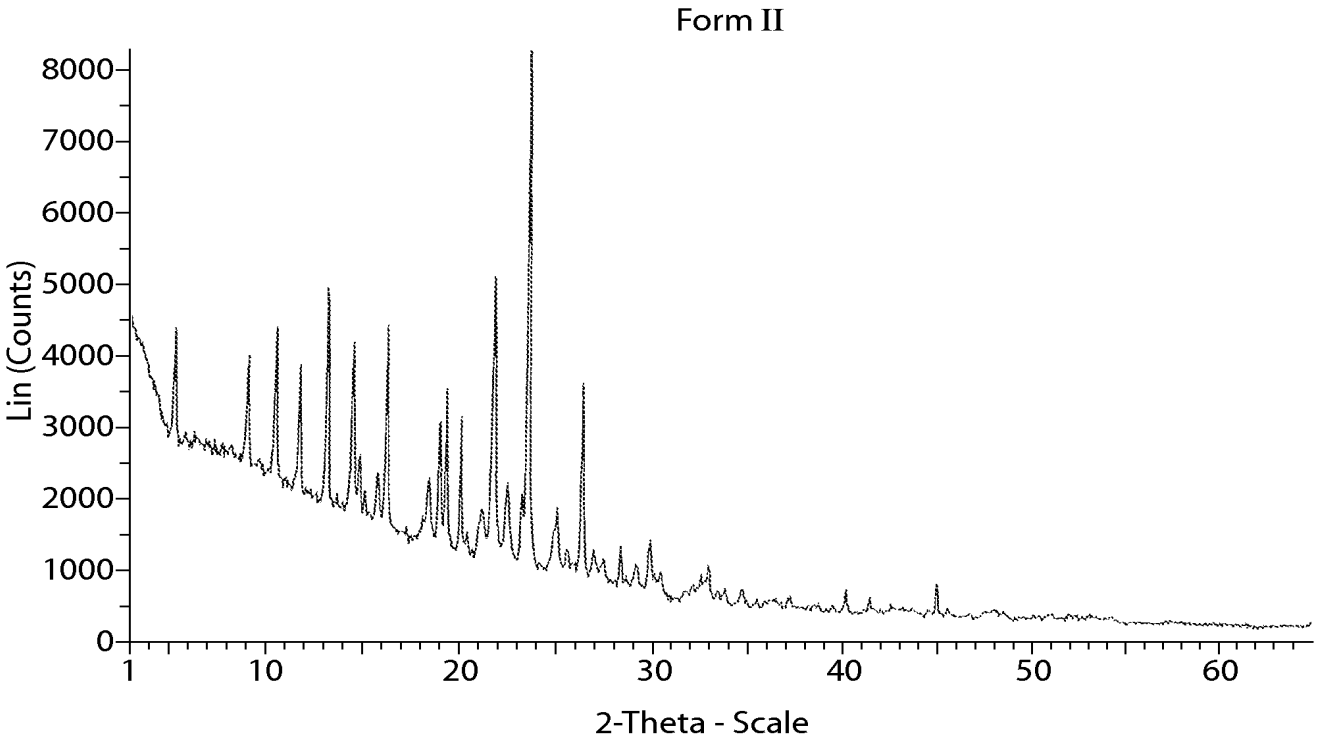
4000
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 12


Form II
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7000
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4000
3000
2000
1000
0
Lin (Counts)
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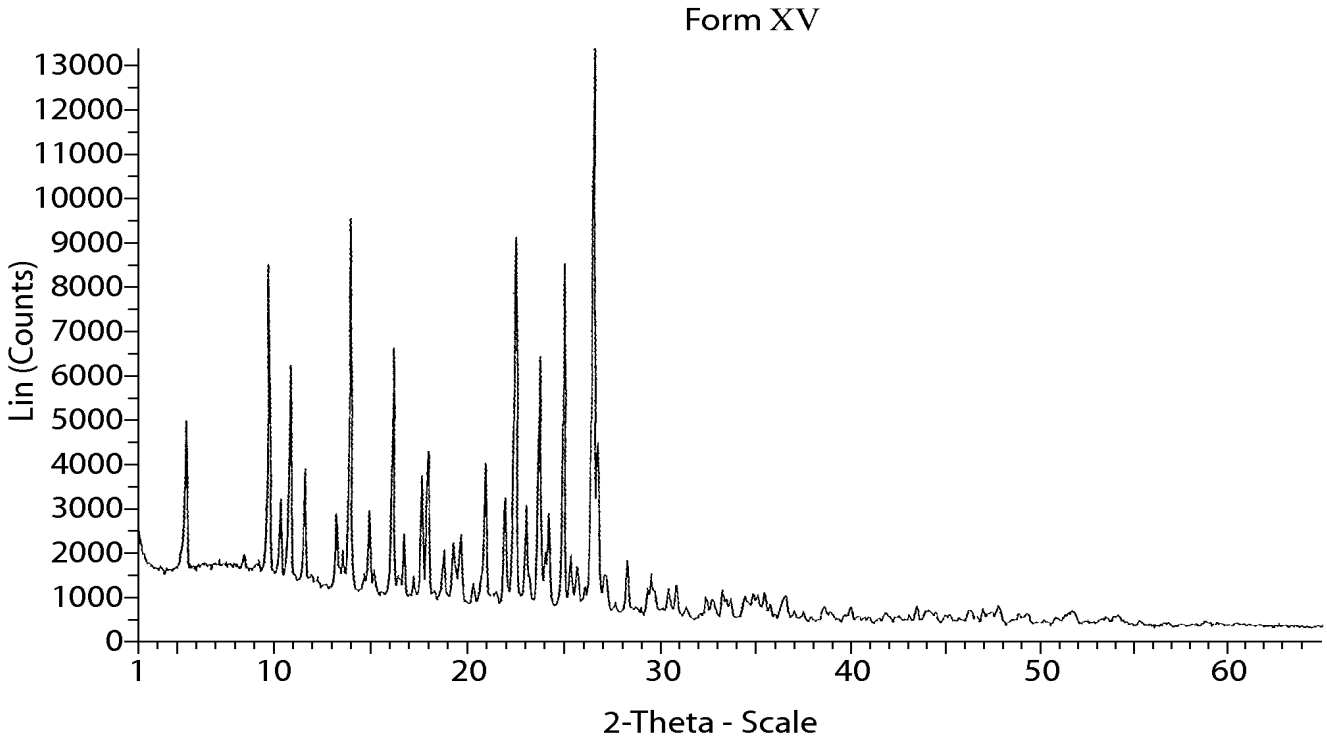
10
20
30
40
50
60
2-Theta - Scale

Fig. 13


Form XV
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12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Lin (Counts)
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 14

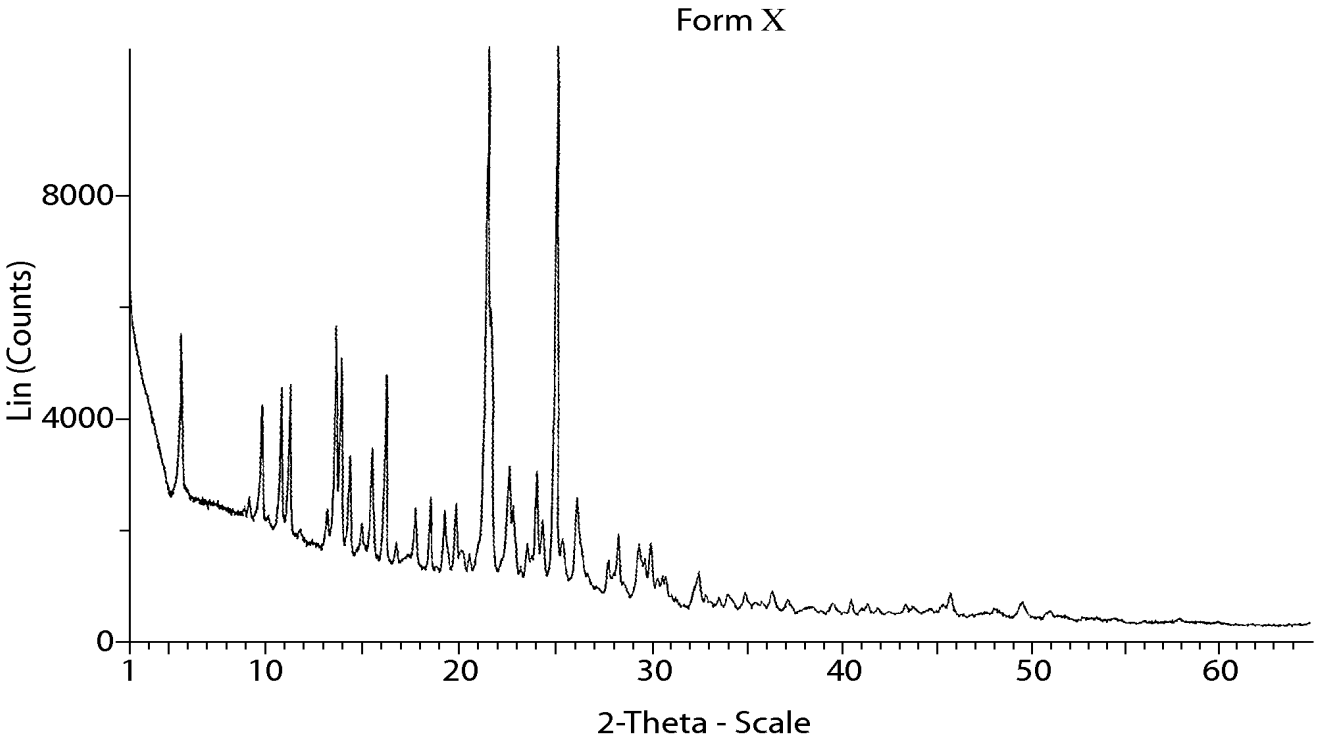
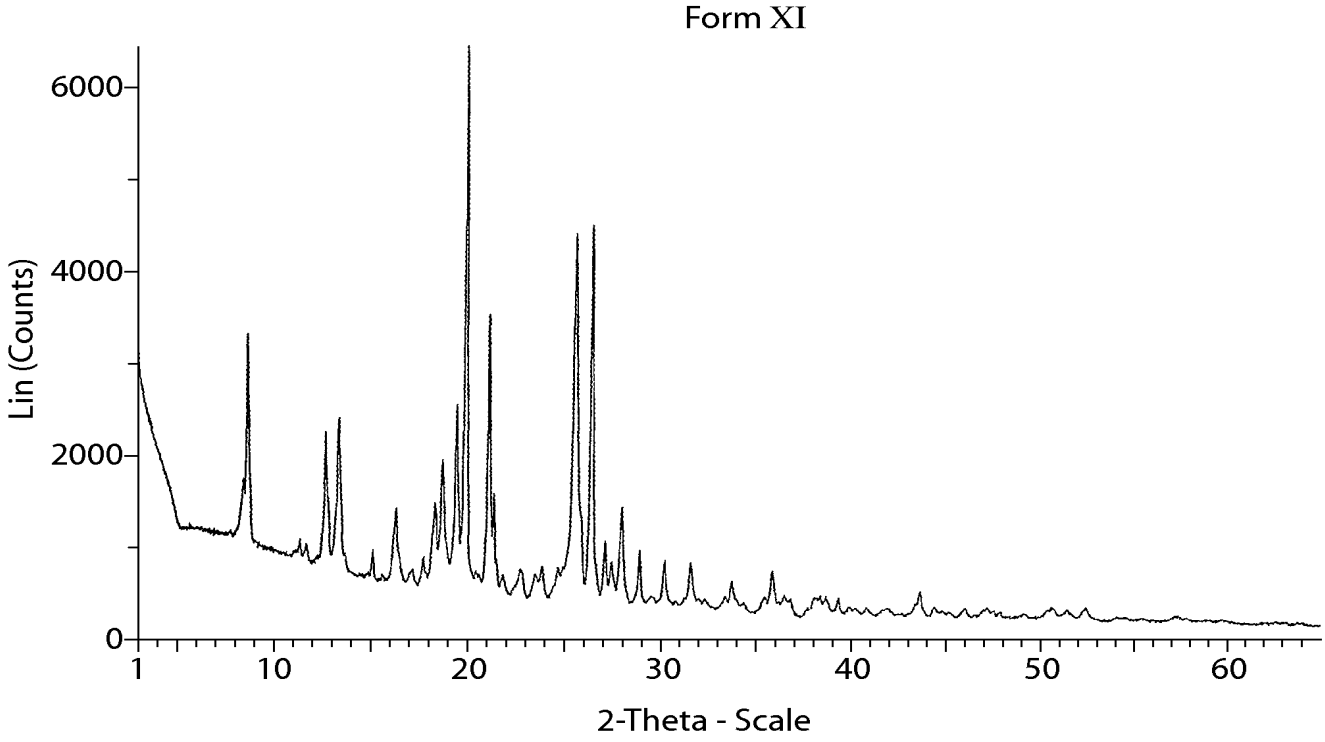

Form X
8000
4000
0
Lin (Counts)
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 15


Form XI
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4000
2000
0
Lin (Counts)
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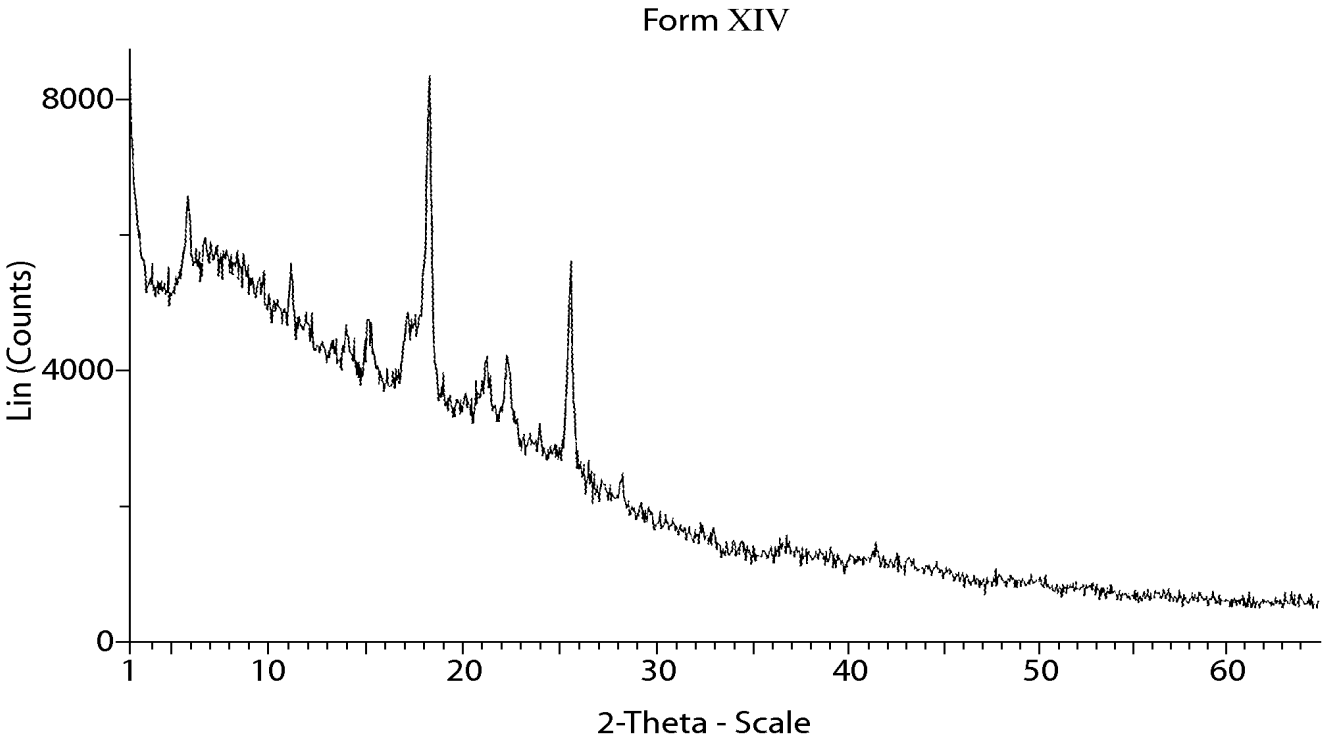
10
20
30
40
50
60
2-Theta - Scale

Fig. 16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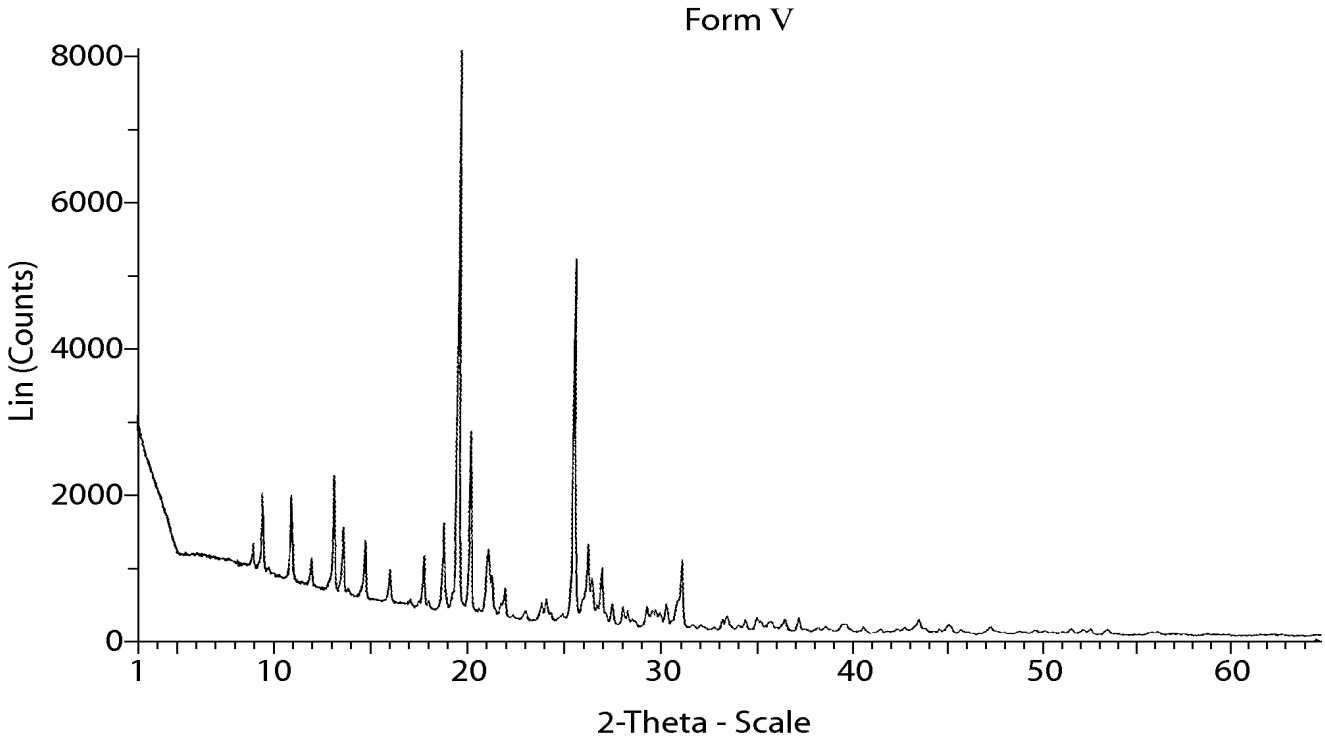
4000
0
Lin (Counts)
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 17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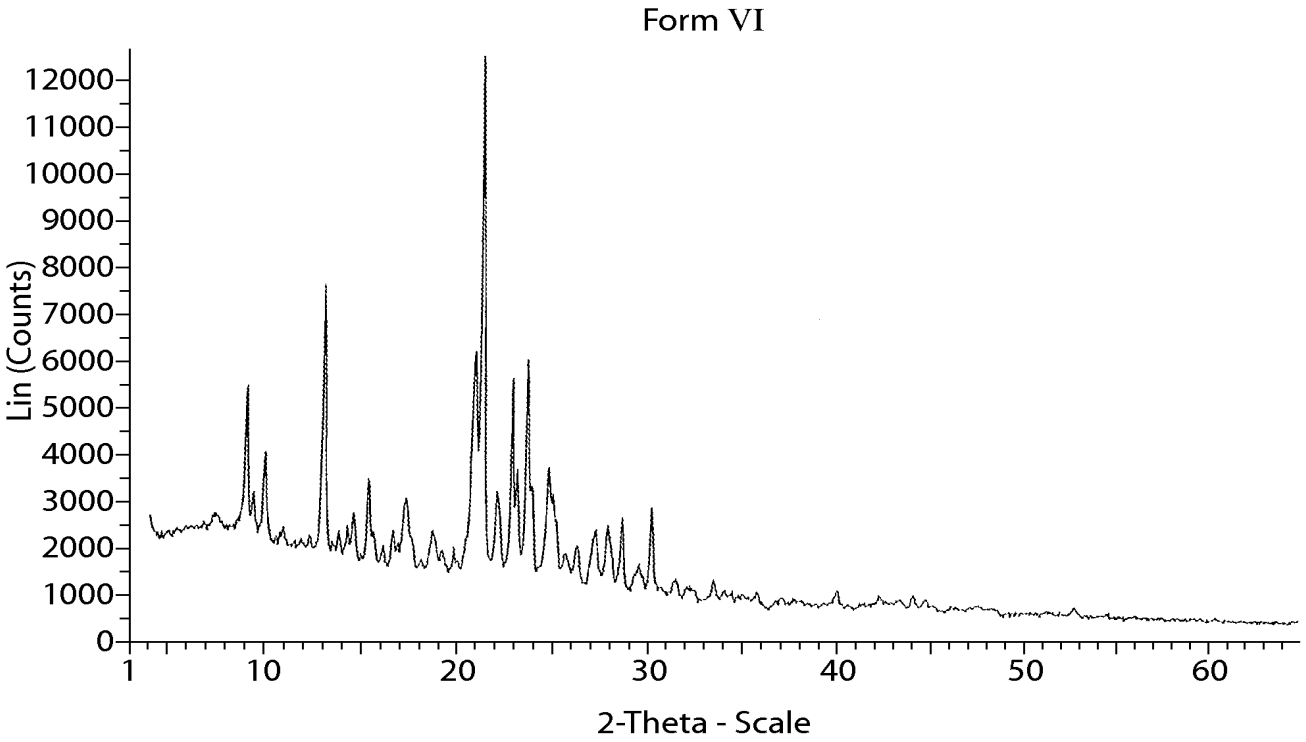
6000
4000
2000
0
Lin (Counts)
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 18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11000
10000
9000
8000
7000
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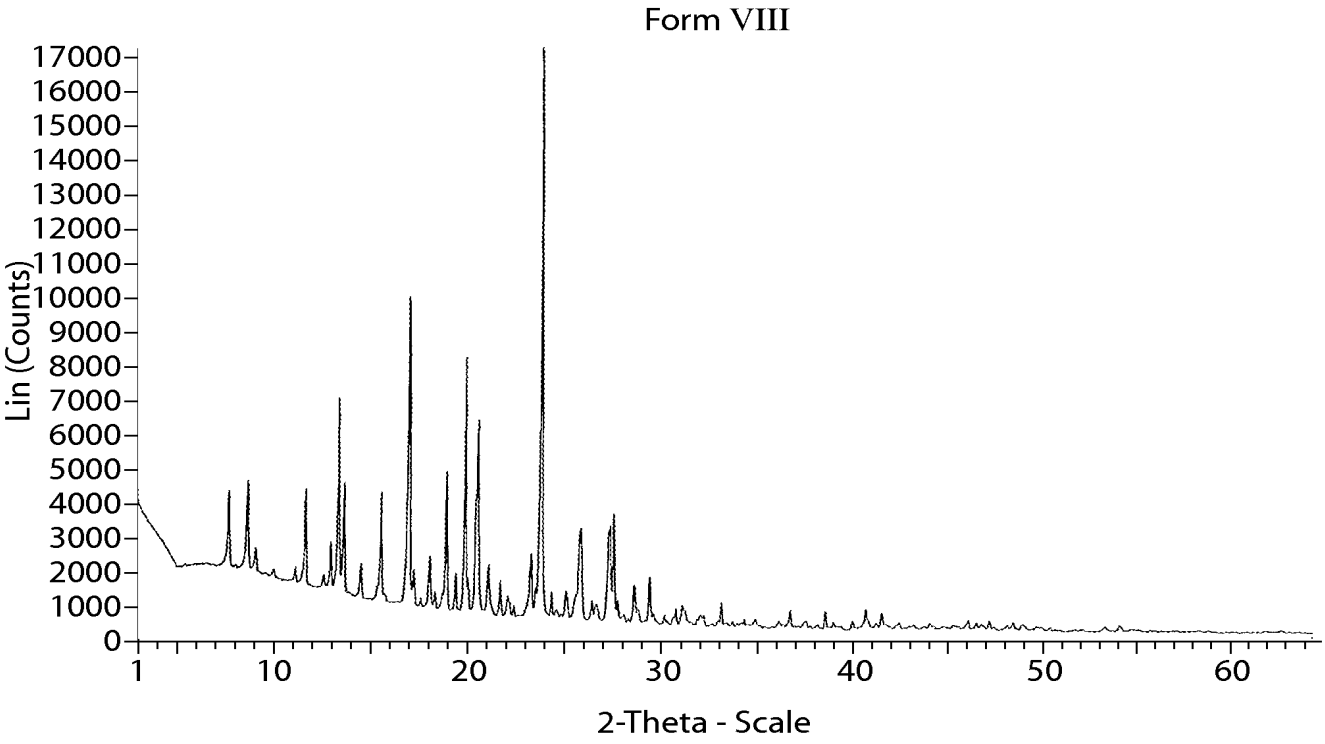
5000
4000
3000
2000
1000
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 19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12000
11000
10000
9000
8000
7000
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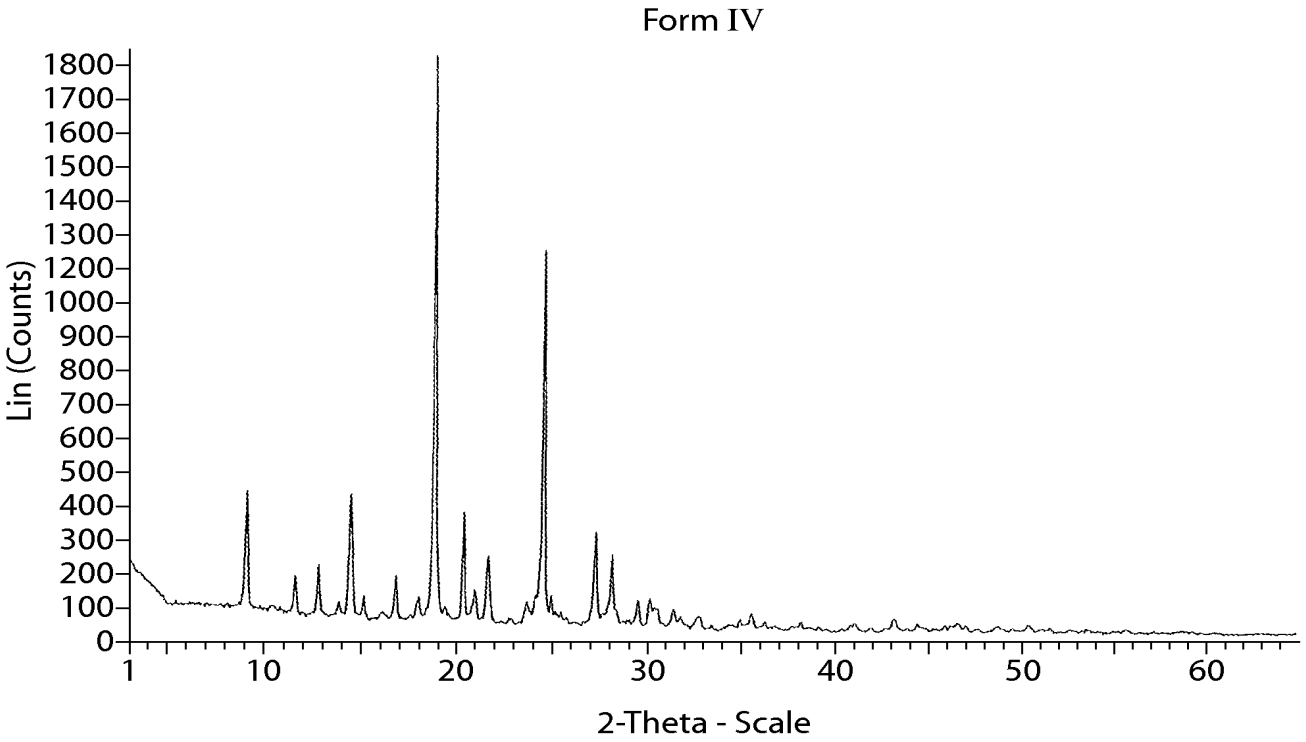
4000
3000
2000
1000
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 20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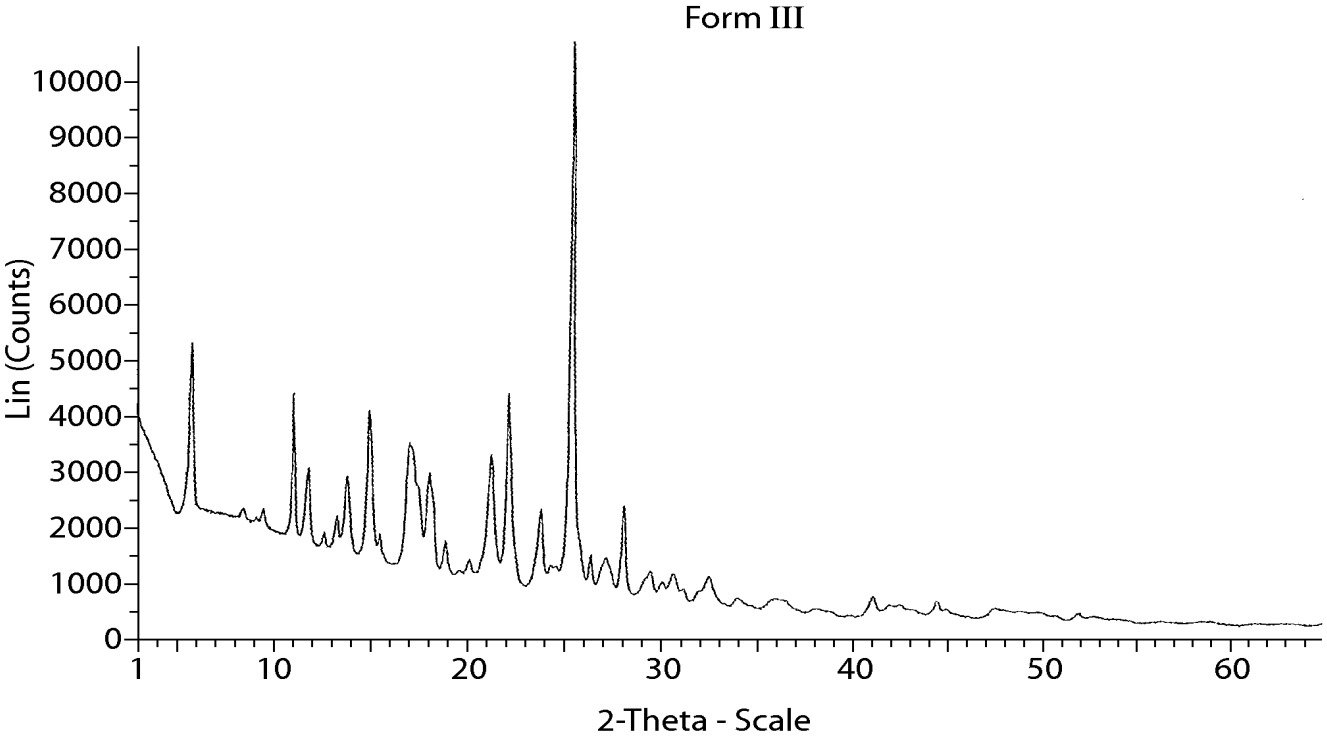
1600
1500
1400
1300
1200
1000
900
800
700
600
500
400
300
200
100
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 21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Lin (Counts)
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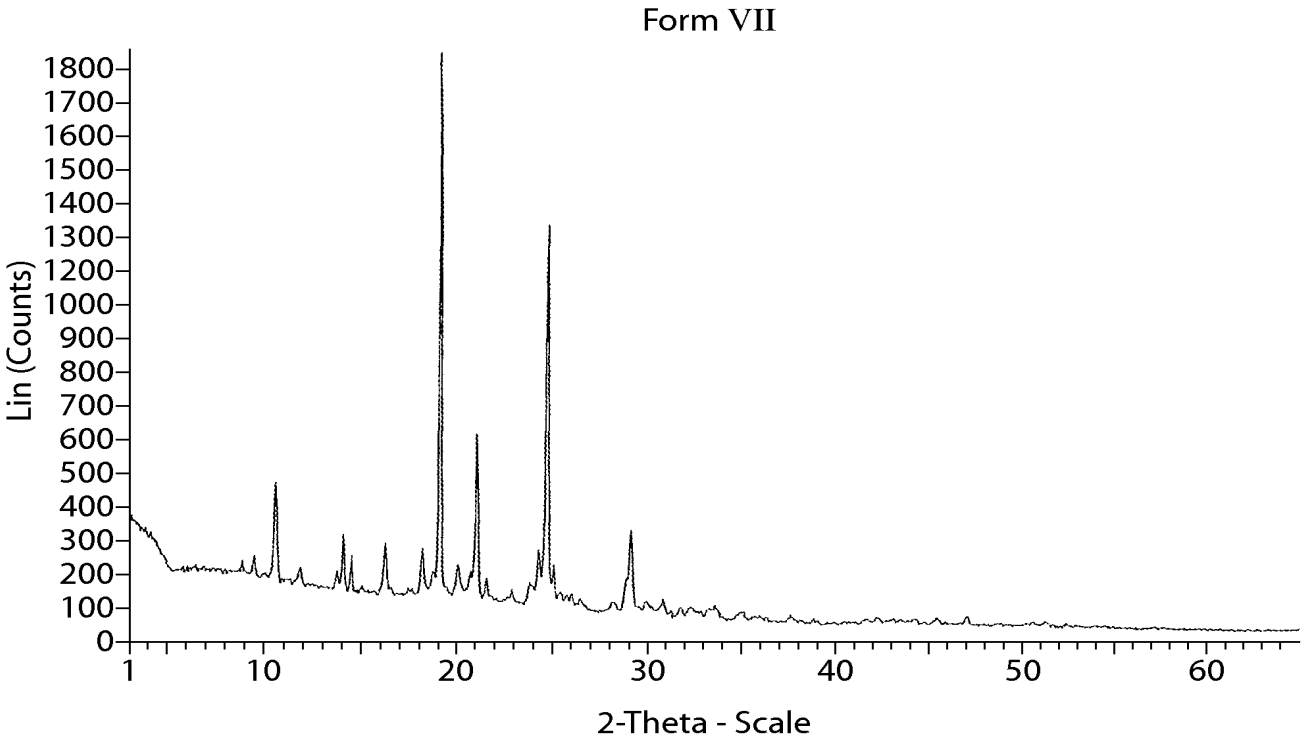
4000
3000
2000
1000
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 22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1500
1400
1300
1200
1000
900
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600
500
400
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200
100
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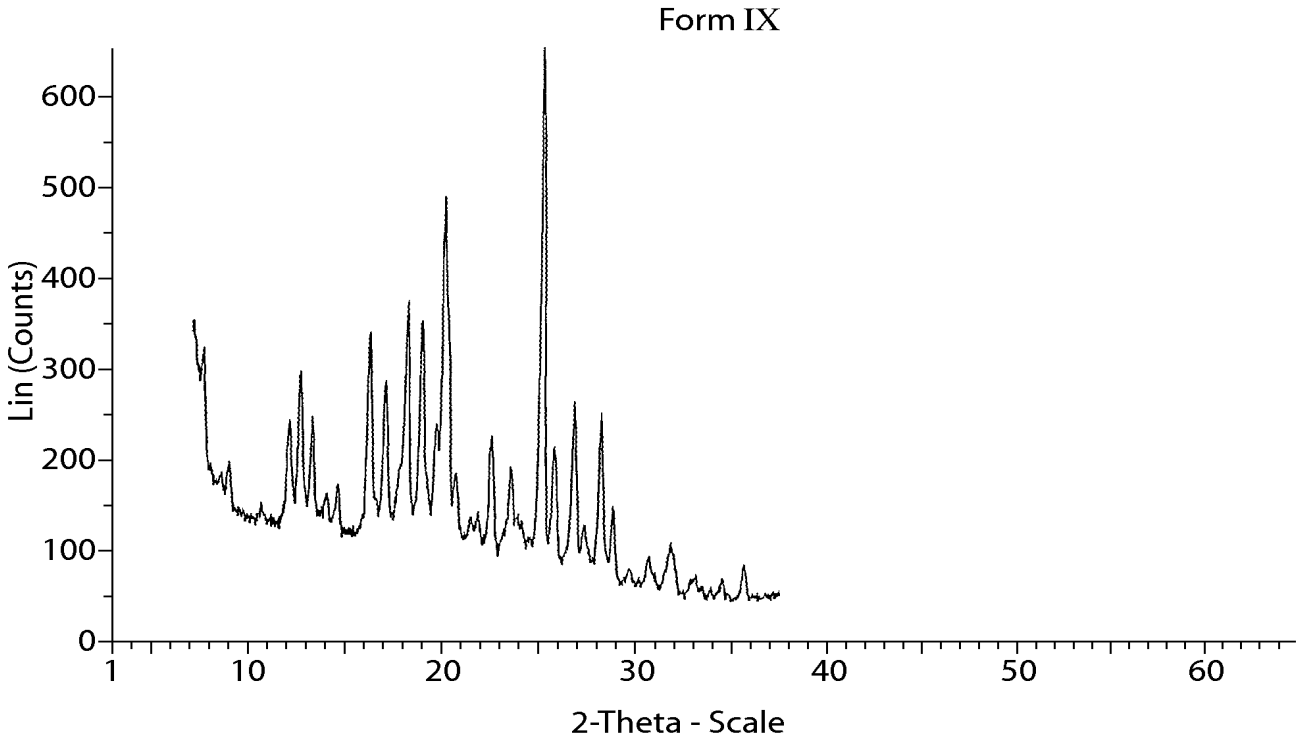
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 23


Form IX
Lin (Counts)
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500
400
300
200
100
0
1
10
20
30
40
50
60
2-Theta - Scale

Fig. 24

Form XIII

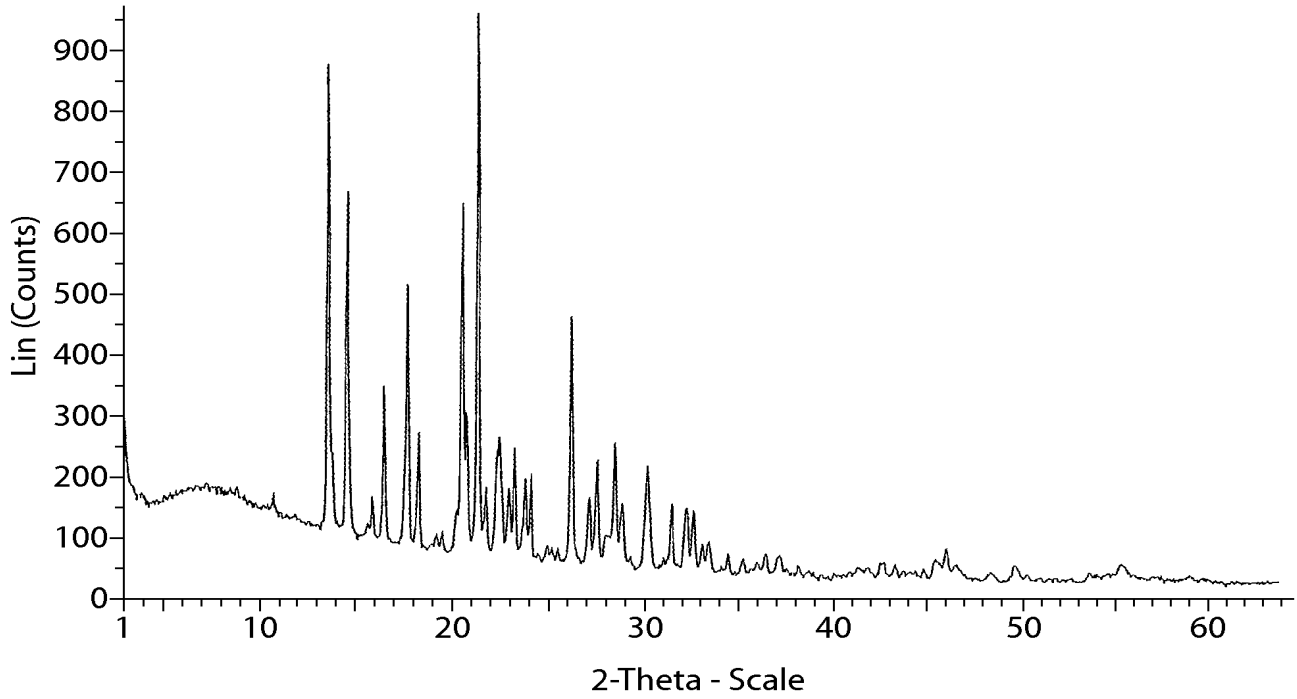


Fig. 25

Form XVI

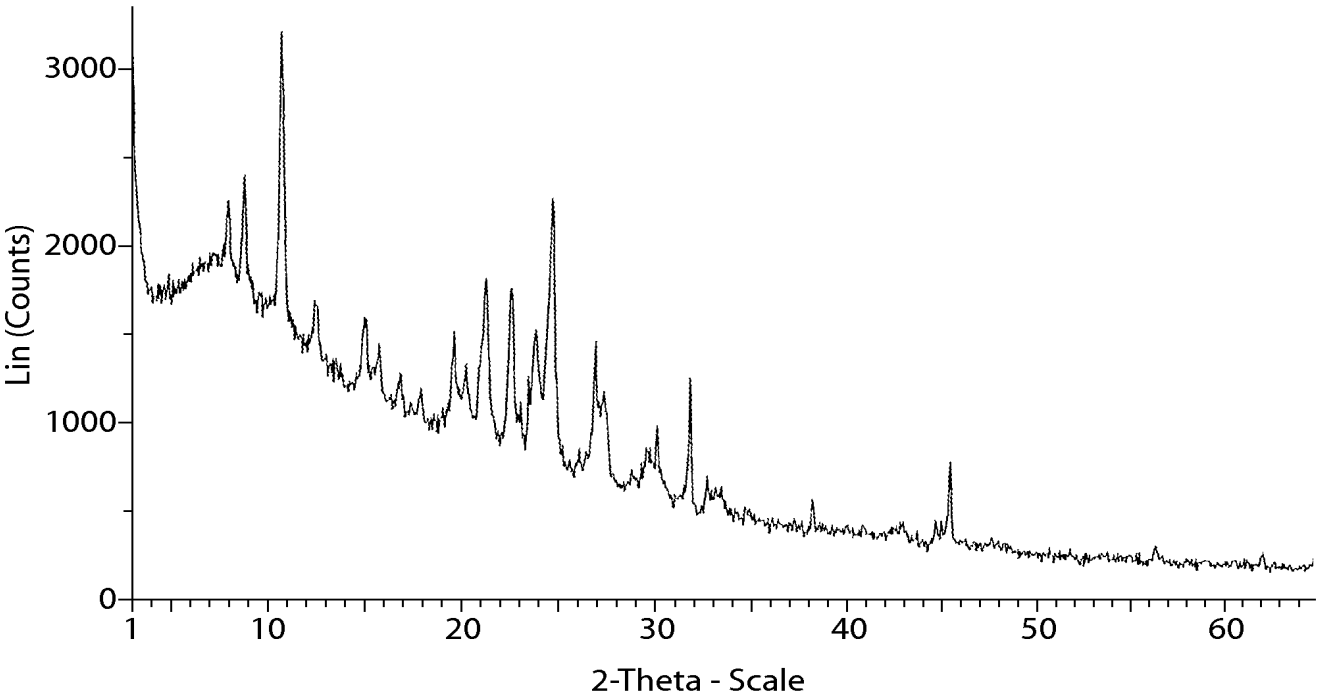


Fig. 26

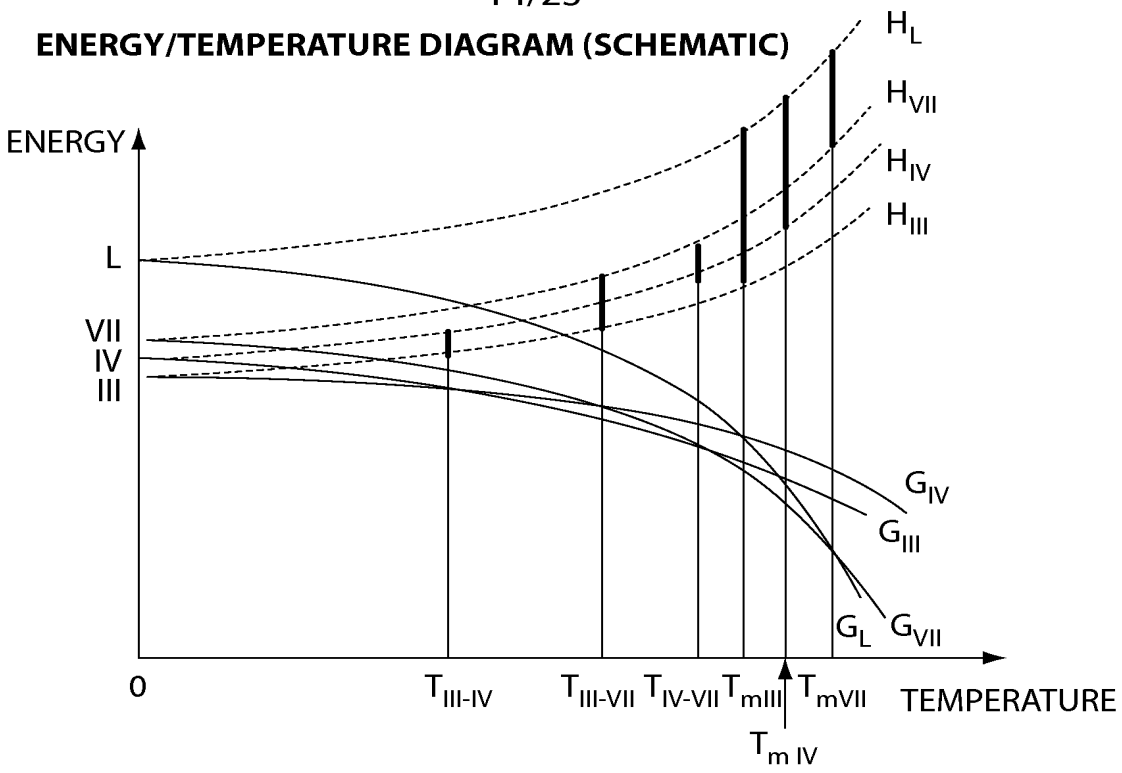
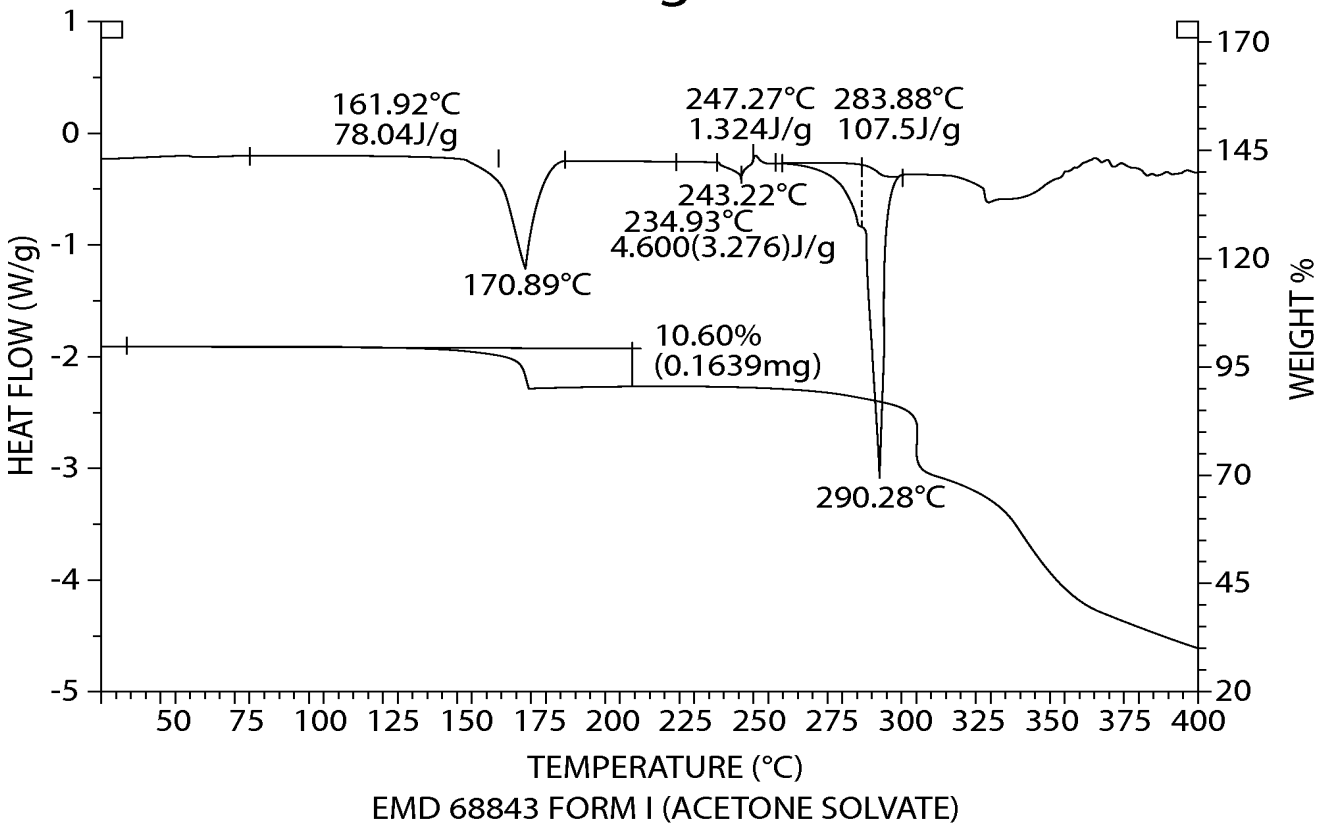

ENERGY/TEMPERATURE DIAGRAM (SCHEMATIC)
ENERGY
L
VII
IV
III
H_L
H_{VII}
H_{IV}
H_{III}
G_{IV}
G_{III}
G_L
G_{VII}
0
T_{III-IV}
$T_{III-VII}$
T_{IV-VII}
T_{mIII}
T_{mVII}
TEMPERATURE
$T_{m\ IV}$

Fig. 27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78.04J/g
247.27°C
1.324J/g
283.88°C
107.5J/g
243.22°C
234.93°C
4.600(3.276)J/g
170.89°C
10.60%
(0.1639mg)
290.28°C
HEAT FLOW (W/g)
WEIGHT %
TEMPERATURE (°C)
EMD 68843 FORM I (ACETONE SOLVATE)

Fig. 28

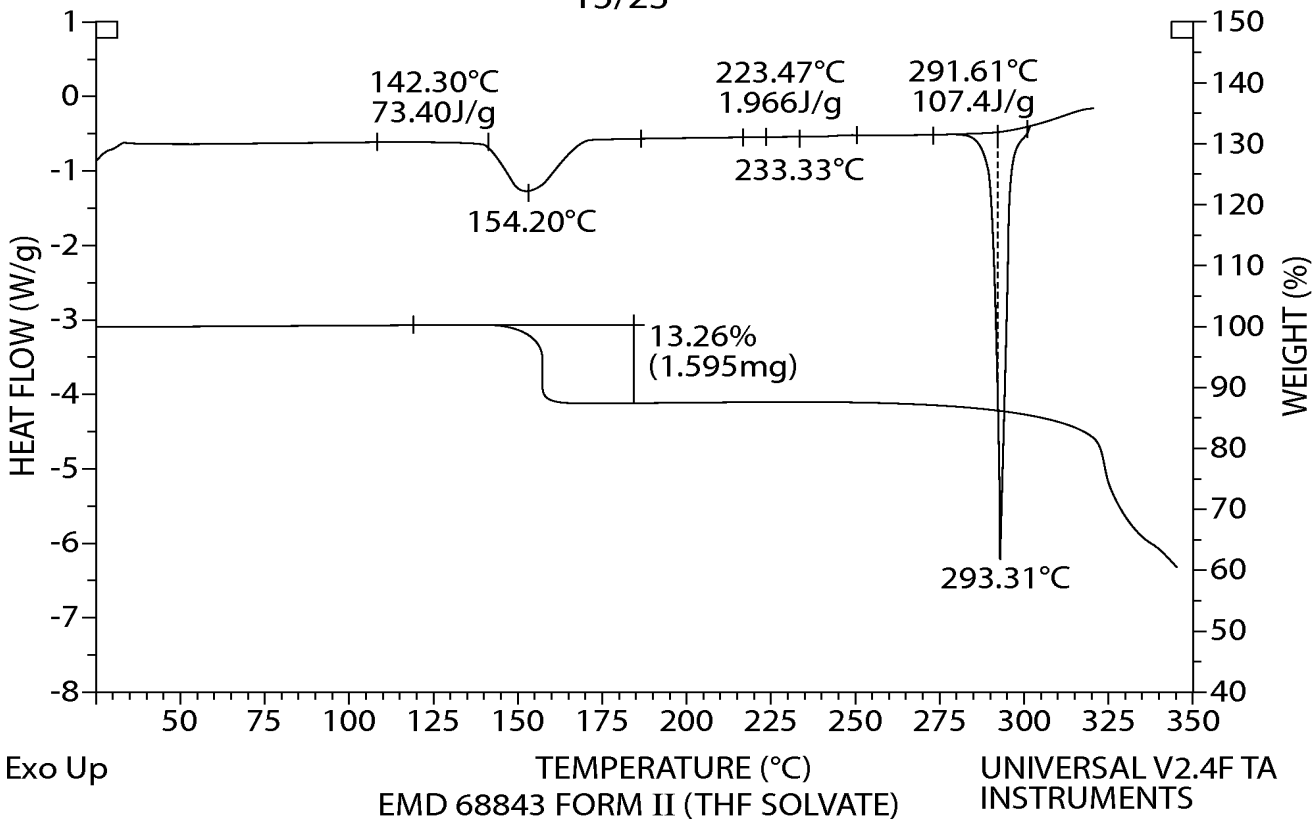

142.30°C
73.40J/g
154.20°C
223.47°C
1.966J/g
233.33°C
291.61°C
107.4J/g
13.26%
(1.595mg)
293.31°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM II (THF SOLVATE)
UNIVERSAL V2.4F TA
INSTRUMENTS

Fig. 29

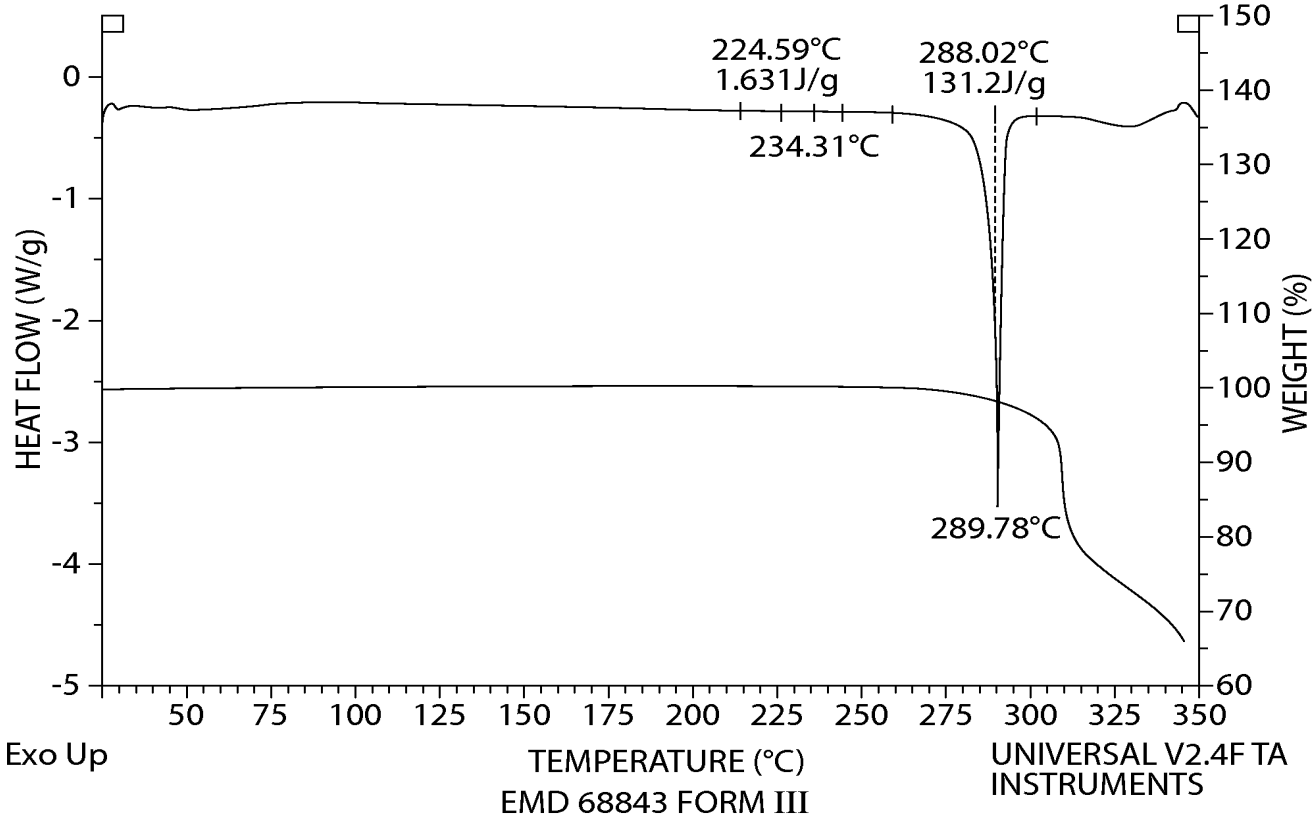

224.59°C
1.631J/g
234.31°C
288.02°C
131.2J/g
289.78°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM III
UNIVERSAL V2.4F TA
INSTRUMENTS

Fig. 30

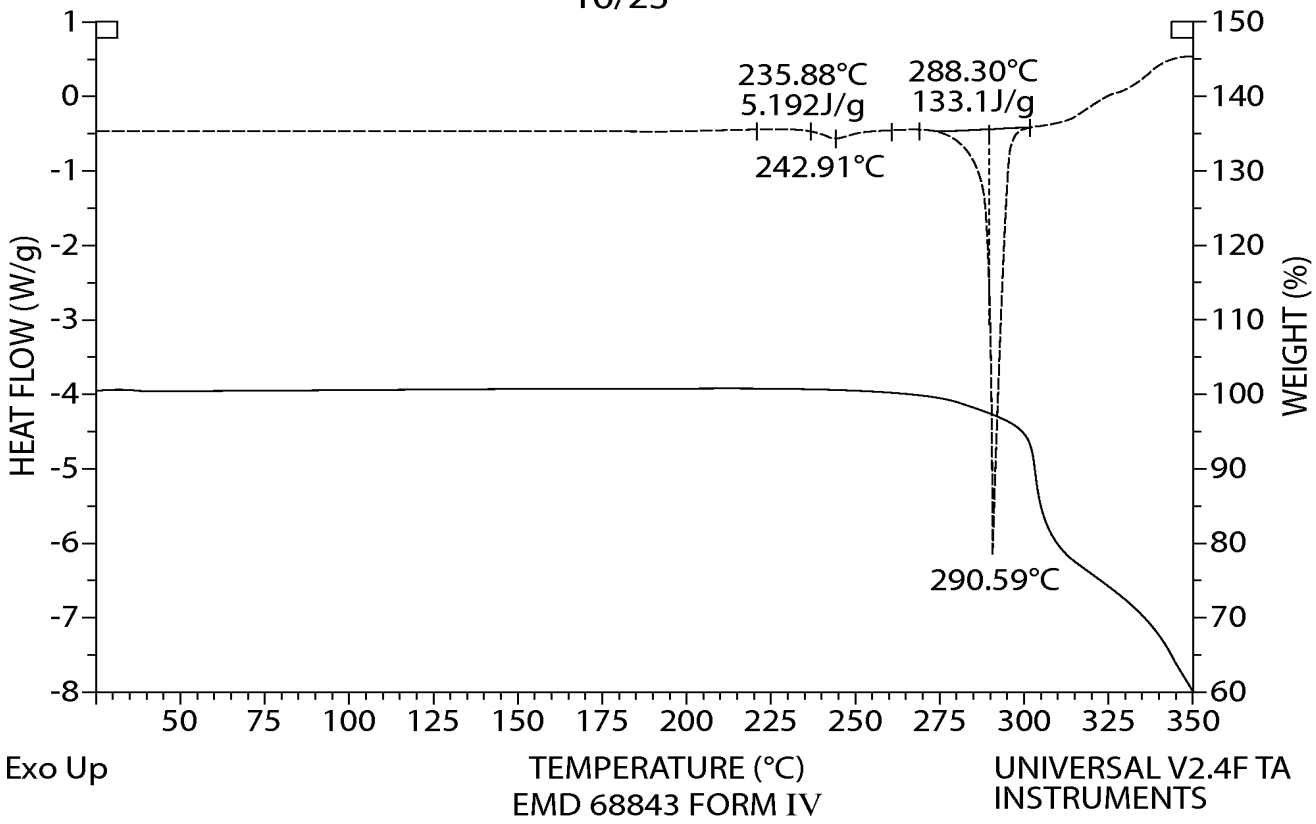

235.88°C
5.192J/g
242.91°C
288.30°C
133.1J/g
290.59°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM IV
UNIVERSAL V2.4F TA
INSTRUMENTS

Fig. 31

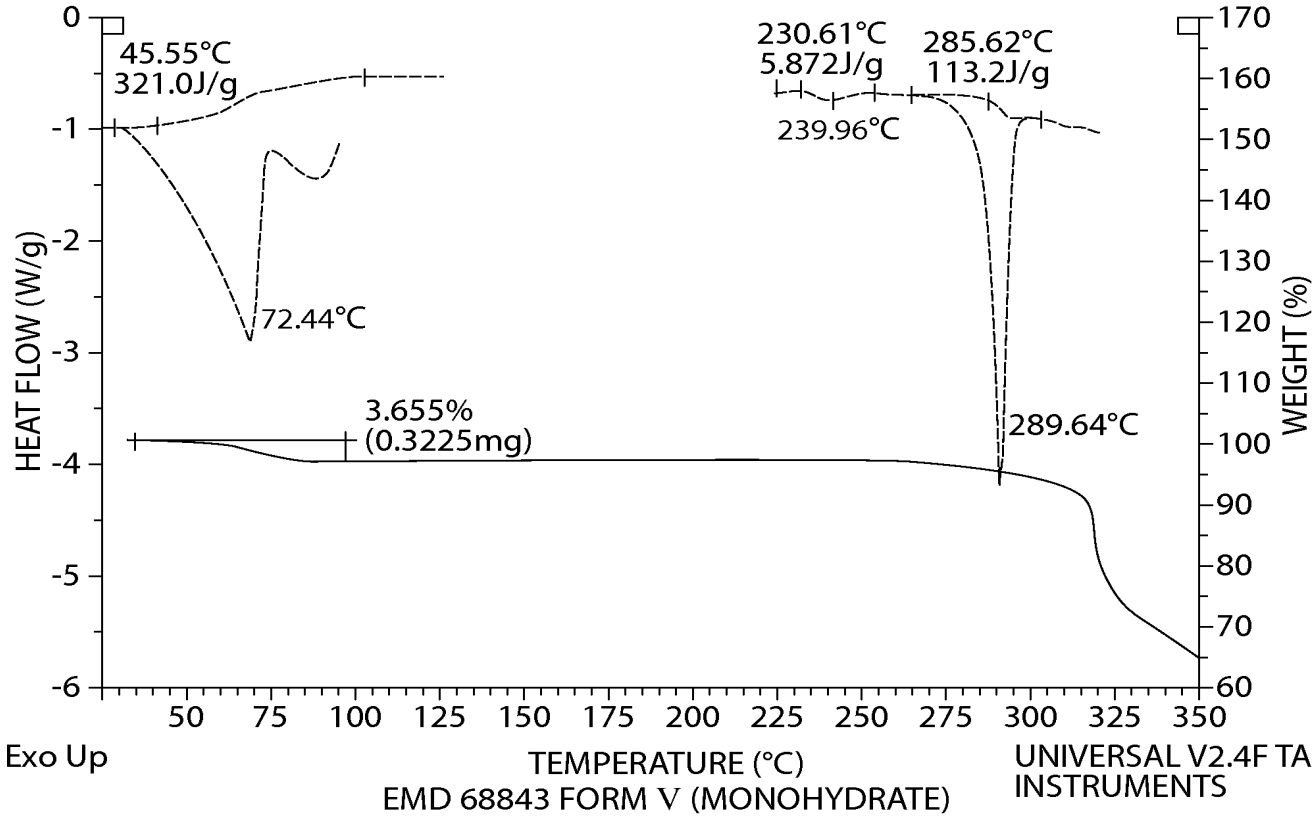

45.55°C
321.0J/g
72.44°C
3.655%
(0.3225mg)
230.61°C
5.872J/g
239.96°C
285.62°C
113.2J/g
289.64°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM V (MONOHYDRATE)
UNIVERSAL V2.4F TA
INSTRUMENTS

Fig. 32

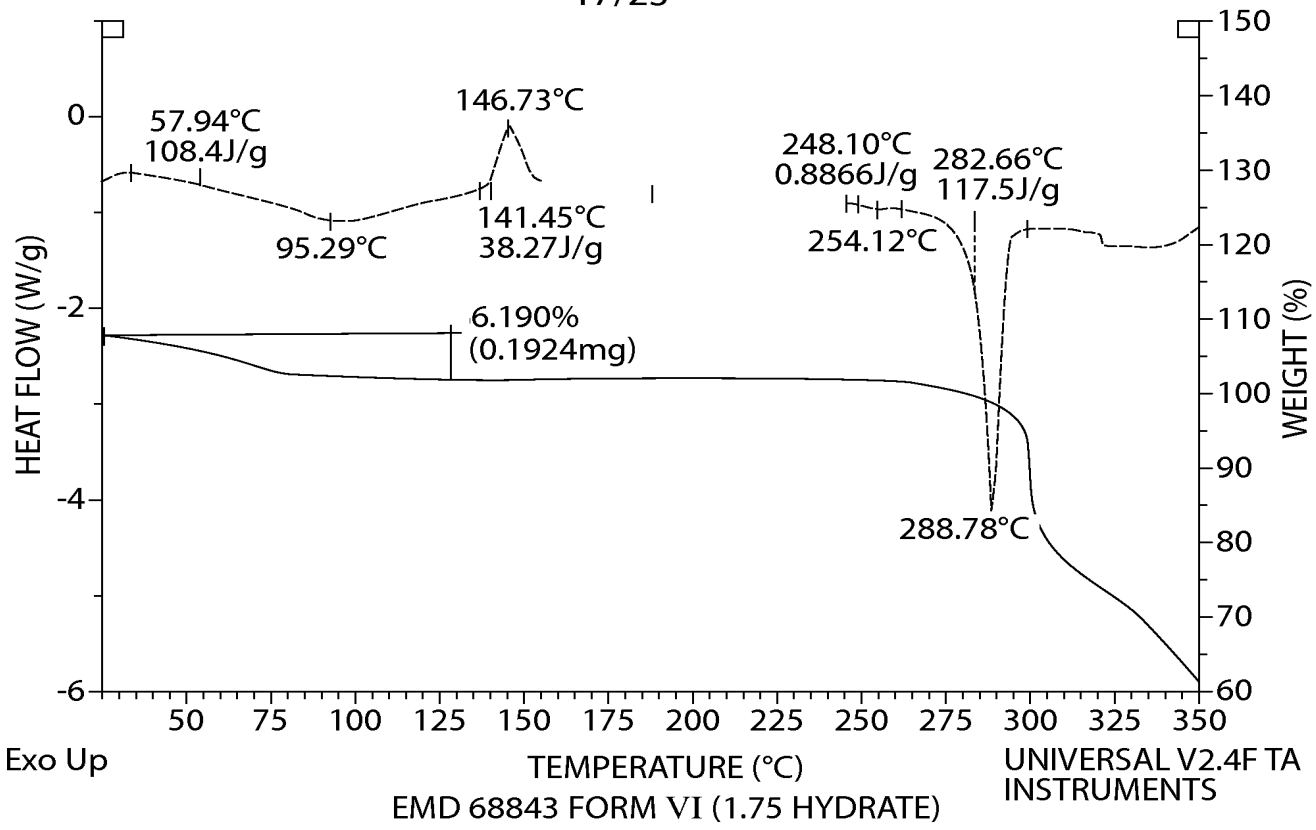

57.94°C
108.4J/g
146.73°C
95.29°C
141.45°C
38.27J/g
248.10°C
0.8866J/g
282.66°C
117.5J/g
254.12°C
6.190%
(0.1924mg)
288.78°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM VI (1.75 HYDRATE)
UNIVERSAL V2.4F TA INSTRUMENTS

Fig. 33

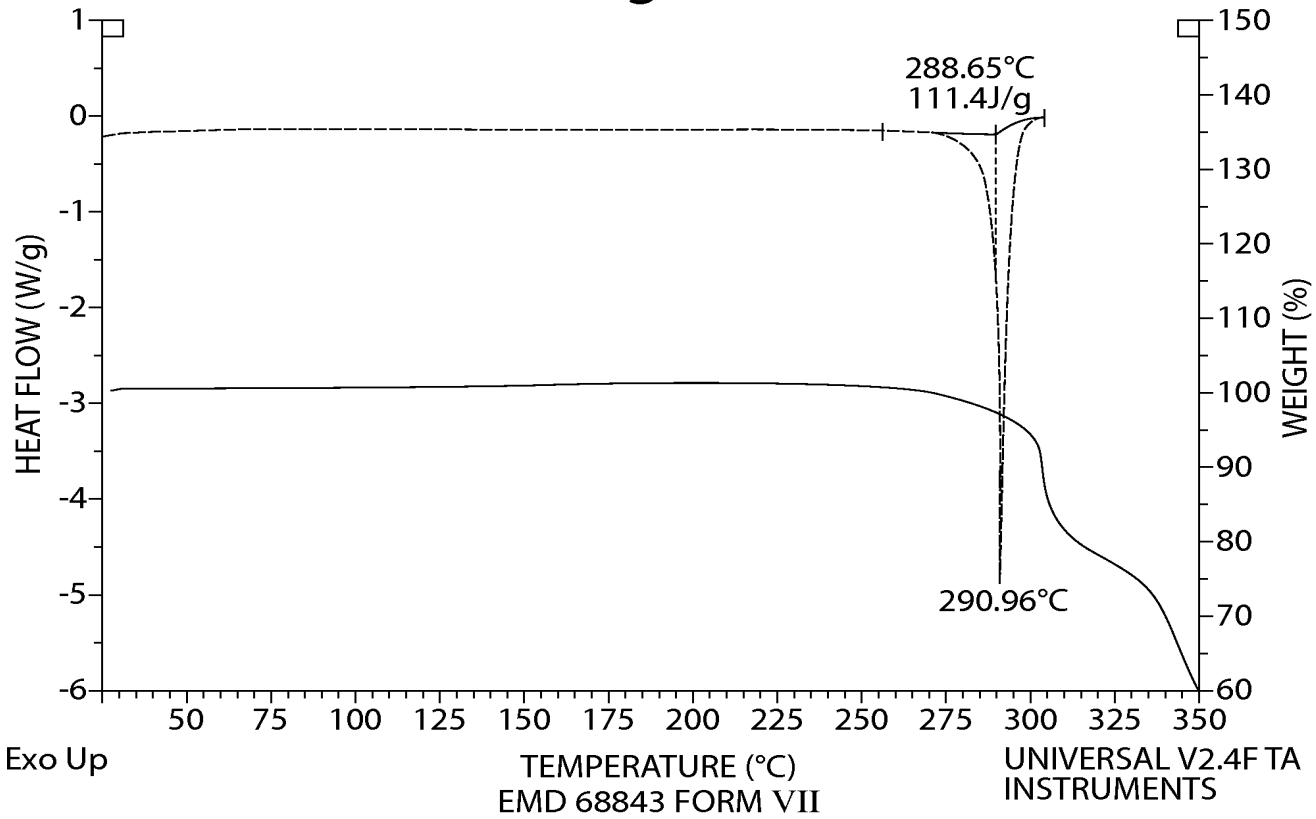

288.65°C
111.4J/g
290.96°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM VII
UNIVERSAL V2.4F TA INSTRUMENTS

Fig. 34

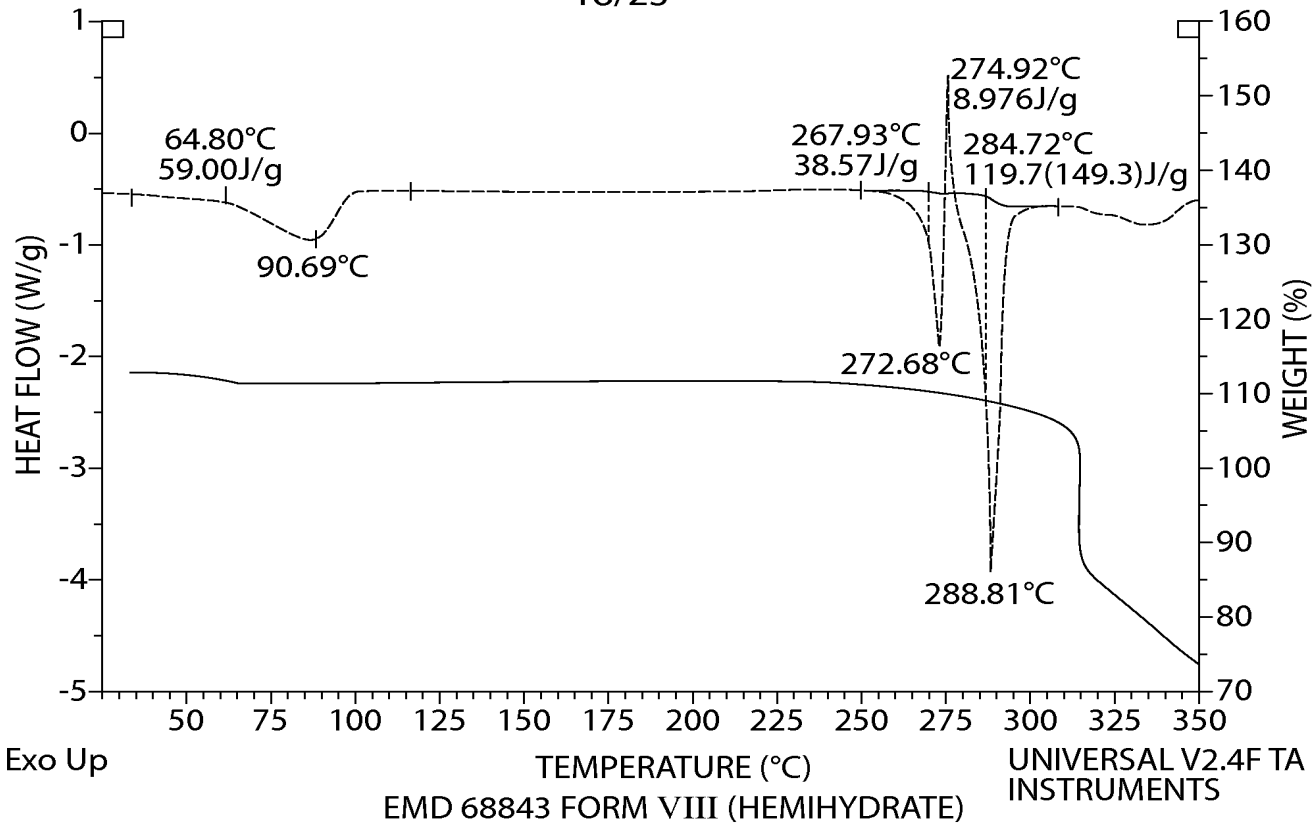

64.80°C
59.00J/g
90.69°C
267.93°C
38.57J/g
274.92°C
8.976J/g
284.72°C
119.7(149.3)J/g
272.68°C
288.81°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM VIII (HEMIHYDRATE)
UNIVERSAL V2.4F TA INSTRUMENTS

Fig. 35

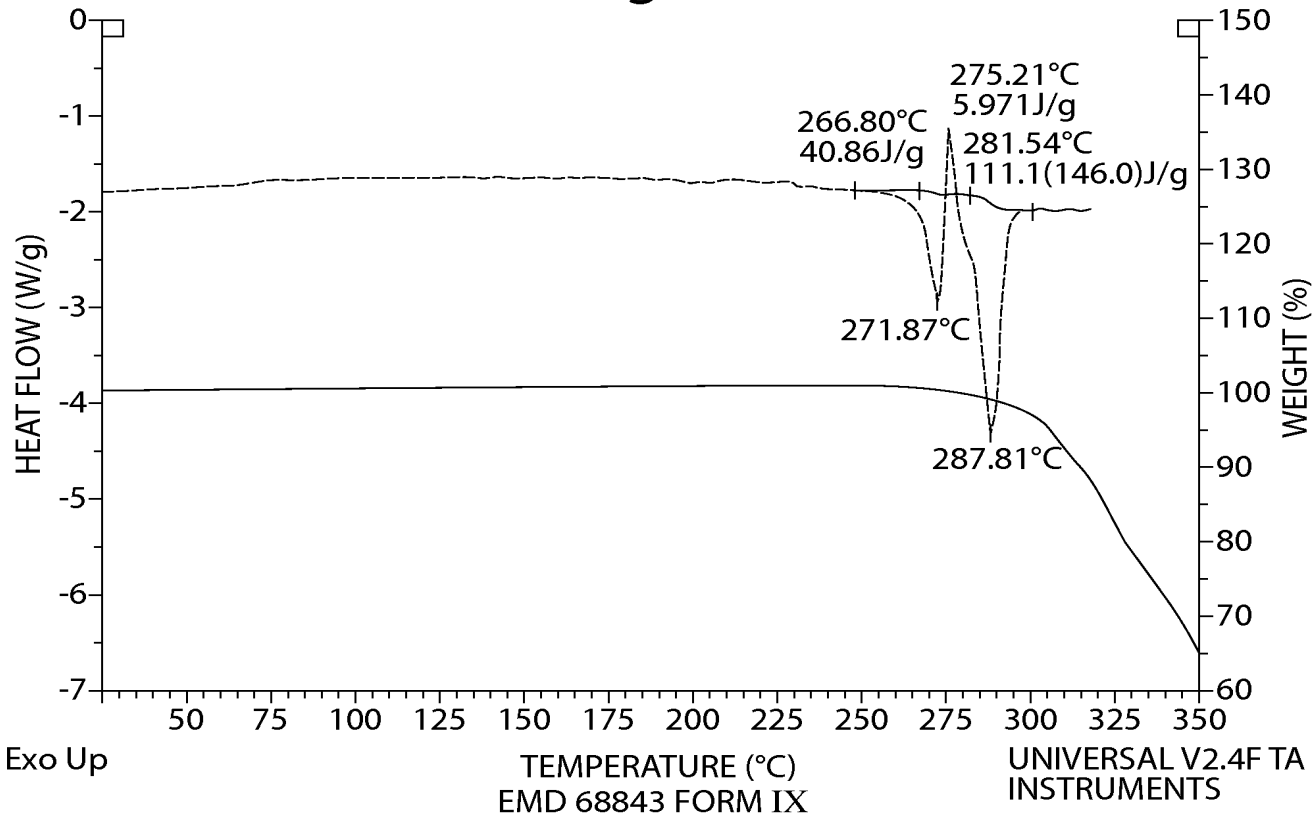

266.80°C
40.86J/g
275.21°C
5.971J/g
281.54°C
111.1(146.0)J/g
271.87°C
287.81°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
EMD 68843 FORM IX
UNIVERSAL V2.4F TA INSTRUMENTS

Fig. 36

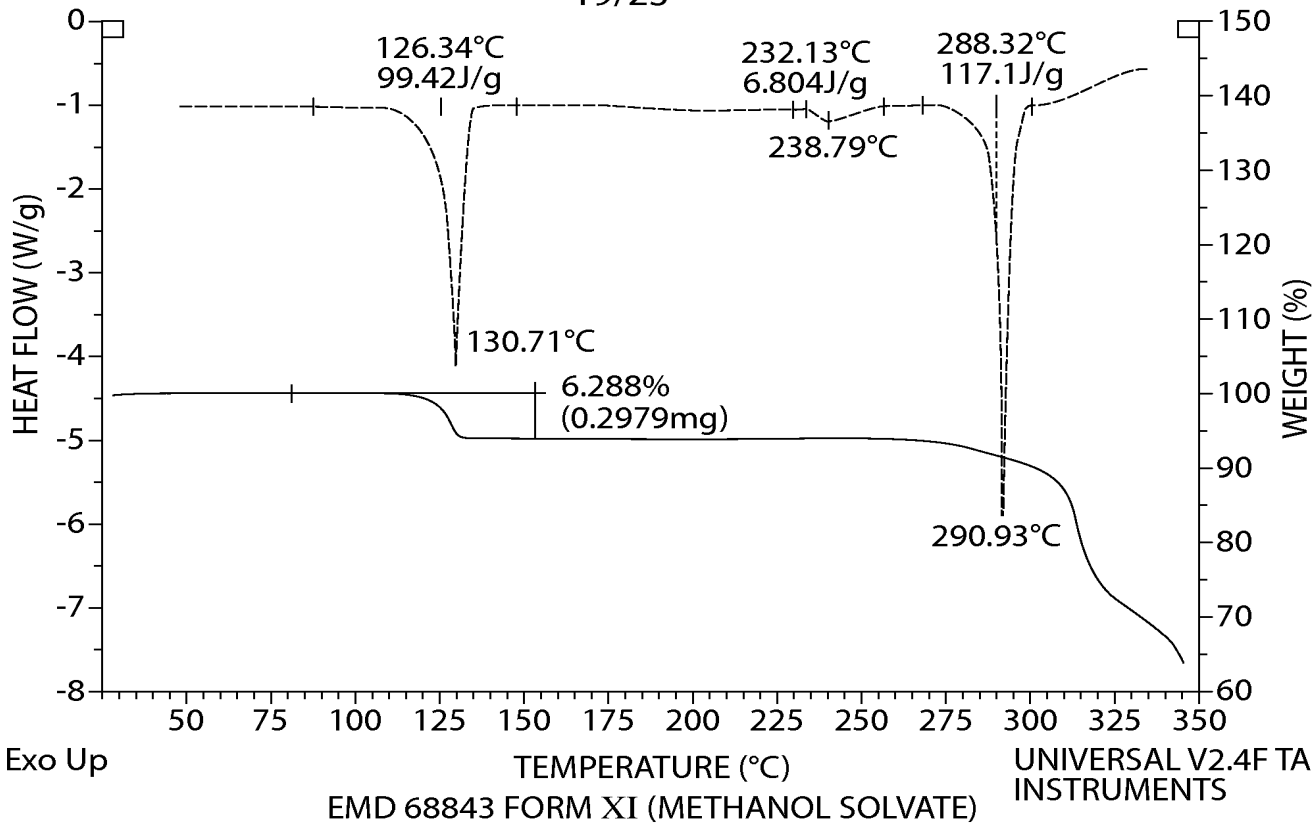

126.34°C
99.42J/g
232.13°C
6.804J/g
288.32°C
117.1J/g
238.79°C
130.71°C
6.288%
(0.2979mg)
290.93°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
UNIVERSAL V2.4F TA INSTRUMENTS
EMD 68843 FORM XI (METHANOL SOLVATE)

Fig. 37

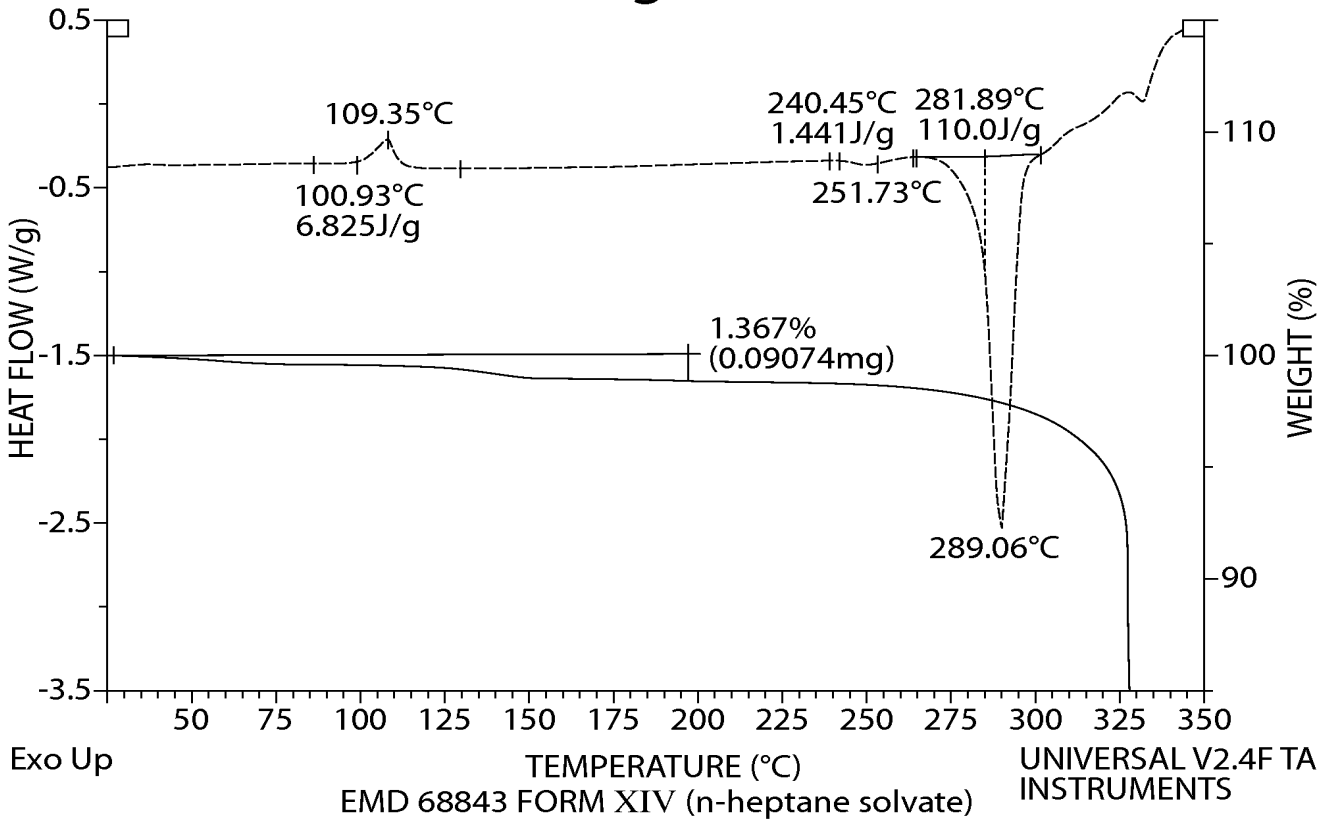
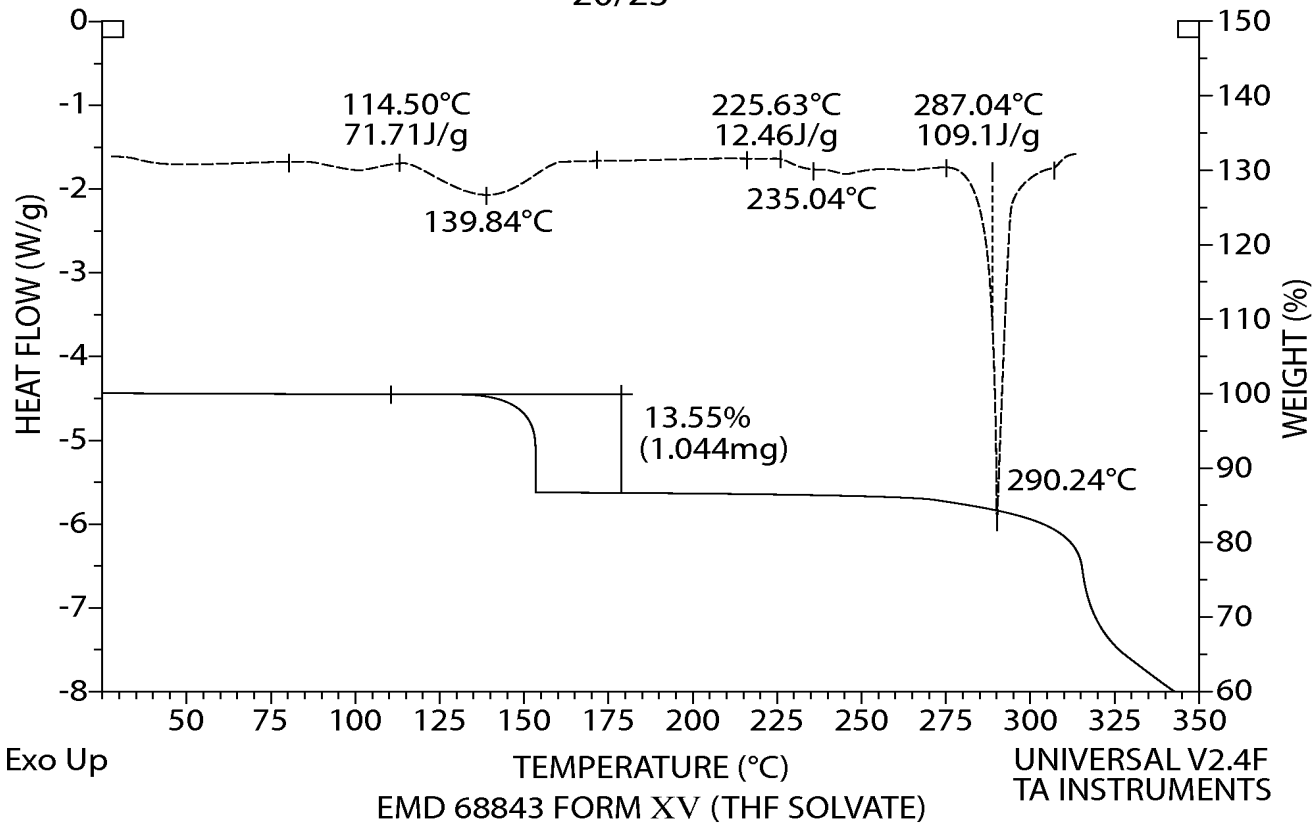

109.35°C
100.93°C
6.825J/g
240.45°C
1.441J/g
281.89°C
110.0J/g
251.73°C
1.367%
(0.09074mg)
289.06°C
HEAT FLOW (W/g)
WEIGHT (%)
Exo Up
TEMPERATURE (°C)
UNIVERSAL V2.4F TA INSTRUMENTS
EMD 68843 FORM XIV (n-heptane solvate)

Fig. 38



EMD 68843 FORM XV (THF SOLVATE)

Fig. 39

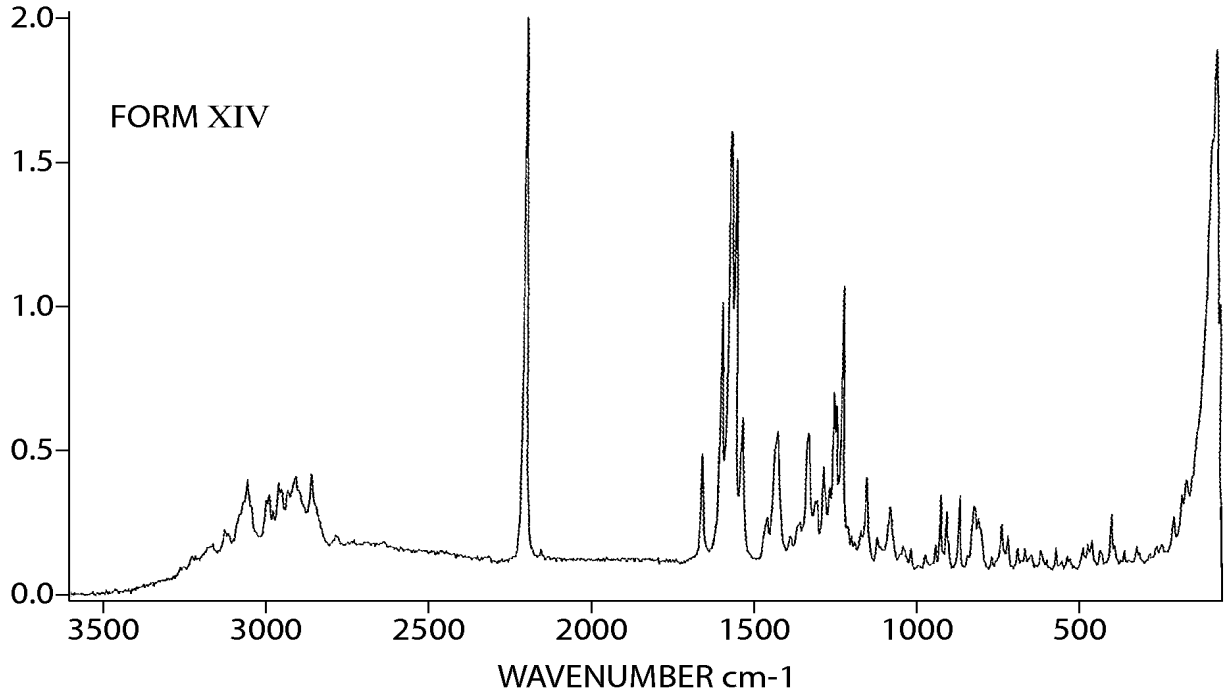


Fig. 40

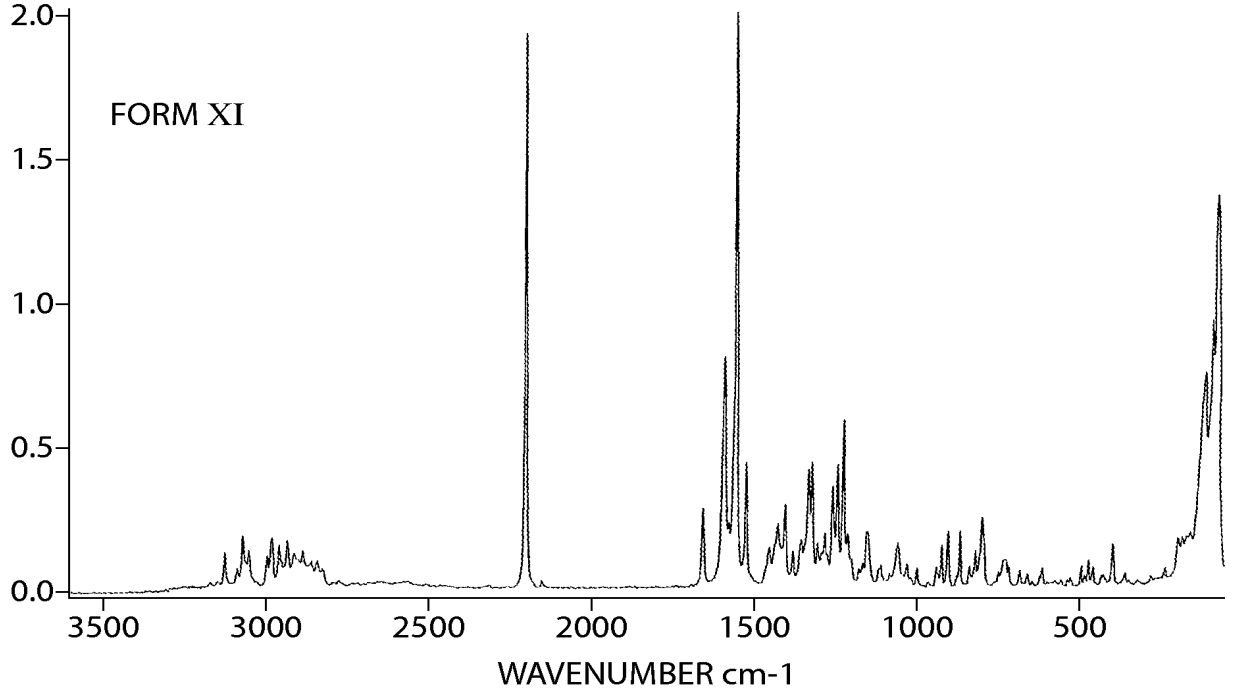

FORM XI
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 41

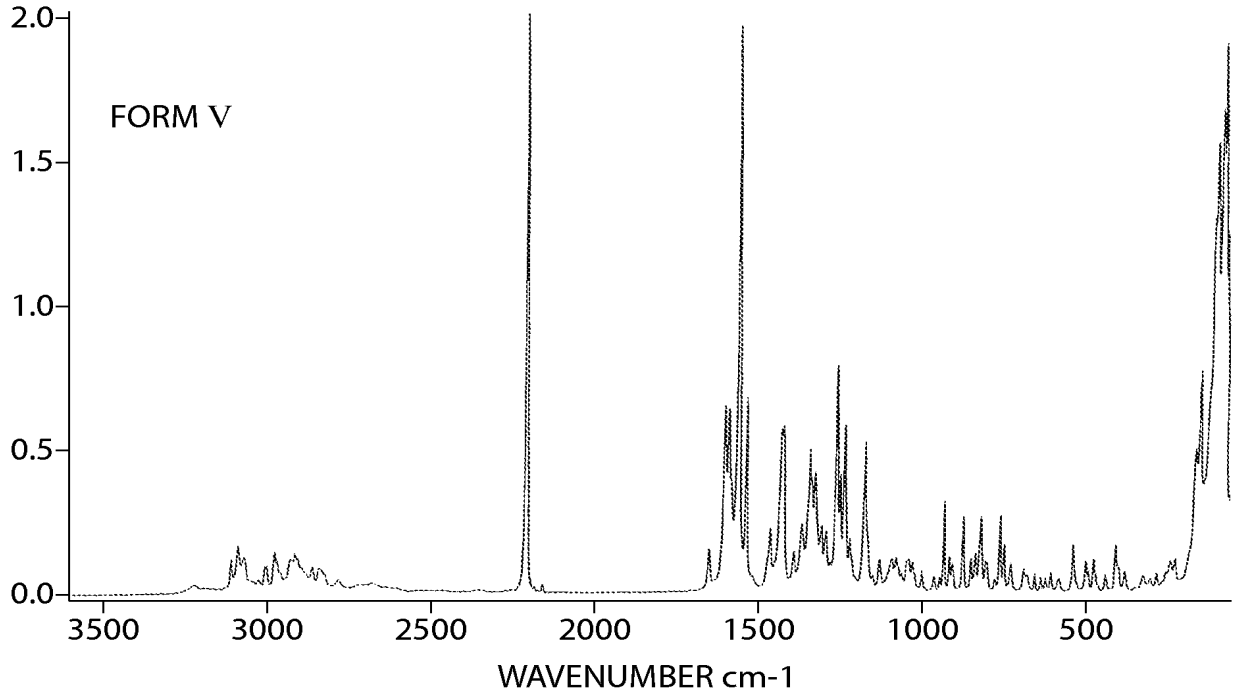

FORM V
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 42

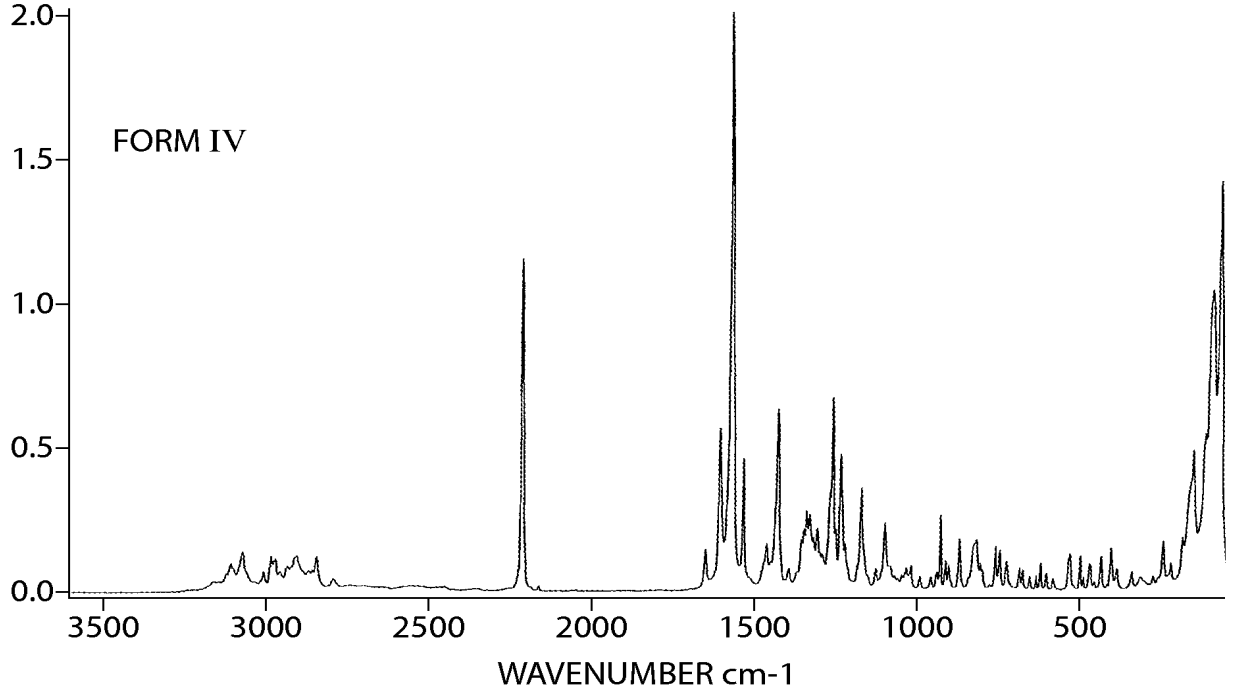

FORM IV
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 43

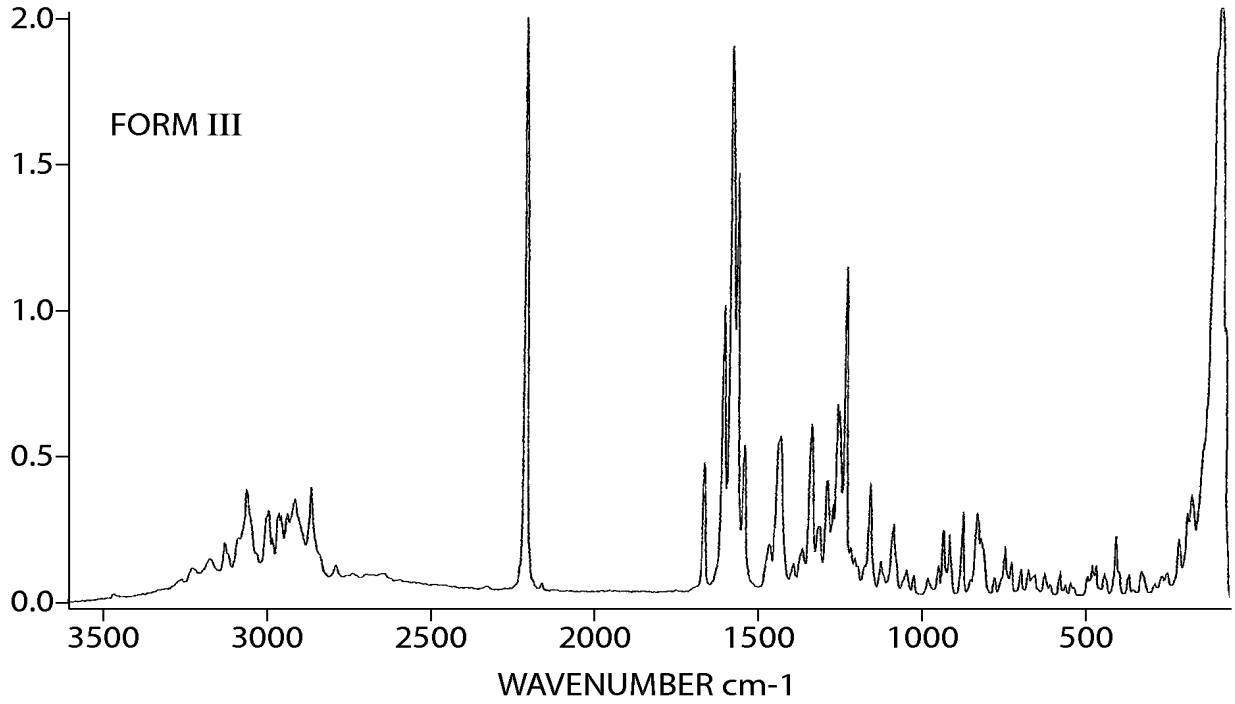

FORM III
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 44

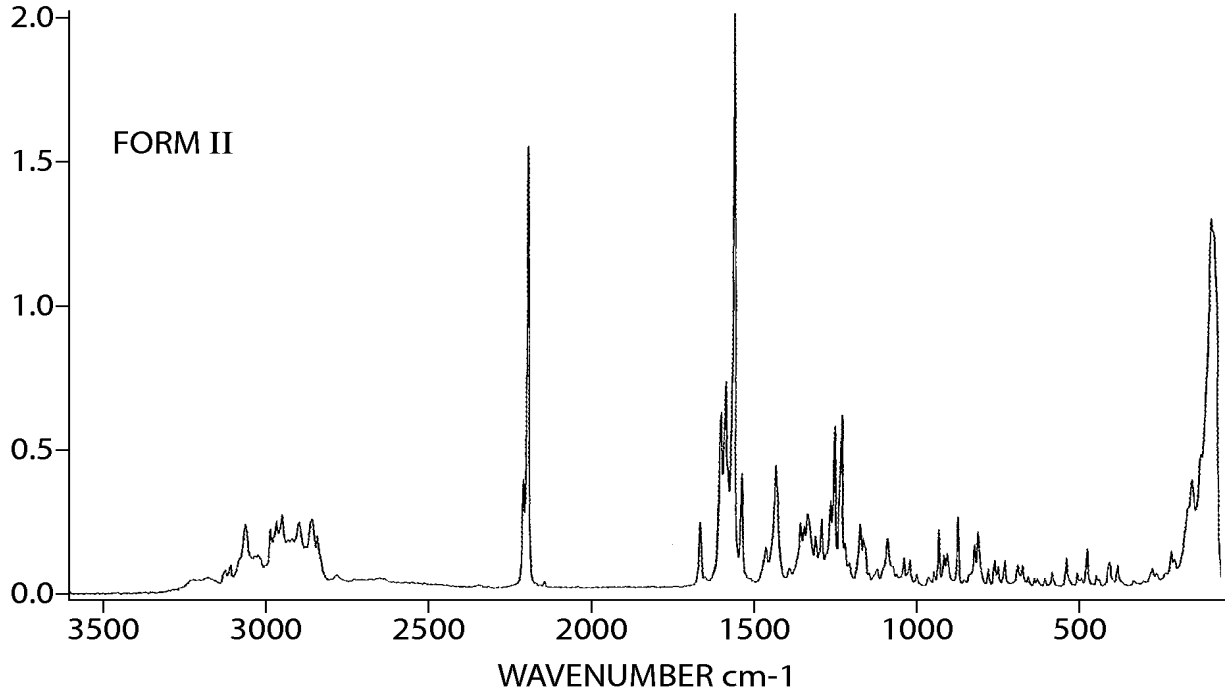

FORM II
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 45

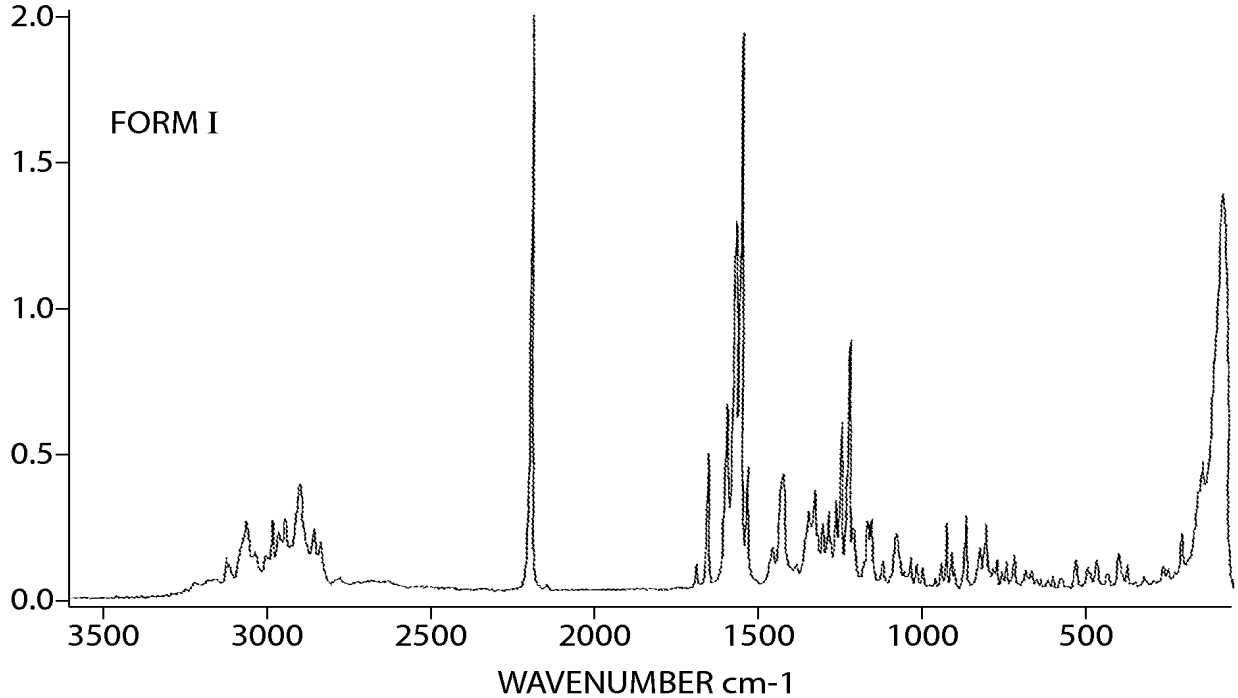

FORM I
2.0
1.5
1.0
0.5
0.0
3500
3000
2500
2000
1500
1000
500
WAVENUMBER cm-1

Fig. 46

Doc Code: Oath

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)		
☐ Declaration Submitted With Initial Filing OR ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (f)) required)	Attorney Docket Number	120140-00109
	First Named Inventor	Andreas Bathe
	COMPLETE IF KNOWN	
	Application Number	13/658,088
	Filing Date	October 23, 2012
	Art Unit	N/A
	Examiner Name	Not Yet Assigned

POLYMORPHIC FORMS OF 1-[4-(5-CYANOINDOL-3-YL)BUTYL]-4-(2-CARBAMOYLBENZOFURAN-5-YL) PIPERAZINE HYDROCHLORIDE

(Title of the Invention)

As a below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application

OR

☒ United States Application Number or PCT International application number 13/658,088

filed on 10/23/2012 .

The above-identified application was made or authorized to be made by me.

I believe I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby state that I have reviewed and understand the contents of the above identified specification,

I acknowledge the duty to disclose all information known to me that is material to patentability in accordance with Title 37, Code of Federal Regulations, § 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Authorization To Permit Access To Application by Participating Office

☐ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed, 2) any foreign application to which the above-identified patent application claims priority under 35 USC 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

DECLARATION — Utility or Design Patent Application

Direct all correspondence to: [x] The address associated with Customer Number: 86738 OR [ ] Correspondence address below

Name		
Address		
City	State	Zip
Country	Telephone	Email

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LEGAL NAME OF SOLE OR FIRST INVENTOR:

(*E.g.*, Given Name (first and middle [if any]) and Family Name or Surname)

Andreas Bathe

Inventor's Signature	Date (Optional)
Andreas Bathe	3-12-2012

Residence: City	State	Country
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Mailing Address: Merckstrasse 17

City	State	Zip	Country
Darmstadt		64283	Germany

[x] Additional inventors are being named on the 2 supplemental sheet(s) PTO/AIA/10 attached hereto.

PTO/AIA/10 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet (for PTO/AIA/08,09) Page 1 of 2

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Bernd Helfert

Inventor's Signature	Date (Optional)

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Ober-Ramstadt		Germany

Mailing Address: Schillerstrasse 1

City	State	Zip	Country
Ober-Ramstadt		64372	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Steffen Neuenfeld

Inventor's Signature	Date (Optional)
	05-12-2012

Residence: City	State	Country
Messel		Germany

Mailing Address: Adelungstrasse 12

City	State	Zip	Country
Messel		64409	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Heike Kniel

Inventor's Signature	Date (Optional)
	05.12.12

Residence: City	State	Country
Heppenheim		Germany

Mailing Address: Konigsbergerstrasse 9

City	State	Zip	Country
Heppenheim		64646	Germany

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) **Supplemental Sheet (for PTO/AIA/08,09)** Page 1 of 2

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Bernd Helfert

Inventor's Signature	Date (Optional)
Bernd Helfert	10, 11, 2012

Residence: City	State	Country
Ober-Ramstadt		Germany

Mailing Address: Schillerstrasse 1

City	State	Zip	Country
Ober-Ramstadt		64372	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Steffen Neuenfeld

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Messel		Germany

Mailing Address: Adelungstrasse 12

City	State	Zip	Country
Messel		64409	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Heike Kniel

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Heppenheim		Germany

Mailing Address: Konigsbergerstrasse 9

City	State	Zip	Country
Heppenheim		64646	Germany

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SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet (for PTO/AIA/08,09) Page 2 of 2

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Matthias Bartels

Inventor's Signature	Date (Optional)
	06.12.12

Residence: City	State	Country
Darmstadt		Germany

Mailing Address: Carsonweg 92

City	State	Zip	Country
Darmstadt		64289	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Susanne Rudolph

Inventor's Signature	Date (Optional)
Susanne Rudolph	06-12.2012

Residence: City	State	Country
Dieburg		Germany

Mailing Address: Pfarrgasse 15

City	State	Zip	Country
Dieburg		64807	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Henning Böttcher

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Darmstadt		Germany

Mailing Address: Stiftstrasse 12

City	State	Zip	Country
Darmstadt		64287	Germany

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SUPPLEMENTAL SHEET FOR DECLARATION	ADDITIONAL INVENTOR(S) Supplemental Sheet (for PTO/AIA/08,09) Page 2 of 2

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Matthias Bartels

Inventor's Signature	Date (Optional)

Residence: City	State	Country
Darmstadt		Germany

Mailing Address: Carsonweg 92

City	State	Zip	Country
Darmstadt		64289	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Susanne Rudolph

Inventor's Signature	Date (Optional)

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Dieburg		Germany

Mailing Address: Pfarrgasse 15

City	State	Zip	Country
Dieburg		64807	Germany

Legal Name of Additional Joint Inventor, if any:
(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)
Henning Böttcher

Inventor's Signature	Date (Optional)
Hg Böttcher	

Residence: City	State	Country
Darmstadt		Germany

Mailing Address: Stiftstrasse 12

City	State	Zip	Country
Darmstadt		64287	Germany

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/032,183	Filing Date 09/19/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
	09/19/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)		
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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/LAVINIA JOHNSON/

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/032,183	Filing Date 09/19/2013	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	09/19/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0	X $80 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	***4	= 0	X $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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