

## TERRY THRELFALL

39 Park Drive  
UPMINSTER  
Essex RM14 3AL

School of Chemistry  
University of Southampton  
Highfield, Southampton  
SO17 1BJ, UK

Tel: 017082 220742

Tel: 01904 432576/Fax: 01904 432516  
email t.threlfall@soton.ac.uk

### CAREER HISTORY

**Senior Research Fellow, Crystallography Group, School of Chemistry** 2003 - date  
Research - investigating crystallisation and solid-solid transition processes, crystallizing samples for X-ray crystallographic studies, understanding the molecular solid state through structural systematics, spectral and thermal studies of polymorphs, solvates, hydrates and derivatives.

**Honorary Research Fellow, Department of Chemistry** 1999 - 2003  
Research - investigating polymorphism through spectral and structural investigation of the solid state forms of sulphadruugs.

**Industrial Liaison Executive, Department of Chemistry.** 1991 - 1999  
Responsible for organising Short Courses for Industry; setting up Multi-university Modular MSc.; External Analytical Services; Skills teaching

- Involved in skills based workshops for undergraduates
- Set up and tutored on "Problem Solving for Analytical Chemists" and "IR and Raman Spectroscopy" courses for industrial analysts.
- Joint author of 'A Question of Chemistry'. Now translated into French and Japanese.

29 years with Rhone Poulenc Rorer Ltd., formerly May & Baker Ltd, now Sanofi-Aventis.

**Consultant** 1990 - 1991  
Responsible for providing technical support and data gathering for overseas tax litigation.

**Principal Scientist** 1987 - 1990  
Responsible for maintaining patent monopoly worth £130 million per annum worldwide. Organised schools and academic liaison activities and acted as an internal scientific consultant.

- Negotiating skills, especially in Japan

**Process Research Manager** 1983 - 1987  
Responsible for developing processes for whole of May and Baker Ltd. Facilities included pilot plant, pressure reactor and clean room. 28 scientific staff. Budget £ $\frac{1}{2}$  m.

- General management skills; also helped with management skills courses.
- Interviewing. Noted that many well qualified candidates did not interview well and that many well qualified appointees failed to apply their knowledge effectively.
- On Career Counselling Panel

**Departmental Head, Physical Chemistry** 1976 - 1983  
Providing a wide range of scientific services. Ran pigment development project. 22 staff.

- Organised technicians' development courses
- Presented successful cases for expansion, new laboratory and new equipment.

**Section Head, Spectroscopy** 1962 - 1976  
Responsible for providing a spectroscopic service and for pearling agent research.

### EARLIER HISTORY

Mathematics Teacher 1962; NATO Research Student, Switzerland, 1959-1961; Part-time lecturer in Chemistry and Physics 1957-1959; Trainee in Electrical Engineering Industry 1955-1956.

## **EDUCATION**

B.Sc. Chemistry 1956; Ph.D. Organic Chemistry 1971; LL.B. Law 1984.

## **OTHER ACTIVITIES**

Taught German part-time for ~ 25 years. Active member of many societies.

## **PERSONAL**

Aged 74 years, married with 2 grown-up children.

1. I am a Senior Research Fellow in the Department of Chemistry at the University of Southampton. My principal fields of interest are polymorphism and other aspects of solid state crystal structure and behaviour, and in understanding crystallization and transformation processes. My current research interests are in relating molecular structure to crystal structure using structural systematics and in applying spectroscopy and microscopy to crystallization and to solid-solid transition processes.

2. I received a Bachelor of Science degree in chemistry from London University in 1956, a Ph.D. in organic chemistry from London University in 1971 and a Bachelor of Law degree from the University of London in 1984.

3. In 1962, I was appointed Section Head of Spectroscopy at May & Baker Ltd., which later became known as Rhone Poulenc Rorer Ltd. Over the years at May & Baker, I introduced NMR, mass spectroscopy, preparative HPLC and chemical microscopy and electron microscopy to the company. As the Section Head, I was specifically responsible for the Pearling agent research program which presented substantial crystalline challenges. In 1976, I was appointed as the Department Head of Physical Chemistry. In this capacity, I was responsible for overseeing a substantial group of scientists, technical officers, and technicians in relation to the origin of samples, identity of samples, purity of samples, hydration, solvation, polymorphism, salt formation, crystal habit and amorphicity. In 1983, I was appointed as Process Research Manager and was responsible for scaling up synthetic routes, which involved consideration of the purity, purification, crystallisation, stability and filterability of samples. In 1987, I became a Principal Scientist, in which capacity I organized schools liaison and acted as an internal scientific consultant. Over my twenty-nine years at May & Baker, I gained considerable experience of a wide variety of situations and of problems associated with the identification, purification, crystallisation and separation of compounds of all kinds, but particularly with organic pharmaceuticals.

4. Prior to taking a position at the University of Southampton, I was the Industrial Liaison Executive in the Department of Chemistry at the University of York. Specifically, I joined the University of York faculty in 1991 and was later appointed a Research Fellow. At the University of York, I organized short courses for industry, participated in skills based workshops for undergraduates, and conducted research on polymorphism, instrumentation and molecular templates. I currently conduct research relating to growing crystals large enough for single crystal diffraction work and for other studies. I personally carry out 500 crystallisations per year, particularly for the preparation of polymorphs, hydrates, solvates and co-crystals.

## PUBLICATIONS BY TERRY THRELFALL

### BOOKS

A Question of Chemistry: Creative Problems for Critical Thinkers. Garrett, J., Overton, T. and Threlfall, T., Longman, Harlow, UK, 1999. Now translated into French and Japanese.

### BOOK CHAPTERS

“Vibrational Spectroscopy of Solid-State Forms – Introduction, Principles and Overview” T.L. Threlfall and J.M. Chalmers in “Applications of Vibrational Spectroscopy in Pharmaceutical Research and Development” Ed. D.E. Pivonka, J.M. Chalmers and P.R. Griffiths, J. Wiley, New York and Chichester

“Polymorphs, Solvates and Amorphous Compounds” in the “Wiley Handbook of Vibrational Spectroscopy”, Ed. Griffiths, P. and Chalmers, J. Wiley, New York and Chichester 2001

“Instrument Design Considerations” in Standards and Best Practice in Absorption Spectrometry. Ed. Burgess, C. and Frost, T., Blackwell Science, Oxford, UK 1999

“Colour Measurement” in Practical Absorption Spectrometry Ed. Burgess, C., Russell, M. and Frost, T., Chapman and Hall, London, UK, 1996

“Structure-Spectral Relationships” in Practical Absorption Spectrometry Ed. Burgess, C., Russell, M. and Frost, T., Chapman and Hall, London, UK, 1996

### ARTICLES

35. *A Systematic Study of the Crystallisation Products of a Series of Dicarboxylic Acids with Imidazole Derivatives*. S. Callear, M.B. Hursthouse and T. Threlfall, CrystEngComm., 2010, 12, 898-908

34. *Why do organic compounds crystallise well, badly or ever so slowly? Why is crystallisation nevertheless such a good purification technique?* M.B. Hursthouse, L.S. Huth and T.L. Threlfall, Org. Proc. Res. Dev., 2009, 13, 1231-40

33. *Turning DSC Charts of Polymorphs into Phase Diagrams: A Tutorial Paper*. T. Threlfall, Org. Proc. Res. Dev., 2009, 13, 1224-1230

32. *The Elusive High-Temperature Solid-State Structure of D,L-Norleucine*. S.J. Coles, T. Gelbrich, U.J. Greisser, M.B. Hursthouse, M. Pitak and T. Threlfall, Cryst. Growth. Des., 2009, 9, 4610-12

31. *Co-crystallisation of organic  $\alpha,\omega$ -dicarboxylic acids with the cyclic amides 2-pyrrolidine and 2-imidazoline*. S. Callear, M.B. Hursthouse and T.L. Threlfall, CrystEngComm., 2009, 11, 1609-14

30. *Packing Similarity in Polymorphs of Sulfathiazole*, T. Gelbrich, D. S. Hughes, M.B. Hursthouse and T.L. Threlfall, CrystEngComm. 2008, 10, 1328

29. *Delta-Sulfanilamide* T. Gelbrich, A. Bingham, T. Threlfall, M. Hursthouse, Acta Cryst.C 2008, C64, o205-o207
28. *Polymorph VI of sulfapyridine: interpenetrating two- and three-dimensional hydrogen-bonded nets formed from two tautomeric forms*, T. Gelbrich and T. Threlfall, Acta Cryst. C 2007, C63, o323-o326
27. T. Gelbrich, M.B. Hursthouse and T.L. Threlfall, *Structural Systematics: Crystal structures of para,para-disubstituted benzenesulfonamides: Part 1, Overview and the isostructural dimers*. Acta Cryst. B, 2007, 63B, 621-632.
26. T.L. Threlfall and T. Gelbrich, *The structure of methylparaben at 118K does not represent a new polymorph*, Cryst. Growth and Design, 2007, 7, 2297
25. Gelbrich, T., Threlfall, T.L., Hursthouse, M.B., *Anilinium chloride adduct of 4-bromo-N-benzenesulfonamide*, Acta Cryst. C, 2006, 62, 470-472
24. Gelbrich, T., Threlfall, T.L., Huth, S., Seeger, E., *Structures of racemic lithium tartrate hydrates*, Polyhedron, 2006, 25, 937-944
23. S. Karami, L. Yang,, D.S. Hughes, M.B. Hursthouse, A.E. Russell, T.L. Threlfall, M. Claybourne, R. Roberts, *Further Errors in Polymorph identification: Furosemide and Finasteride*. Acta Cryst., 2006, B62, 689-91
22. Gelbrich, T., Threlfall, T.L., Huth, S., Seeger, E., Hursthouse, M.B., *Investigation of the relationship between racemic alkali and ammonium hydrogen tartrates and their chiral counterparts*. Z. Anorg. Allg. Chem., 2004, 630, 1451
20. Threlfall, T.L., *The Structural and Thermodynamic Basis of Ostwald's Rule*. Org. Proc. Res. Dev., 2003, 7(6), 1017-1027
21. Portieri, A., Harris, R.K., Fletton, R.A, Lancaster, R.W. and Threlfall, T.L. *Effects of Polymorphic Differences for Sulfanilamide, as seen through 13C and 15N solid-state NMR, together with shielding calculations*. Org. Magn. Resonance, 2003
19. Bingham, A., Hughes, D.S., Hursthouse, M., Lancaster, R.W., Tavener, S., Threlfall, T. *Over one hundred solvates of Sulfathiazole*. Chem. Commun. 2001, 603-604
18. Threlfall, T.L, *Crystallisation of Polymorphs: Thermodynamic Insight into the Role of Solvent*, Org. Process Res. Dev. 2000, 4, 384-390
17. Apperley, D.C., Fletton, R.A., Harris, R.K., Lancaster, R.W., Tavener, S. and Threlfall, T.L., *Sulfathiazole Polymorphism Studied by Magic Angle Spinning NMR Spectroscopy*, J. Pharm. Sci., 1999, 88, 1275-1280
16. Hughes, D.S., Hursthouse, M.B., Threlfall, T. and Tavener, S. *A New Polymorph of Sulfathiazole*, Acta Cryst. 1999, C55, 1831-1833
15. Hughes, D., Hursthouse, M., Lancaster, R., Tavener, S., Threlfall, T. and Turner, P, *How Many Polymorphs has Sulphathiazole? Proposals for reporting Crystallographic Data of Polymorphs*, J. Pharm. Pharmacol., 1997, 49, (S4) p.20
14. Threlfall, T.L. *Analysis of Organic Polymorphs – A Review*, Analyst, 1995, 120, 2435-2460
13. Windram, V.A. and Threlfall, T.L. *Chemical Microscopy in the Pharmaceutical Industry*, Analytical Proceedings, 1992, 29, 108-110
12. Deeley, C.M., Spragg, R.A. and Threlfall, T.L. *A Comparison of Fourier Transform Infrared and Fourier Transform Raman Spectroscopy for Quantitative*

# 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.