



US007297703B2

(12) **United States Patent**
Navarro et al.

(10) **Patent No.:** **US 7,297,703 B2**
(45) **Date of Patent:** **Nov. 20, 2007**

(54) **MACROLIDES**

(75) Inventors: **Francois Navarro**, Bruebach (FR);
Samuel Petit, Mont Saint-Aignan (FR);
Guy Stone, Ettingen (CH)

(73) Assignee: **Novartis AG**, Basel (CH)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **11/020,860**

(22) Filed: **Dec. 23, 2004**

(65) **Prior Publication Data**
US 2005/0107418 A1 May 19, 2005

Related U.S. Application Data

(63) Continuation of application No. 10/393,795, filed on Mar. 21, 2003, now Pat. No. 6,852,729, which is a continuation of application No. 09/866,977, filed on May 29, 2001, now Pat. No. 6,605,613, which is a continuation of application No. PCT/EP99/09521, filed on Dec. 6, 1999.

(30) **Foreign Application Priority Data**

Dec. 7, 1998 (GB) 9826882.4
Mar. 4, 1999 (GB) 9904934.8

(51) **Int. Cl.**
C07D 498/18 (2006.01)
A61K 31/715 (2006.01)

(52) **U.S. Cl.** 514/291; 540/456

(58) **Field of Classification Search** 540/456;
514/291
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,079,128 A 3/1978 Lin et al. 424/181
4,080,445 A 3/1978 Lin et al. 424/227

FOREIGN PATENT DOCUMENTS

EP 0 041 795 12/1981
EP 0 329 460 8/1989
EP 0 423 714 4/1991
WO 94/09010 4/1994
WO 97/03654 2/1997
WO 98/04279 2/1998
WO 98/33482 8/1998

Primary Examiner—Bruck Kifle

(74) *Attorney, Agent, or Firm*—Thomas R. Savitsky;
Gregory C. Houghton

(57) **ABSTRACT**

A mixture comprising a poly-ene macrolide and an antioxidant. Preferably, the poly-ene macrolide is rapamycin and the antioxidant is 2, 6-di-tert.-butyl-4-methylphenol. The presence of the antioxidant improves the stability of the poly-ene macrolide to oxidation.

12 Claims, 4 Drawing Sheets

FIGURE 1/3

Atomic coordinates and equivalent isotropic displacement parameters (\AA^2)
($U(\text{eq})$ is defined as one third of the trace of the orthogonalized U_{ij} tensor)

	x/a	y/b	z/c	$U(\text{eq})$
C(1)	.9065(6)	.0121(9)	.5077(5)	.060(2)
O(1)	.9239(4)	-.0736(6)	.5482(4)	.076(2)
C(2)	.8041(5)	.0615(8)	.4625(4)	.060(2)
C(3)	.7847(7)	.1748(10)	.4984(6)	.087(3)
C(4)	.7627(7)	.1515(10)	.5725(7)	.098(3)
C(5)	.6795(7)	.0653(11)	.5610(6)	.094(3)
C(6)	.7005(6)	-.0496(9)	.5256(5)	.074(3)
N(7)	.7272(4)	-.0269(6)	.4567(4)	.059(2)
C(8)	.6781(5)	-.0693(7)	.3883(5)	.055(2)
O(8)	.6965(4)	-.0432(6)	.3287(3)	.074(2)
C(9)	.5940(6)	-.1566(8)	.3784(5)	.056(2)
O(9)	.6074(4)	-.2513(6)	.4074(4)	.084(2)
C(10)	.4962(5)	-.1136(8)	.3223(5)	.057(2)
O(10)	.5045(4)	-.1009(6)	.2486(3)	.075(2)
C(11)	.4079(6)	-.1951(8)	.3160(5)	.068(3)
C(11M)	.4107(7)	-.3114(9)	.2776(6)	.088(3)
C(12)	.3135(6)	-.1252(10)	.2738(6)	.088(3)
C(13)	.3099(6)	-.0061(10)	.3115(7)	.099(4)
C(14)	.4002(6)	.0651(9)	.3156(6)	.078(3)
O(14)	.4868(4)	-.0019(5)	.3559(3)	.065(2)
C(15)	.4070(6)	.01811(10)	.3592(6)	.082(3)
C(16)	.4953(7)	.2564(8)	.3624(6)	.079(3)
O(16)	.4841(5)	.3639(6)	.4015(4)	.095(2)
C(16M)	.5697(8)	.4308(10)	.4288(7)	.102(3)
C(17)	.5056(6)	.2802(9)	.2841(6)	.073(3)
C(17M)	.4268(7)	.3541(11)	.2307(6)	.103(4)
C(18)	.5806(7)	.2368(10)	.2680(6)	.079(3)
C(19)	.6018(7)	.2458(11)	.1964(6)	.092(3)
C(20)	.6768(8)	.1937(12)	.1809(6)	.097(3)
C(21)	.7032(8)	.2069(13)	.1094(7)	.111(4)
C(22)	.7771(8)	.1565(15)	.0948(7)	.121(5)
C(23)	.8086(8)	.1781(16)	.0240(6)	.128(5)
C(23M)	.7254(9)	.2152(23)	.0474(7)	.184(9)
C(24)	.8912(8)	.2643(18)	.0406(6)	.140(6)
C(25)	.9826(9)	.2329(20)	.1069(6)	.141(6)
C(25M)	1.0348(12)	.1245(20)	.0884(8)	.178(8)
C(26)	1.0512(10)	.3412(22)	.1293(7)	.157(8)
O(26)	1.1132(8)	.3601(21)	.0998(7)	.281(11)
C(27)	1.0375(8)	.4278(16)	.1891(7)	.118(5)
O(27)	1.0877(7)	.5366(13)	.1901(7)	.185(5)
C(27M)	1.0445(17)	.6202(22)	.1382(13)	.256(13)
C(28)	1.0824(7)	.3750(11)	.2699(6)	.091(3)
C(28M)	1.1827(11)	.2501(7)	.2818(4)	.108(2)

FIGURE 1/3 (Cont.)

Atomic coordinates and equivalent isotropic displacement parameters (\AA^2)
(cont.)

	x/a	y/b	z/c	U(eq)
C(29)	1.0329(7)	.2733(10)	.2922(5)	.073(3)
C(29M)	.9318(6)	.2995(10)	.2984(6)	.094(3)
C(30)	1.0764(7)	.1700(10)	.3100(5)	.077(3)
C(31)	1.0376(7)	.0581(10)	.3340(5)	.081(3)
C(31M)	1.0198(9)	-.0385(13)	.2723(7)	.124(4)
C(32)	1.1046(7)	.0210(10)	.4103(6)	.079(3)
O(32)	1.1436(7)	-.0747(9)	.4183(5)	.132(3)
C(33)	1.1271(6)	.1025(9)	.4776(5)	.071(3)
C(34)	1.0764(5)	.0601(8)	.5342(5)	.062(2)
O(34)	.9735(3)	.0853(5)	.4967(3)	.071(2)
C(35)	1.1115(5)	.1217(9)	.6132(5)	.064(2)
C(35M)	1.1060(7)	.2562(10)	.6069(6)	.092(3)
C(36)	1.2149(6)	.0757(9)	.6578(5)	.072(3)
C(37)	1.2650(6)	.1298(9)	.7370(5)	.074(3)
C(38)	1.2091(7)	.1198(14)	.7935(5)	.110(4)
C(39)	1.2680(9)	.1650(16)	.8735(6)	.128(5)
O(39)	1.2082(8)	.1584(20)	.9206(6)	.243(9)
C(39M)	1.2099(20)	.2512(47)	.9702(17)	.498(36)
C(40)	1.3640(9)	.0982(13)	.9048(6)	.0116(4)
O(40)	1.4177(7)	.1412(10)	.9790(5)	.151(4)
C(41)	1.4221(7)	.1138(13)	.8506(6)	.110(4)
C(42)	1.3653(6)	.0697(11)	.7702(5)	.096(3)
C(43)	1.4272(14)	.0621(20)	1.0408(9)	.171(7)
C(44)	1.5146(20)	-.0307(24)	1.0549(10)	.238(12)
O(45)	1.4956(12)	-.1215(13)	.9899(7)	.215(5)

FIGURE 2/3

Bond lengths (Å)

C(1)-O(1)	1.193(10)	C(24)-C(25)	1.52(2)
C(1)-O(34)	1.329(10)	C(25)-C(25M)	1.53(2)
C(1)-C(2)	1.545(11)	C(25)-C(26)	1.54(3)
C(2)-N(7)	1.465(10)	C(26)-O(26)	1.20(2)
C(2)-C(3)	1.500(13)	C(26)-C(27)	1.53(2)
C(3)-C(4)	1.511(14)	C(27)-O(27)	1.42(2)
C(4)-C(5)	1.502(13)	C(27)-C(28)	1.533(14)
C(5)-C(6)	1.518(14)	O(27)-C(27M)	1.34(2)
C(6)-N(7)	1.453(10)	C(28)-O(28)	1.415(10)
N(7)-C(8)	1.315(9)	C(28)-C(29)	1.471(14)
C(8)-O(8)	1.237(9)	C(29)-C(30)	1.311(13)
C(8)-C(9)	1.523(11)	C(29)-C(29M)	1.523(12)
C(9)-O(9)	1.178(9)	C(30)-C(31)	1.497(14)
C(9)-C(10)	1.532(11)	C(31)-C(32)	1.482(13)
C(10)-O(10)	1.398(9)	C(31)-C(31M)	1.53(2)
C(10)-O(14)	1.425(10)	C(32)-O(32)	1.201(11)
C(10)-C(11)	1.540(11)	C(32)-C(33)	1.487(13)
C(11)-C(11M)	1.491(13)	C(33)-C(34)	1.521(11)
C(11)-C(12)	1.546(12)	C(34)-O(34)	1.447(9)
C(12)-C(13)	1.51(2)	C(34)-C(35)	1.537(11)
C(13)-C(14)	1.506(13)	C(35)-C(35M)	1.517(13)
C(14)-O(14)	1.441(10)	C(35)-C(36)	1.540(11)
C(14)-C(15)	1.516(14)	C(36)-C(37)	1.525(12)
C(15)-C(16)	1.511(12)	C(37)-C(38)	1.503(11)
C(16)-O(16)	1.439(11)	C(37)-C(42)	1.532(12)
C(16)-C(17)	1.512(14)	C(38)-C(39)	1.526(14)
O(16)-C(16M)	1.392(11)	C(39)-O(39)	1.399(13)
C(17)-C(18)	1.301(12)	C(39)-C(40)	1.51(2)
C(17)-C(17M)	1.491(13)	O(39)-C(39M)	1.38(4)
C(18)-C(19)	1.441(14)	C(40)-O(40)	1.417(13)
C(19)-C(20)	1.333(14)	C(40)-C(41)	1.50(2)
C(20)-C(21)	1.48(2)	O(40)-C(43)	1.41(2)
C(21)-C(22)	1.30(2)	C(41)-C(42)	1.521(14)
C(22)-C(23)	1.52(2)	C(43)-C(44)	1.59(3)
C(23)-C(24)	1.49(2)	C(44)-O(45)	1.52(2)
C(23)-C(23M)	1.52(2)		

FIGURE 3/3

Bond angles (°)

O(1)-C(1)-O(34)	125.1(7)	C(23)-C(24)-C(25)	116(2)
O(1)-C(1)-C(2)	126.8(8)	C(24)-C(25)-C(25M)	111.7(14)
O(34)-C(1)-C(2)	108.0(8)	C(24)-C(25)-C(26)	110(2)
N(7)-C(2)-C(3)	111.5(6)	C(25M)-C(25)-C(26)	111.9(12)
N(7)-C(2)-C(1)	111.3(7)	O(26)-C(26)-C(27)	120(2)
C(3)-C(2)-C(1)	110.4(7)	O(26)-C(26)-C(25)	122(2)
C(2)-C(3)-C(4)	111.6(9)	C(27)-C(26)-C(25)	118.5(12)
C(5)-C(4)-C(3)	111.8(9)	O(27)-C(27)-C(26)	112.2(12)
C(4)-C(5)-C(6)	110.6(7)	O(27)-C(27)-C(28)	105.4(12)
N(7)-C(6)-C(5)	111.4(8)	C(26)-C(27)-C(28)	109.5(12)
C(8)-N(7)-C(6)	123.5(7)	C(27M)-O(27)-C(27)	118.5(14)
C(8)-N(7)-C(2)	118.6(7)	O(28)-C(28)-C(29)	111.3(9)
C(6)-N(7)-C(2)	117.3(6)	O(28)-C(28)-C(27)	108.7(8)
O(8)-C(8)-N(7)	123.6(7)	C(29)-C(28)-C(27)	118.4(10)
O(8)-C(8)-C(9)	115.6(7)	C(30)-C(29)-C(28)	121.5(9)
N(7)-C(8)-C(9)	120.8(8)	C(30)-C(29)-C(29M)	122.9(10)
O(9)-C(9)-C(8)	121.3(7)	C(28)-C(29)-C(29M)	115.4(9)
O(9)-C(9)-C(10)	124.8(8)	C(29)-C(30)-C(31)	128.7(9)
C(8)-C(9)-C(10)	113.6(7)	C(32)-C(31)-C(30)	108.8(8)
O(10)-C(10)-O(14)	112.1(7)	C(32)-C(31)-C(31M)	113.7(10)
O(10)-C(10)-C(9)	109.7(6)	C(30)-C(31)-C(31M)	111.8(8)
O(14)-C(10)-C(9)	100.5(6)	O(32)-C(32)-C(31)	120.3(11)
O(10)-C(10)-C(11)	108.1(6)	O(32)-C(32)-C(33)	118.8(10)
O(14)-C(10)-C(11)	111.6(6)	C(31)-C(32)-C(33)	120.8(9)
C(9)-C(10)-C(11)	114.9(7)	C(32)-C(33)-C(34)	110.2(8)
C(11M)-C(11)-C(10)	114.3(7)	O(34)-C(34)-C(33)	104.8(6)
C(11M)-C(11)-C(12)	111.2(8)	O(34)-C(34)-C(35)	109.8(6)
C(10)-C(11)-C(12)	107.9(7)	C(33)-C(34)-C(35)	114.5(7)
C(13)-C(12)-C(11)	111.9(8)	C(1)-O(34)-C(34)	119.2(7)
C(14)-C(13)-C(12)	109.9(9)	C(35M)-C(35)-C(34)	112.6(8)
O(14)-C(14)-C(13)	109.8(8)	C(35M)-C(35)-C(36)	113.2(8)
O(14)-C(14)-C(15)	106.2(7)	C(34)-C(35)-C(36)	108.6(7)
C(13)-C(14)-C(15)	113.2(8)	C(37)-C(36)-C(35)	116.9(8)
C(10)-O(14)-C(14)	115.1(6)	C(38)-C(37)-C(36)	115.6(7)
C(16)-C(15)-C(14)	114.5(7)	C(38)-C(37)-C(42)	109.6(8)
O(16)-C(16)-C(15)	105.4(7)	C(36)-C(37)-C(42)	107.5(8)
O(16)-C(16)-C(17)	112.5(8)	C(37)-C(38)-C(39)	112.5(8)
C(15)-C(16)-C(17)	113.4(8)	O(39)-C(39)-C(40)	113.9(13)
C(16M)-O(16)-C(16)	114.0(7)	O(39)-C(39)-C(38)	108.2(10)
C(18)-C(17)-C(17M)	124.9(9)	C(40)-C(39)-C(38)	111.0(11)
C(18)-C(17)-C(16)	119.2(9)	C(39)-O(39)-C(39M)	119(2)
C(17M)-C(17)-C(16)	115.9(8)	O(40)-C(40)-C(41)	110.3(10)
C(17)-C(18)-C(19)	127.7(10)	O(40)-C(40)-C(39)	110.2(12)
C(20)-C(19)-C(18)	125.6(11)	C(41)-C(40)-C(39)	108.9(10)
C(19)-C(20)-C(21)	126.6(11)	C(43)-O(40)-C(40)	115.9(12)
C(22)-C(21)-C(20)	126.3(12)	C(40)-C(41)-C(42)	111.2(9)
C(21)-C(22)-C(23)	126.0(13)	C(41)-C(42)-C(37)	112.8(9)
C(24)-C(23)-C(23M)	111(2)	O(40)-C(43)-C(44)	114(2)
C(24)-C(23)-C(22)	111.4(10)	O(45)-C(44)-C(43)	112.2(14)
C(23M)-C(23)-C(22)	114.2(10)		

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.