

BULLETIN



BRITISH SOCIETY OF RHEOLOGY

1980, Vol. 23, No. 2

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Hon. Editor:

Dr. C. R. DIMOND,

Morgan Thermic Ltd.,

Technological Centre,

Bewdley Road,

Stourport-on-Severn.



FOREWORD

How many times have you thought I'd like to go to that conference but—A conference held recently, in my own field of concrete technology, cost in the region of £200 for two days excluding accommodation. The annual BSR conference figures very prominently in most rheologists calendar; they are assured of interesting and varied technical sessions, they know that socially it will be an enjoyable few days and are confident that the accommodation and food will be reasonable. All this is provided at a cost which is not a deterrent to would be participants. Looking back over the past three years it can be seen that the costs to members to attend the conferences at Edinburgh, Plymouth and Aberystwyth including full board and the conference dinner was £43, £45 and £50 respectively—almost inflation proof. It is a great pity that other society's and organisations do not take heed. As with all the BSR conferences the success is due to the volunteer organisers and realistic financial costing using academic establishments' facilities.

The Editor would like to receive more technical enquiries as these stimulate correspondence and discussion. These should be sent to the Editor whose address from the 1st May will be: Morgan Thermic Ltd., Technological Centre, Bewdley Road, Stourport-on Severn. Tel. 02993-2271.

OFFICERS AND MEMBERS OF COUNCIL, 1980-1981

President: DR. W. M. JONES, Physics Department, U.C.W., Penglais Aberystwyth.

Secretary: DR. C. J. S. PETRIE, Department of Engineering Mathematics, University of Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU.

Treasurer: MR. A. EVANS, Department of Surgery, Royal Victoria Infirmary, Newcastle upon Tyne.

Membership Secretary: DR. D. C-H. CHENG, Warren Spring Laboratory, Stevenage, Herts. SG1 2BX.

Abstracts Editor: MR. J. ASTIN, Department of Applied Mathematics, U.C.W., Penglais, Aberystwyth.

Bulletin Editor: DR. C. R. DIMOND, Morgan Thermic Ltd., Technological Centre, Bewdley Road, Stourport-on-Severn.

Ordinary Members:

DR. T. E. R. JONES, School of Mathematical Sciences, Plymouth Polytechnic, Plymouth.

DR. H. A. BARNES, Unilever Ltd., Port Sunlight, Cheshire.

DR. D. MARSHALL, Institute of Polymer Technology, Loughborough University of Technology, Loughborough LE11 3TU.

DR. D. R. OLIVER, Department of Chemical Engineering, University of Birmingham, Birmingham.

MR. F. N. COGSWELL, I.C.I. Ltd., Plastic Division, Welwyn Garden City.

MR. M. CAMINA, Paint Research Association, Teddington, Middlesex.

CONFERENCE REPORT—LOUGHBOROUGH

Practical Rheology in Polymer Processing

Loughborough 26th-27th March, 1980

It is always a pleasure for the Society to return to the University of Loughborough whose hospitality, especially in respect of both quality and quantity of food, left many of the delegates so well sated that there was little of the debate of papers which we have come to expect in the Society's meetings. This was a joint meeting with the Plastics and Rubber Institute attended by about one hundred and forty delegates drawn from all sections of industry and academy including about forty from overseas, some of whom made a veritable odyssey of the cross country railway journey from Harwich to Loughborough when they established such good relations with British Rail that the schedules were rearranged in order to allow the replenishment of provisions.

Five years ago there was another meeting entitled "Polymer Rheology and Plastics Processing" organised by the same bodies at the same place. Unless the subtlety of the English language has deceived me one might expect similar papers at both meetings so that by comparing these meetings we can obtain some appreciation of how the subject has developed over the period.

Looking at the papers which were contributed we find some clear trends:

Papers	1975		1980	
	Number (%)		Number (%)	
	28	—	21	—
<i>Who from</i>				
Academic	13½	(48)	14	(67)
Raw materials	9	(32)	7	(33)
Processors	5	(18)	—	(0)
Machinery	½	(2)	—	(0)
<i>Where from</i>				
UK	19	(68)	12	(57)
Overseas	9	(32)	9	(43)
<i>What about</i>				
Rubber	—	(0)	6	(29)
Thermoplastics	26	(93)	13	(63)
Others	2	(7)	2	(8)
<i>How processed</i>				
Injection moulding	5	(18)	8	(38)
Blow moulding	1½	(5)	2	(10)
Film blowing	3½	(13)	—	(0)
Extrusion	4	(14)	1	(5)

What has happened to the contributions from those who construct and use the technology? Has there been a boom in rubber rheology or a fall in interest in thermoplastics? Why the acceleration in studies on injection moulding while film processing and extrusion have become unfashionable?

Perhaps the growth of papers of rubber interest is a result of the change in title. If this is so it is of interest to note that of those six papers no less than five were from industry and five were from overseas. Is there enough interest in rubber rheology in the United Kingdom? Is there enough interest in academy.

If we consider only thermoplastics contributions we see a drop from 26 to 13 and a charge in balance from:

	1975		1980	
Academy	13½	(52%)	13	(93%)
Industry	12½	(48%)	1	(7%)

—a virtual elimination of the industrial contribution. At the 1975 meeting the Director of Polymer Engineering noted that the gap between theory and practice was partially one of communication and that during that conference each side had cast out lines to the other. It would be nice to report that those lines had been taken up but the evidence was not clearly visible.

And so to detail.

Colbert gave the conference an excellent start with “an integrated approach to efficient polymer processing”. He stressed the three necessary components as: a model, a computer and an engineer. The model must be simple enough to answer problems, and the engineer must understand both its capability and limitaitons, however, his most alarming caveat was that irrespective of model, a computer programme can reflect the prejudice of the programmer.

The papers on injection moulding fell into two groups: the prediction of mould filling (Colbert, Richardson and Reichsten), and the characterisation of mouldings (White, Harland, Bright, Crawford and Marshall). Listening to the former group I was bound to ask “have we made any progress in this field in the last five years?” and compare back with the 1975 paper of Moroni. If there has been progress in this field it is not obvious to me. The number of papers which have developed mathematical models of mould filling certainly runs well into double figures if not yet three and yet each new author ignores everything that has gone before and proceeds to tackle the same problems. Have we become so obsessed with the need to do ‘original’ work that we scorn to research the literature? Rather than pursue this course at future conferences could we not have some detailed review of the state of the art saying just what has already been achieved, what are the differences between various

authors, and what must be done to reconcile conflicting results and progress the science. Is there a role for the Society to sponsor such reviews? To illustrate my concern I take a point from Reichstein's paper concerned with the balance between heat generation and heat exchange in forming a frozen layer during pressure driven flow through cooled channels. The author notes that a pressure of 1,000 bar has only a small effect on thermal conductivity and therefore the effect of pressure can be ignored. By returning back to the 1975 proceedings we find that Menges and Wubken (from the same group of workers!) demonstrated that 400 bar increases the relaxation time, and so by implication the viscosity, by one order of magnitude. Thus surely 1,000 atmospheres must be expected to have a profound effect on the rate of energy dissipation. There is also a probability that pressure will have an effect of increasing the temperature at which the melt freezes. Perhaps these various influences have equal and opposite effects.

The second group of papers on characterisation of mouldings seemed to promise some controversy and indicate a fertile ground for further work of both experimental and theoretical nature—while this subject is still relatively new to rheologists is an ideal time for someone to prepare an objective review of both observations, methods and ideas.

The papers on rubber (Turner, Targiel, Leppe, Patel, Leblanc and Colbert) were much concerned with rheology as a characterisation tool. One of the problems of rubber rheology is the phenomenon of wall slip which can have an order of magnitude effect on the observation of "flow". Turner's paper on "the effect of pressure and metal surfaces on the flow behaviour of rubber" presented a deep study of the phenomenon of wall slip and its implications which may make some people think again about the so called phenomenon of "stress overshoot". It was particularly helpful that Turner developed his paper directly from the 1975 results of Worth and Helmy so that, with the following paper by Targiel, we now have a clear appreciation of the state of the art with respect to this phenomenon, its importance and its possible mechanism.

Various aspects of stretching flow were explored by Worth, Petrie, Cogswell and Janssen. The latter paper was especially concerned with the interaction between flow fields and crystallisation.

Developments in the mechanical handling of polymer melts were described: by Meyer, in respect of a novel design for a single screw extruder; by Worth, concerned with the blow moulding die design and the elimination of welds in tubular extrusion; and by Masberg, who demonstrated the principles of finite element analysis in die design.

New to most delegates will have been the study of the rheology of nitrocellulose systems described by Carter. Although arguably one

of the earliest polymer systems enlisted by man it has, in the recent past, received little attention at this Society's meetings. I am certain that we shall hear more at future conferences about such systems. However, before rushing away to test it in the latest instrument, take a warning from the literally exploded view of a torque rheometer.

The conference kept well to time— partly due to a lack of discussion. So often do we have to ask for more discussion time at our conferences that it came as something of a surprise to have five minutes extra for coffee. The reticence of delegates to put the affairs of rheology to rights may have been a preoccupation with what the Chancellor of the Exchequer was doing to them at the same time. However, that reticence was less noticeable in the evening. One group at least pursued its heated discussion until three in the morning at one hall of residence before they tiptoed away into the night not to be heard again during the formal sessions at all.

F. N. COGSWELL

CHEMICAL SOCIETY INDUSTRIAL FELLOWSHIP

The Fellowship

The Process Technology Group of the Chemical Society have recently set up a Research Fellowship to investigate the rheological problems encountered by industry when dealing with dispersions; in particular the prediction of their properties from a knowledge of the nature of the continuous and disperse phases, especially the physical chemistry of the particle-particle interactions. Together with this main interest, three subsidiary topics will be studied:

- a) the measurement of rheological properties.
- b) the characterisation of the particles/surfaces, i.e. measurement of particle size, charge etc.
- c) the way in which processing affects the establishment of a desired rheology.

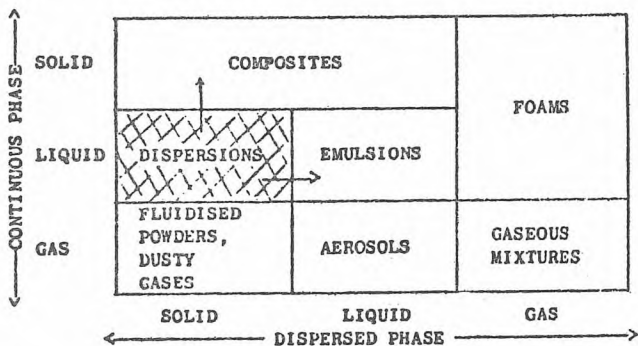
It is the aim of the fellowship to draw together the common threads of rheological problems and experience found in a wide range of industries including:

Pharmaceutical
Detergents
Paints
Printing Inks
Food
Cement
Clay (china, etc.)

Toiletries (toothpastes, etc.)
 Oil (Drilling muds, etc.)
 Plastics (fillers in melts, etc.)
 General Chemical (synthetic clays, silica, fillers, thickeners, etc.)

Alongside these studies; a similar assessment will be made of the current state of theoretical knowledge that could help solve real problems and visits will be made to university departments and research institutes to find the current interests and predict future developments.

The area of interest is as follows:



Although our interests are defined as solids in liquid*, it could well be that at some earlier or later stage in its history a dispersion may have been/become a composite/emulsion due for instance to temperature changes.

The problems involve the following:

1. *Prediction* of the rheological properties of a dispersion in terms of:
 - yield stress at low stress/strain
 - viscosity level over some defined deformation rate/stress region (i.e. brushing, pouring, etc.)
 - thixotrophy (breakdown/build-up)
 - elasticity

*Polymer solutions will not be studied.

for *PARTICLE* characteristics ranging over:

- charged/uncharged
- polymer modified/unmodified
- round or assymetrical (plates/rods)
- mono—or poly-dispersed
- small ($1/10 \mu\text{m}$) or large (mm)

—dilute or concentrated ($0 \rightarrow \phi \text{ max}$)

—aggregated/non-aggregated

in *LIQUIDS* that are:

—Newtonian or non-Newtonian

—electrolytic or non-electrolytic

—elastic or inelastic

One major aim of the fellowship will be to define the problems in consistent rheological and physico-chemical form and nomenclature, to provide a common basis for comparison.

Attention will also be paid to the rheometric methods used across various industries; many empirical methods do not produce absolute data and thus cannot provide comparable data, and an attempt will be made to suggest standardisation and intercomparison of methods.

However, many methods have provided simple tests for the effectiveness of empirical formulation changes—it is hoped to collect together these ad-hoc methods of obtaining a desired property (properly defined or otherwise!)

Typical situations that highlight problems are:

1. Production of a product with a desired rheological prescription (e.g. “thickened”) using a wide range of raw materials to offer flexibility/economy to a product formulator.
2. In various products, even though the final version of the product may be solid, various product precursors may be dispersions of particles in liquids. These particles may need to be in a good state of dispersion before the final product state is achieved so must not sediment, accumulate or deplete in critical regions when flowing etc.
3. The role of “processing aids”.
4. Handling dispersions in mixers, pumps, etc. requires that power consumption can be calculated from rheological information and also that delicate structures must be given time to form or reform under deformation.
5. Quality control—viscosity as output, particles (size, shape) as input.

These problems are common to many industries—how common remains to be found by this fellowship. Having collated common problems an attempt will be made to match these against available theoretical predictions. (These will have been collected in parallel with the problems.)

Where the theory is wanting, the challenge will be given to those working in this area to use the collected information to direct their immediate research interests.

Informal contact has already been made with a number of people involved in the above to declare my intention to visit them (ICI Plastics, Cement Research, Drilling Mud consultant, most Unilever groups: foods, detergents, toiletries, china clay rheology consultant, Pain Research Association, ICI Corporate, BP Research, Shell Research etc.).

The outcome of the work will be two-fold:

- A major contribution to a symposium.
- A monograph reporting the work. This publication will seek to inform industry on where each stands relative to others in terms of dispersion problems, and where all stand relative to theoretical advances. Theoretical workers will be given clear guidelines on the practical problems of dispersion rheology that need studying theoretically.

During the time available (approx. 12 months) as many industrial and university visits as possible will be made and for this purpose help is sought from interested parties to arrange such visits. To help assess the situation a questionnaire has been compiled and copies will be sent to all interested in advance.

The Fellow

The fellowship has been awarded to:

Dr. Howard A. Barnes
Unilever Research Port Sunlight Laboratory
Port Sunlight
Merseyside L62 4XN
Tel.: 051-645-2000 Ext. 8349
Telex: 627578

Dr. Barnes' interest in rheology began in undergraduate days. While studying Physics at UCW Aberystwyth, he spent a long summer vacation working in the Rheology Laboratory of Dr. George Scott Blair at NIRD Reading. The particular project was to evaluate a technique for measuring the viscosity of blood while withdrawing a sample from a patient. On returning to Aberystwyth the interest in rheology was maintained by contact with Dr. (now Professor) Ken Walters (lately President of the British Society of Rheology and the organiser of this year's Chemical Society summer school in Rheology). After finishing his physics degree and a post-graduate diploma in electronics, he joined Ken Walters in the Applied Mathematics Department where he carried out experimental studies on the flow of visco-elastic fluids for his Ph.D. He joined Unilever Research in 1970 and for the last ten years has been engaged in research on the flow properties of detergent systems and is consulted on a wide range of industrial rheology problems in the food, toiletries, and printing areas of Unilever's business.

NOTICE OF THE ANNUAL GENERAL MEETING

The 40th Annual General Meeting of the British Society of Rheology will be held on Tuesday, 9th September, 1980 in the Gustave Tuck Lecture Theatre, University College, Gower Street, London, commencing at 5.30 p.m.

Members are reminded that (under Rule 7 (b)) the business of the meeting includes:

- (i) The election of a President for 1980-82,
- (ii) The election of other officers and members of Council for 1980-81,
- (iii) The receipt of a report and audited accounts from Council,
- (iv) Appointment of auditors and fixing of their remuneration (rule 6),
- (v) Dealing with matters raised by Council or by any member, and receiving suggestions from members for consideration by Council.

Members may also wish to note that (under rule 4 (b)) Council intends to propose that the Annual General Meeting raise the annual subscription to £5. This was discussed at the last Annual General Meeting and the Treasurer will no doubt repeat to this meeting the reasons for the proposal (apart from the facts of inflation and that the subscription has remained at £2 for ten years).

Nominations received to date are as follows:

<i>President</i>	Professor J. R. A. Pearson
<i>Secretary</i>	Dr. C. J. S. Petrie
<i>Treasurer</i>	Mr. A. Evans
<i>Membership Secretary</i>	Dr. D. C-H Cheng
<i>Editor (Abstracts)</i>	Mr. J. Astin
<i>Editor (Bulletin)</i>	Dr. C. R. Dimond

Ordinary Members

Dr. H. A. Barnes
Dr. T. E. R. Jones
Dr. D. E. Marshall
Dr. D. R. Oliver
Mr. B. Roberts

Nominations for Council or for any of the offices are invited. Note that there are five nominations for the six places on Council. Nominations should be sent to the Secretary or may be made at the meeting (see rule 5 (b)).

The Secretary would be pleased to receive notice of any matter that any member wishes to raise.

C. J. S. PETRIE
March, 1980

MEMBERSHIP NEWS

Applications for Membership

The following applications were approved by Council at its last meeting (March 1980).

Gutteridge, Pamela Ann, B.Sc.,
Ph.D.
p,t,sa,C,D,F,G,H.

I.C.I. Ltd. Plastics Division,
P.O. Box No. 6,
Bessemer Road,
Welwyn Garden City,
Herts.

Lapasin, Romano, Dr.
f,et,sa,G.

Istituto di Chimica Applicata e Ind.,
Universita di Trieste,
v. Valerio,
34127, Trieste, Italy.

Bains, Ranjit Singh, B.Sc., G.R.I.C.
f,et,sa,C,D,F,G,I,J,K,L,M.

Contraves Industrial Products Ltd.,
Times House,
Station Rpproach,
Ruislip,
Middx. HA4 8LH.

Armstrong, Robert C., B.Ch.E.,
Ph.D.
f,et,sa,B,D,N.

M.I.T. Dept. of Chemical
Engineering
Building 66-370,
Cambridge,
M.A. 02139, U.S.A.

Papo, Adriano,
Deg. in Chem. Engng., Ph.D.
f,et,sa,G.

Universita di Udine,
Istituto di Chimica,
Viale Umgheria 43,
33100 Udine,
Italy.

Charnock, Ronald Scott, B.Sc.(Hons.),
Ph.D., A.N.C.R.T., G.P.R.I.
p,et,sa,C,F,G,H,N,O.

Loctite (Ireland) Ltd.,
Technical Facility,
Whitestown Industrial Estate,
Tallaght,
Co. Dublin, Ireland.

Kulkarni, Praghakar Balrishna,
Ph.D.
p,et,sa,C,F,G,H,N,O.

Loctite (Ireland) Ltd.,
Technical Facility,
Whitestown Industrial Estate,
Tallaght,
Co. Dublin, Ireland.

Nangle, Brendan J., B.Sc., Ph.D.,
M.I.C.I.
p,et,sa,D,F,G,O.

Loctite (Ireland) Ltd.,
Technical Facility,
Whitestown Industrial Estate,
Tallaght,
Co. Dublin, Ireland.

Walker, Antony Thomas Sansom,
B.Sc., Ph.D.
p,et,sa,B,F,G.

U.K.A.E.A.,
A.E.E. Winfrith,
Dorchester,
Dorset.

Hammond, Thomas Henry, B.Sc.,
C.Eng., F.I.Chem.E.
p,et,sa,G,M,N.

Polytechnic of Wales,
Department of Chemical Engineering,
Treforest,
Pontypridd,
Mid-Glam.

Resignations

- 236 H. A. Johns, Reading
762 P. K. Tandon, Xerox Research U.K. Ltd., Welwyn Garden City
406 K. E. Schreiner, Oslo, Norway
067 R. W. Bryant, M.o.D.-P.E.-E.R.D.E.
665 J. C. Snowdon, State College PA., U.S.A.

List of Honorary Members

The first date refers to election to membership, and the second relates to election to honorary membership.

- W. H. Copley 1964, —
E. B. Babler 1944, 1967
Dr. W. H. Banks 1940, 1971
D. Bulgin 1944, 1973
Emeritus Prof. E. L. Crossley 1940, —
A. L. Deadman 1940, 1968
Mme. Dr. A. Dobry-Duclaux 1947, 1973
Prof. R. W. Douglas 1960, 1975
Prof. A. E. Green 1957, 1979
Dr. L. Grunberg 1950, 1973
Rt. Hon. Earl of Halsbury 1946, 1974
Dr. E. W. J. Mardles 1940, 1958
P. Merriman 1943, 1979
C. C. Mill 1940, 1979
Dr. B. S. Neumann 1947, 1976
Dr. A. H. Nissan 1955, 1979
W. F. O. Pollett 1946, 1968
F. J. Rigby 1947, 1979
Dr. R. Roscoe 1947, 1978
Dr. R. Schnurmann 1945, 1974
Dr. G. W. Scott Blair 1940, 1968
Dr. R. W. B. Stephens 1942, 1973
Prof. S. G. Ward 1944, 1973
Prof. L. R. G. Treloar 1942, —
J. Wilson , 1958

This list is the complete record of Honorary Membership of the Society and if anyone has any further information to add to the above then they should contact the Secretary.

'A SCIENTIFIC MEETING'

The Society will hold a Scientific Meeting in London on Tuesday, 9th September, 1980, at the Gustave Tuck Theatre of the University College, Gower Street, beginning at 14.00.

It is hoped that the programme will include an address from the recipient of the Society's Gold Medal and this year's Annual Award winner. Other invited papers include:

R. I. Tanner: 'Theories of extrusion and correlation with experiments'

A. B. Metzner and R. K. Gupta: 'Non-isothermal rheological behaviour of polymers, with application to film blowing'

The registration fee for the meeting is £5 before 1st September or £7 at the meeting. In the event of sufficient demand an informal dinner will be held after the meeting (estimated cost £15 per head).

Should you wish to join the dinner party would you please indicate so with your registration which be sent to:

F. N. Cogswell,
67 Daniells,
Welwyn Garden City,
Herts. AL7 1QT.

RHEOLOGY ABSTRACTS

(a) Acknowledgement

The Editor of Rheology Abstracts would like to thank the following abstractors whose dedication and hard work have been in no small measure responsible for the present very healthy state of the Abstracts:

J. ASTIN	C. R. DIMOND	D. E. MARSHALL
D. M. BANCROFT	A. EVANS	D. R. OLIVER
K. M. BEAZLEY	J. FERGUSON	A. J. PALFREY
R. BUSCALL	P. FREAKLEY	R. PARKER
D. C-H. CHENG	D. W. HADLEY	C. J. S. PETRIE
R. P. CHHABRA	J. F. HUTTON	R. N. F. PINFOLD
F. N. COGSWELL	R. D. HUTTON	Z. RIGBI
M. M. CROSS	R. S. JONES	J. C. SCOTT
M. F. CULPIN	T. E. R. JONES	R. W. WILLIAMS
A. R. DAVIES	F. M. LESLIE	

(b) The following journals are now in need of abstractors:

J. Appl. Phys.
J. Coating Technology
Chem. Eng. J.
Rev. Sci. Inst.

Would anyone willing to act for these or any other journal not in List 1, page 66, British Society of Rheology Bulletin 1978, Vol. 21, No. 4, please contact

J. Astin,
Department of Applied Mathematics,
University College of Wales,
ABERYSTWYTH, Dyfed.

CONFERENCE ANNOUNCEMENT

Rheology of Rubbery Materials and Rubber Compounds— Theory and Practice

A joint meeting of the Belgian Group of Rheology and the British Society of Rheology will be held at the University of Liege from Tuesday, 7th April, to Thursday, 9th April, 1981.

Offers of papers are invited, in particular in the following areas:

Rheology of mixing,
Processing of rubber compounds,
Dynamic properties of cured materials,
Process modelling and design.

It is hoped to attract both contributions of a practical nature and of a theoretical nature, in order to provide a forum for the exchange of ideas.

Enquiries should be addressed to:

Dr. C. Marco,
University of Mons,
19 Avenue Maistriau,
B-7000 Mons Belgium),

or to Dr. D. E. Marshall,
Institute of Polymer Technology,
Loughborough University of Technology,
Loughborough, Leics. LE11 3TU (U.K.)

to whom offers of papers (title and abstract of about 200 words) should be sent to arrive no later than 31st August, 1980.

SPECIAL OFFER TO MEMBERS

"Rheological Techniques" by R. W. Whorlow, published by Ellis Horwood at £26.80, is available to members of the British Society of Rheology at the special price of £19.95, if they order directly from John Wiley & Sons Ltd. of Chichester. Send a cheque (or equivalent) for £19.95 with your order to

John Wilson,
Product Manager,
John Wiley & Sons Ltd.,
Baffin Lane,
Chichester,
Sussex, PO19 1UD,
England.

The price includes postage and packing provided that payment is made at the time of ordering. Copies ordered from overseas will be sent by surface mail. Any difficulties should be referred to the Membership Secretary in the first instance. (Members should note that the price of £20.50 quoted in Rheology Abstracts (22 (3) p.205) was a preliminary estimate by the publishers and is not correct. The full published price is £26.80. They may also note that the book has nearly 450 pages rather than 300 as stated in Rheology Abstracts.)

NEW JOURNAL

The International Journal of Adhesion and Adhesives is to be launched in April 1980. Published by the IPC Science and Technology Press Limited the journal will cover such topics as Fracture Mechanics, Viscoelastic stress analysis, Methods of testing and Dynamic performance.

RHEOLOGICAL INSTRUMENTS

The Petronic MR8300 series visco-elastic analyser is manufactured by Integrated Petronic Systems Ltd. of London and is a constant stress viscometer. The control system is pre-programmed for the torque to be applied in creep, continuous or oscillatory modes using either parallel plates, cone and plate or concentric cylinder viscometric geometries.

DIARY

1980

14th-16th May. Rheogoniometry Course—Ross Priory.

4th July. B.S.R. Council Meeting—Birmingham.

16th-17th July. Liquid Crystal Polymers—Leeds.

9th September. Scientific Meeting and A.G.M.—London.

1981

8th-11th September. Stretching Flows—Newcastle (provisional).

1982

29th March-1st April. Deformation, Yield and Fraction of Polymers—Cambridge.