

THERMAL METHODS GROUP
ANALYTICAL DIVISION
ROYAL SOCIETY OF CHEMISTRY

TMG NEWS

Editor: Dr G M Clark, Nene College, Moulton Park, Northampton NN3 7AL



Analytical Division
**ROYAL
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CHEMISTRY**

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THERMAL METHODS GROUP
The Society of C | Analysts, Editors & Laboratory Scientists
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CHAIRMAN'S CORNER

There seems to be a brightness over the Thermal Analysis field at the moment! Lots of people are talking enthusiastically about the new developments aid apparatus aid the use of the techniques for newer materials. At two recent meetings, the vital role played in the oil industry and the polymer and fire retardant area were much discussed.

It is very exciting to hear of new uses for thermal methods, and even more exciting to find many new workers wishing to discover the merits aid applications of Thermal Analysis. The November meeting on "Evolved Gases" shows one direction in which instrumentation is heading and the Committee hope that their plans for the next years will continue the forward momentum.

I wonder what the most unusual application of thermal analysis is? I know, that valuable work has been done on almost every material, but is there an experiment on an extremely valuable, or extremely nasty or most peculiar substance? I can only contribute some investigations on wools, food aid soils, but if you think your work is "the most unusual", perhaps you would write an article for TMG News!

As the end of my term of office approaches, I would like most sincerely to thank all those who have given me such valuable help. Every Committee member has been most patient at meetings, and have not shouted at me too much. A very special vote of thanks to Cyril Keattch and to Dick Still for their professional expert assistance with administrative and financial matters. The file of correspondence has grown large and world-wide as the TMG wrote to congratulate other groups or to enquire about their activities. With the 10th ICTA getting nearer, this will certainly increase.

I hope that Jenny Hider will have a very happy time as Madame Chairman (or Chairlady?) and we thank her for the great work she has done during the past years co-ordinating and organising such successful meetings. I have a feeling that she will prove a Tigress in the Chair!

Watch out committee!.

Keep the Thermal Methods Group Flag Flying High!

With best wishes

Peter Haines

..... AND FROM THE VICE - CHAIRMAN

No doubt our Chairman, Peter Haines, has reviewed the Group's activities over the past year so I would like to welcome members to our forthcoming meetings.

Our next meeting is the "Applications of Evolved Gas Analysis" to be held with the Annual General Meeting of the Group, on the 15th November at the Scientific Societies' Lecture Theatre in London. We have a full and interesting programme for this meeting and we hope it will appeal to many members, as it deals with a variety of methods, suitable for many areas of application. I would also like to thank my colleagues on the organising committee, David Morgan, Joyce Griffiths and Ted Charsley for their efforts in arranging this meeting.

Then we have the meeting on "High Tc Oxide Superconductors" to look forward to in April, an area which is currently of increasing interest. Frank Sale is the man to contact there if you wish to contribute.

The Group tries to produce a variety of meetings, some of which will be of interest across the applications boundaries and others where there is, perhaps, a more specialized field of concern. However we are always ready to listen to your suggestions if you feel there is a topic/area we should be covering.

I will actually be there at the next meeting to greet you, after having missed the last two, due to a now noisy little bundle that I can hear in the background. I think perhaps I should have called her Thelma Alice in honour of the group, but sorry folks, I didn't —she is Elizabeth.

I look forward to seeing you in November.

Jenny Hider

DATES FOR YOUR DIARY

AGM Meeting : Applications of Evolved Gas Analysis

Wednesday, 15th November, 1989

Scientific Societies Lecture Theatre, London.

Speakers and Titles:

“Evolved Gas Analysis Techniques”, by P Barnes (Leeds Polytechnic)

“A Simple Evolved Gas Detector Facility for the Characterisation of Textile Fibres”, by JS Crighton (Leeds University)

“EGA of Diesel Exhaust Particles”, by D R Glasson, C Seebold and G E Millward (Polytechnic South West)

“Measurement of HCl Evolution in Temperature-programmed Reduction of Supported Metal Chlorides”, by G C Bond, (Brunel University)

“Simultaneous TG-Quantitative Evolved H₂O and CO₂ Analysis by NDIR” by D Thornley and N Pallat (BP)

“Use of EGA to Investigate the Effect of Flame Retardants on Toxic Gas Evolution from Pyrolysed Cotton Fabric”, by D Price (Salford University)

“Applications of TG coupled to FTIR Spectroscopy”, by J Sellors and R A Spragg (Perkin Elmer)

“Industrial Applications of Simultaneous TA-MS”, by E L Charsley and S R Warrington (TACS, Leeds)

“Applications of Combined TG-DSC-MS in the Field of Polymers and Ceramics”, by E Kaisersberger and M P Doherty (Netzsch, Selb)

Thermal Analysis of High Tc Oxide Superconductors

Thursday and Friday 19-20 April 1990. Manchester University.

This meeting will be held in association with the Interdisciplinary Research Centre of the University of Cambridge, the Institute of Metals, and the Institute of Ceramics.

Potential contributors should contact Dr Frank Sale, Department of Metallurgy and Materials Science, University of Manchester, Manchester M1 7HS.

AGM Meeting: Applications of Thermal Methods to Pharmaceuticals

Thursday 22 November 1990.
Scientific Societies Lecture Theatre, London.

10th Thermal Analysis Sdiool

Wednesday - Saturday 3 - 6 April 1991.
Materials Science Centre, University of Manchester
Institute of Science and Technology.

ESTAC 5

Monday - Friday, 26-31 August 1991.
Sophia-Antipolis High-Tech Campus, Nice, France.
Potential contributors and attendees requiring the second circular (to be published in early Summer 1990) should register their interest with the Chairman of the Organising Committee, Dr J Rouquerol, Thermodynamics & Microcalorimetry Centre, 26 rue du 141me RIA, 13003 Marseille, France.

AGM Meeting: November 1991

Details to be announced

10th ICTA

24-28 August 1992.
Hatfield Polytechnic, UK.

Organising and Scientific committees have been formed and initial meetings held. First circulars will be available in May 1991 and 1-page abstracts will be required by end December 1991.

Organising

Prof. D.V. Nowell (Chair)
Dr C J Keattch (Secretary)
Dr R H Still (Finance)
Dr J M Barton
Mr E L Charsley
Dr G M Clark
Miss J B Griffiths
Dr T J Lever
Dr F R Sale

Scientific:

Dr R S Whitehouse (Chair)
Dr C J Keattch
Dr R H Still
Dr E Gimzewski
Dr R C Mackenzie
Dr D J Morgan
Dr F W Wilburn

1989 REPORT OF THE HON SECRETARY

For readers who do not receive the Group's AGM papers the Hon Secretary's 1989 Report is reproduced below.

“This Report must commence by pointing out an error in the 1988 Report namely that the International Confederation for Thermal Analysis (ICTA) Congress, held from August 21 to 26, 1988, in, Jerusalem, was the 9th and not the 8th.

At this congress, several matters of interest to Group members took place:

Firstly, Mr Charsley's term as the Group's ICTA Affiliate Councillor came to an end and he was succeeded by Dr F W Wilburn, a Past-Chairman of the Group.

Secondly, Mr Charsley, also a Group Past-Chairman, was elected Honorary Secretary of the Committee of the European Symposium for Thermal Analysis and Calorimetry (ESTAC).

Thirdly, the founding Chairman of the Group, Dr R C Mackenzie was elected the first Honorary Member of ICTA.

Finally, in competition against China, India and the USA, the UK, through the Group's Immediate Past-Chairman (Professor D V Nowell), was successful in its bid to host the 10th IOTA Congress, August 24th to 28th, 1992 the venue being Hatfield Polytechnic. This commitment will ensure the active participation of several Group members on the 10th ICTA Congress Committees.

Turning to more parochial matters, from January 4th to 6th, 1989 the Group held a Meeting at UMIST entitled “Application of Thermal Methods in Polymer Science and Technology”. This was a Joint Meeting with the North West Region and the Macro Group and attracted approximately 100 participants.

Immediately after the period covered by this Report, a Meeting on “Evolved Gas Analysis” is to be held in London. Expectations are high for a good attendance and some interesting papers.

This Report concludes with the customary thanks for continued excellent assistance from the Secretariat at Burlington House”.

C.J.Keattch

THE THERMAL ANALYSIS CAROL

(To be sung to the tune of “Hark the Herald Angels Sing”)

Sing of Thermal Analysis!
What a range of techniques this is!
Properties of substances
We can measure and assess.
For every run, we must record
All conditions which we stored
Strictly by the ICTA rules.
Then Thermal Methods are the tools.

To study changes, small or great
While heating up at controlled rate!

Thermogravimetry’ s fine
We can make it determine
Polymeric degradation,
Or metallic oxidation
By our balance delicate
We can find reaction rate,
Loss of solvents, such as water,
Reactions used in making mortar.

Anything that changes weight
When heated up at constant rate!

DTA and DSC
Tell us about energy.
Measuring the difference,
(Sample minus Reference)
Then the record gives us peaks,
Which the thermal worker seeks.
Boiling, melting, purity,
Sample heat capacity.

Provided that we calibrate
And heat (or cool) at programmed rate!

Hail the Thermal Analyst!
Gloriously may he exist!
Heating, cooling, measuring,
Properties of everything!
Moduli by TMA,
Gases off by EGA,
Polymers or minerals,
Energies in joules (or cal)

Joyfully we celebrate
Heating up at programmed rate.

NEWS OF PEOPLE

From time-to-time the Editor hears of events in the lives of the members. Below is a selection of the more publishable ones. If you know better, tell the Editor.

David Dollinore, Chairman of the Group from 1969 to 1971, suffered a mild heart attack earlier this year but the news from the University of Toledo is that he has recovered well. We send the best wishes of the Group.

Dick Still, current Treasurer of the Group, has also been unwell, suffering from a trapped nerve. We send best wishes for a speedy recovery.

Jenny Hider, Vice-Chair of the Group, has recently given birth her second child, Elizabeth. Congratulations and best wishes to both of you.

Phil Barnes, past Committee Meter, has been awarded a personal chair by Leeds Polytechnic. The Group sends its warm congratulations. Some readers may not be aware that Derek Nowell, immediate past Chairman of the Group, received a personal chair from Hatfield Polytechnic last year.

Jezz Leckenby, past Committee meter, has moved to the USA.

Graham Clark, Newsletter Editor, has been appointed as Principal of Angus College from 1 January 1990, and will no longer require the services of an interpreter!

Cyril Keattch, Honorary Secretary of the Group, has not yet fallen of a ladder this year.

Ted Charsley, Chairman of the Group f ran 1979 to 1981, is reported to be writing up his doctoral thesis — a task he commenced in 1967, but didn't get round to finishing! Good luck, Ted.

EXILES CORNER

We have many overseas meters, particularly in the USA and Europe, and a few in Asia, Africa and Australia. News from them would be most welcome. Come on, don't be shy!

APPLICATIONS OF THERMAL ANALYSIS IN POLYMER SCIENCE AND TECHNOLOGY

This 2-day Meeting was held jointly with the NW Region of the Analytical Division and the Macromolecular Group on 4-6 January 1989 at Manchester University. About 100 participants attended. Two plenary lectures were presented, the first by Professor J Seferis (University of Washington) on "Applications of DMA in long-term durability investigations of polymer coposites" and the second by Professor G Camino (University of Turin) on "The application of thermal methods to the study of fire retardants and intumescent systems".

RECENT ADVANCES IN THERMAL ANALYSIS

A most successful 1-day course was organised by the Thermal Analysis Consultancy Service at Leeds Polytechnic on 9 May 1989. About 85 participants were present, and some late applications had to be refused for reasons of space. Lectures presented were:

- "Introduction" by R.C. Mackenzie;
- "DTA/DSC" by P.G. Laye;
- "TG/DTG" by SB Warrington;
- "EGA" by PA Barnes;
- "Thermomechanical. Methods" by JM Barton;
- "Complementary Techniques" by EL Charsley; and
- "Sources of TA information" by EL Charsley.

QUANTITATIVE ASPECTS OF DSC

A 2-day residential course was held by the Thermal Analysis Consultancy Service at Leeds Polytechnic on 12-13 September 1989. In depth coverage of major areas of application including enthalpy, specific heat, kinetics, phase diagrams, purity, standardisation, and the relationship between DSC and calorimetry. Recent advances in DSC instrumentation were also discussed.

Speakers included:— JM Barton (RAE, Farnborough);
EL Charsley (TACS, Leeds Polytechnic);
E Gimzewski (BP Research, Sunbiry);
PJ Haines (Kingston Polytechnic);
PG Laye (Leeds University);
M Richardson (NPL, Te&]ingctri);
RA Schulz (University of Surrey).

An exhibition of the latest DSC equipment from DuPont, Mettler, Netzsch, Perkin-Elmer, Setaram and Stanton- Redcroft was also held.

THE THERMAL METHODS GROUP, 1965- THE FIRST TWENTY ONE YEARS

Members may not be aware that a history of the Group was written by the Hon Secretary, Cyril Keattch, to celebrate the twenty—first anniversary of the Group in 1986. This excellent article charting the development and progress of the Group in a most entertaining and readable style was published in Analytical Proceedings, Vol 25, No 11, November 1988, pages 342 -349.

SIMULTANEOUS TG-MASS SPECTROMETRY—
THE THERMAL ANALYSIS CONSULTANCY SERVICE
EXTENDS ITS EVOLVED GAS ANALYSIS FACILITIES

The Thermal Analysis Consultancy Service, based at Leeds Polytechnic, has extended its evolved gas analysis facilities by the installation of a new TG-MS system comprising a DuPont 951 thermobalance linked to a VG Quadrupole Micromass PC mass spectrometer.

Evolved products are carried through a heated quartz capillary to any of three MS inlets. These inlets allow any common purge gas to be used, and a very high sensitivity is obtainable using a jet separator inlet under a helium purge. Even strongly acid gases are readily monitored.

Both instruments are computer-controlled, which gives advantages in the scope of experiments and the presentation of data in report—ready format. Volatiles may be studied in the scanning mode for identification, or in the “multiple ion monitoring mode” for the generation of complete evolved gas profiles for selected species. The latter, when compared with the TG data, enables a comprehensive interpretation of weight loss processes to be made.

For further details of how TG-MS might help in your work contact

Dr Steve Warrington at:

The Thermal Analysis Consultancy Service

Leeds Polytechnic

Calverley Street

Leeds LS1 3HE

Tel: (0532) 448236 or 448234

Fax: (0532) 425733

SCIENCE EXCHANGE SERVICE

Science Exchange Service have announced a new service exclusively for Thermal Analysts. If you have a requirement for Thermal Analysis systems (TG, DTA, DSC, TMA) and wish to consider the purchase of second user equipment at substantial savings, contact them at the address below. All items are serviced to full specification and supplied complete with warranty.

A range of Thermal Analysis units are offered from well known manufacturers such as Perkin—Elmer, Stanton Redcroft, DuPont and Mettler.

The persons to contact are either Chris Manning or Clive Griffiths
at:—

Science Exchange Service
Rutherford House
43 Terrace Road, Walton—on—Thames, Surrey KT12 2SP

Tel: (0932) 246688

THERMAL ANALYSIS COURSES

The Thermal Analysis Consultancy Service continues its Thermal Analysis training programme with two courses in 1990.

The first course organised in conjunction with VG Quadrupoles Ltd is on “Simultaneous Thermal Analysis—Mass Spectrometry”. Topics to be covered include the principles of the quadrupole mass-spectrometer, interfacing techniques, interpretation of mass spectra and a wide range of application studies. There will also be a demonstration of equipment.

The special guest speaker is Professor AR McGhie of the University of Pennsylvania and the meeting will be chaired by Professor PA Barnes of Leeds Polytechnic. The other speakers will be Dr NJ Manning and Mr C Walker of VG Quadrupoles and Mr EL Charsley and Dr SB Warrington of the Thermal Analysis Consultancy Service.

The meeting will be held on the 29th March 1990, at the Post House Hotel at Bramhope, Nr Leeds.

The second course will be held in Leeds in May 1990, on “Industrial Applications of Thermal Analysis” and will be specifically concerned with the application of DSC, DTA, TG, EGA, Thermomechanical Methods, Hot stage microscopy and Microcalorimetry to the study of problems of industrial interest.

For further details, contact:—

Edward Charsley
Head of the Thermal Analysis Consultancy Service
Leeds Polytechnic
Calverley Street
Leeds LS1 3HE

Tel: (0532) 448234 or 448236
Fax: (0532) 425733

COLUMBIA SCIENTIFIC'S REACTION CALORIMETER, THE QRC

CSI's quantitative reaction calorimeter for laboratory analysis of thermal response during chemical reactions is now available in Europe. The instrument employs power compensation measurement technology and comprises a calorimeter with stirrer, measurement probes, support electronics, reagent delivery systems and a refrigeration/heating unit. All are under the control of a MacIntosh II computer with printer. The base of the vessel is in contact with a heat exchange assembly –but the surrounding environment is strictly adiabatic. The heat exchange assembly combines a foil heater with a silicon oil cooling chanter. The oil is colder than the reagent/vessel (usually by 30⁰C) so power must be applied to the foil heater to maintain isothermal equilibrium.

Measured reagents are temperature-equilibrated before reaching the reaction vessel, and multiple reagents can be delivered simultaneously or sequentially controlled by volume, mass, reaction heat, stirring torque, pH or pressure.

When the reagent is delivered to the reaction vessel, the resulting exothermic or endothermic reaction changes the temperature in the reaction vessel. The QRC's heat-exchanger causes change to the power supplied to the foil heater, maintaining isothermal conditions. This variance in power is measured and quantitative analysis of the reaction heat can be accomplished.

Thus the QRC yields thermodynamic and kinetic data for process development and optimisation, plant changes and safety evaluation. Also, as a safe desk—top pilot plant, small scale syntheses are readily possible.

For further information on the QRC, contact
Dr Martin Ottaway, International Manager, Columbia Scientific,
101 Garamonde Drive, Milton Keynes MK8 8W.
Tel: (0908) 569595; Fax (0908) 569520

NEW THERMAL ANALYSIS TECHNICAL LITERATURE FROM PERKIN-ELMER

A new library of Thermal Analysis technical literature is available from Perkin-Elmer. The library currently includes 30 different Thermal Analysis Newsletters that review the many standard and advanced software programs for Perkin—Elmer Thermal Analysis Systems. Other technical newsletters, addressing topics such as new Thermal Analysis applications, instrumentation and software, are to follow on a continuing basis.

The new Thermal Analysis Newsletters are available free of charge from Perkin-Elmer. To obtain those currently available write to

Edward C Collins, Perkin-Elmer Corporation, 761 Main Avenue, Mail Station 12, Norwalk, CT 06859—0012,USA, quoting the PE TAN Number below.

- 1 List of Perkin—Elmer Thermal Analysis Newsletters —
November 1988
- 2 Software For the Perkin—Elmer DELTA Series Thermal
Analysis System
- 3 Software For the Perkin-Elmer 7 Series Thermal Analysis
System
- 4 7 Series DSC Software Library
- 5 7 Series TGA Software Library
- 6 7 Series TMA Software Library
- 7 DSC 7 Kinetics Software For The 7 Series Thermal Analysis
System
- 8 DSC 7 Purity Software For The 7 Series Thermal Analysis
System
- 9 DSC 7 Specific Heat Software For The 7 Series Thermal
Analysis System
- 10 7 Series TASBASIC Software Library
- 11 DELTA Series DSC 7 Software Library
- 12 DELTA Series TGA 7 Software Library
- 13 DELTA Series TMA 7 Software Library
- 14 DSC 7 Kinetics Software For The DELTA Series Thermal
Analysis System
- 15 DSC 7 Purity Software For the DELTA Series Thermal
Analysis System

- 16 DSC 7 Partial Area Software For The DELTA Series Thermal Analysis System
- 17 TGA. 7 Multi Ramp Software For The DELTA Series Thermal Analysis System
- 18 DELTA Series DELTASOFT Software Library
- 19 DSC 7 Specific Heat Software For The DELTA Series Thermal Analysis System
- 20 DSC 7 Isothermal Software For The DELTA Series Thermal Analysis System
- 21 TGA 7 Kinetics Software For The DELTA Series Thermal Analysis System
- 22 DSC Sample Pans and Crimping Assemblies
- 23 PC Series DSC 7 Software Library
- 24 PC Series TGA 7 Software Library
- 25 PC Series TMA7 Software Library
- 26 DSC 7 Kinetics Software For the PC Series Thermal Analysis System
- 27 DSC 7 Purity Software For the PC Series Thermal Analysis System
- 28 DSC 7 Partial Area Software For the PC Series Thermal Analysis System
- 29 TGA 7 Kinetics Software For the PC Series Thermal Analysis System
- 30 Polymerizing Polymers with UV Light

TMG LOGO

In their collective wisdom the Committee elected logo no 3 for adoption as the Group's logo. (My mole was right — Editor). Observant readers will have spotted it on the front cover of this issue. It is reproduced below for those who didn't.



Thanks to all who submitted entries.

NOW WILL THE WINNING ENTRANT PLEASE OWN UP!

THERMAL ANALYSIS REVIEWS AND ABSTRACTS

Subscribers and readers of the new TARandA,, which has replaced Thermal Analysis Abstracts, will be aware that the new desk-top-published style and format in its blue livery provides a much more readable journal. Issues are also now published on time so it now provides a much better updating service of the worldwide Thermal Analysis literature. Review content is also increasing. A listing of Reviews 1—7 was given in TMG News No 7 (1988). Recently published Reviews are:

No 8 “Use of Thermal Analysis for Investigating Different Solid Fuels”.

D D Rustschev (Bulgaria).

Volume 18, No 1 (1989)

No 9 “Theories of Differential Thermal Analysis:
A Critical Review”.

FWWilburn (UK).

Volume 18, No 4 (1989)

TARandA is published in six issues per year. Over 300 journals are regularly scanned by over 30 abstractors worldwide. Comprehensive author and keyword indexes feature in each issue. Anyone wishing to contribute a future review article (a fee is paid for published reviews) or to join the team of abstractors (who are paid 3.00 Swiss francs per published abstract) should contact Dr G M Clark, Editor TARandA, c/o Interscience Communications Ltd, 24 Quentin Road, London, SE13 5DF.

Annual subscriptions, currently £220 per annum, can be obtained from the Publications Section of Interscience Communications Ltd. Back issues are also available at much reduced prices.