

BULLETIN



**BRITISH SOCIETY
OF RHEOLOGY**

1970, No. 1, Vol. 13

Hon. Editor:

JOHN HARRIS,
Schools of Chemical Engineering
The University,
Bradford,
Yorks. U.K.



NOTICE TO INTENDING CONTRIBUTORS

The B.S.R. Bulletin is now available as a vehicle for several categories of communication by Members.

1. Technical papers (two copies required).
2. Descriptive papers of general interest.
3. Letters which may be either
 - (i) technical or
 - (ii) non-technical.

The technical papers will be refereed and so will technical letters but the latter only by one person. Descriptive and non-technical material will be published if it is of general interest.

In addition, project reports and computer information will be published.

It is hoped that B.S.R. members will find rapid publication sufficiently attractive to warrant submitting work.

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FOREWORD

It is appropriate at the start of a new decade to glance forward to try to discern the shape of future developments in all fields likely to change the present state of Rheology in the U.K. Now that a great deal of the spice of space flights has faded with the events of July 20th, 1969 (first moon landing), which was wonderfully free from technical mishaps the most obvious speculative public scientific events of the immediate future are the widespread introduction of supersonic and super-sized aircraft with the possibility that some unsuspected and perhaps unpleasant rheological properties of the construction materials may be revealed. We are certainly aware that the final laboratory test of the materials will be the actual service of them for extended periods.

In another area the forthcoming general elections may have an effect in the national organisation of science and in the finances available to the dispensers of public and private funds for research. This too could ultimately be important because the activities of the bulk of rheologists is largely in research as rheology is accepted today.

Nearer home, the Council of the Society has recently taken the important step of invoking a Working Party on Publications with the object, through this instrument, of assessing needs and means in this field. The results of decisions taken by the Council following the report of the Working Party will undoubtedly have an important formative on the Society over the next decade. Members of the Society will be able to make a real contribution to the effectiveness of the Council's deliberations by their reactions to the questionnaire which has been circulated to members this year, and therefore to the shape of rheology in the U.K. for some considerable time to come.

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B.S.R. AUTUMN CONFERENCE

The Society has applied to hold its 1970 Autumn Conference at the Royal Military College of Science, Shrivenham, from September 7th to the 10th. The theme of the Conference will be "Rheology in Industry." Papers are invited for this Conference, and intending authors are asked to contact Dr. K. M. Beazley, 44 Brockstone Road, Boscoppa, St. Austell, Cornwall, as soon as possible. Titles and abstracts of such papers should be forwarded to the above address so as to reach it not later than May 1st, 1970, or as soon thereafter as possible.

THE MEASUREMENT OF PULSATING FLOW

Organised by: **The Institute of Measurement and Control**

Co-sponsor: **The Institution of Mechanical Engineers**

The Symposium will be international in character with contributions in both academic and industrial fields with the following objects: —

- (1) To make people aware of the importance of the influence of pulsations on the accuracy of flow measurement
- (2) To draw attention to the methods of assessing errors due to pulsations
- (3) To discuss effects of pulsations on various primary elements used in flow measurement
- (4) To discuss the practical means for avoiding or minimising the effects of pulsations on primary metering devices
- (5) To highlight the gaps of knowledge and direct attention to the areas in which further research is most needed

A half-day colloquium will also be held in which users of flow measuring devices can exchange ideas and experiences in an informal way.

PROGRAMME

Thursday, April 2nd, 1970

Welcoming address by Vice-Chancellor, D. M. A. LEGGITT, Esq., M.A., D.Sc., F.R.Ae.S., F.I.M.A.

Opening remarks by President of Institute of Measurement and Control, J. E. SAMSON, Esq., B.Sc., F.Inst.P., M.Inst.M.C.

SESSION 1—*Chairman:* C. W. Munday, Esq., B.Sc., M.Inst.M.C.

Measurement of Pulsating Flows by K. J. Zanker, Esq., B.Sc.

"A Review of the Work of J. L. Hodgson on the 'Venturi Meters in Pulsating Flow'" by Professor J. M. Zarek, Dip.Ing., B.Sc., Ph.D., C.Eng., R. C. Mottram, Esq., B.Sc.(Eng.), C.Eng., M.I.Mech.E.

"Flow in an Oscillating Pipe" by P. Minton, Esq., B.Sc. (Eng.), A.C.G.I., C.Eng., S. Selvalingam, Esq., B.Sc. (Eng.)

"La Mesure Des Debits Pulsatoires Au Moyen D'Appareils Deprimogenes" by Professor A. Fortier

SESSION 2—*Chairman:* T. A. LUCAS, Esq., B.Sc., M.Inst.M.C.

"Instantaneous Flow Measurement" by M. J. Tindal, Esq., B.Sc.(Tech.), Ph.D., C.Eng., M.I.Mech.E.

"Behaviour of the Secondary Devices in Pulsating Flow" by T. J. Williams, Esq., B.Sc., Ph.D., M.Sc., C.Eng., F.I.Mech.E.

"Induced Voltage Electromagnetic Flowmeters for Pulsating Flows" by M. K. Bevir, Esq., Ph.D.

"Rotameters and Turbine Flowmeters in Pulsating Flow" by H. H. Dijstelbergen, Esq., Ph.D.

"A Drag Plate Flowmeter for Pulsating Flow" by J. J. Hunter, Esq., M.I.E.E., W. L. Green, Esq., M.Sc. (Tech.), M.I.Mech.E.

"The Effects of Pulsating Flow on a Control System" by K. F. Gill, Esq., M.Sc., Ph.D., B. W. Imrie, Esq., B.Sc., M.Sc., G. E. Harland, Esq., B.Sc., Ph.D.

Friday, April 3rd, 1970

SESSION 3—*Chairman:* N. REAM, Esq., B.A., Ph.D., F.I.M.A., M.Inst.M.C.

"The Influence of Transmission Line Geometry on Measuring of Oscillatory Pressure" by S. Goldschmidt, Esq., Ph.D., J. F. Ury, Esq., Ph.D.

"Dynamic Calibration of Gas Flowmeters" by Miss K. R. Maslen, B.Sc.

"Cross-Correlation Techniques Applied to Pulsating Flow Measurement" by M. S. Beck, Esq., Ph.D., S. A. Abeysekera, Esq.

"Ultrasonics in Flow Measurement" by H. R. Martin, Esq., Ph.D., J. E. Carrington, Esq.

"Interrogating Flow Fields with Radar and Laser Sources" by J. Harris, Esq., Ph.D., M.Inst.M.C.

"Fluid Dynamic Problems Awaiting Solution" by F. A. V. Engel, Esq., Dr.Ing., D.I.C. Dip.Ing., (El.Eng.)

SESSION 4—*Chairman:* E. I. LOWE, Esq., B.Sc.(Eng.), M.Inst.M.C.
Discussion of the *Practical Problems of Flow Measurement*

Opening remarks by C. LAMOND, Esq., B.Sc., M.Inst.M.C.

Speakers: Llewellyn Young, Esq., C.Eng., F.I.Mech.E.,
F. C. Whalen, Esq., B.A., M.Inst.M.C., B. W. Balls, Esq.,
B.Sc., M.Inst.M.C., J. C. McVeigh, Esq., Ph.D.,
M.Inst.M.C.

Summing up the work of the Conference proceedings:
E. Muller, Esq., B.Sc.(Eng.), M.Inst.M.C.

NETHERLANDS SOCIETY OF RHEOLOGY

Preliminary list of lectures to be presented at the Symposium of the Netherlands Society of Rheology on May 21st and 22nd, 1970

At Hotel "De Schammert," Leende (near Eindhoven).

Prof. Dr. U. Bianchi (University Genova): Pressure dependence of glass transition temperature in polymers.

Drs. J. P. Braam Houckgeest (Kon./Shell Laboratorium Amsterdam): The isothermal compressibility of polyvinylacetate in the glass transition region.

Dr. N. A. Brunt (West-Terschelling): The statistical interpretation of visco-elasticity.

Ir. J. Heyboer (Centraal Laboratorium T.N.O. Delft): Height of mechanical loss peaks in relation to conformational energy.

Dr. Th. Holleman (Kon./Shell Laboratorium Amsterdam): The temperature dependence of the volume retardation of poly-vinylacetate.

Drs. H. van Hoorn (Kon./Shell Laboratorium Amsterdam): The influence of side group structure on the glass transition temperature of isomeric vinyl ester polymers.

Ir. R. Jongepier (Kon./Shell Laboratorium Amsterdam): The mechanical and dilatometric glass transition of asphaltic bitumen.

Ir. S. J. van der Meer (AKZO, Arnhem): The dynamic-mechanical glass-rubber transition of oriented polymer fibres.

Dr. A. J. Pennings (Central Laboratorium D.S.M. Geleen): Melting behaviour in relation to morphological structure of polyethylene.

Dr. C. A. F. Tuijnman (Centraal Laboratorium D.S.M. Geleen): Thermal activation relations.

Ir. H. G. Weyland (AKZO, Arnhem): Prediction of the glass transition temperature of polymers.

Enquiries to: V. Schreiber,

Bond Voor Materialenkennis,

Bureau: 'S-Gravenhage,

Stadhouderslaan 28,

The Hague, Holland.

"CHEMECA" 70
CHEMICAL ENGINEERING CONFERENCE
AUSTRALIA 1970

Melbourne August 18th–21st. Sydney August 24th–26th

Topics

1. Particle Mechanics: Including mineral processing, comminution, classification, froth flotation, agglomeration, dust and mist collection.
 2. High Temperature Processes: Including pyro-metallurgy, glass and refractory manufacture.
 3. Chemical Reaction Engineering: Including reaction systems, kinetics, electrochemical and hydrometallurgical processes, reactor performance, petrochemicals.
 4. Biochemical and Biomedical Engineering: Including biological fermentation, biological leaching and extraction, food engineering, biomedical processes and devices.
 5. Rheology and Mixing: Including engineering aspects of rheology and mixing of non-Newtonian fluids.
 6. Diffusional Processes: Including heat, mass and energy transfer operations.
 7. Process Dynamics and Control: Including computer control and optimisation.
 8. Scientific Management: Decision making applied to the planning and use of resources; to R & D; to design; to process operation.
- Addresses for communications:

General

The Secretary, Chemeca 70,
Australian Academy of Science,
Gordon St.,
Canberra City, A.C.T.,
Australia 2601.

Technical Programmes

Assoc. Prof. J. R. Norman,
Dept. of Chemical Engineering,
University of N.S.W.,
P.O. Box 1,
Kensington, N.S.W.,
Australia 2033.

THE INSTITUTE OF PHYSICS AND THE PHYSICAL SOCIETY

International Conference on THERMODYNAMICS

Sponsored by

The International Union of Pure and Applied Physics
The International Union of Pure and Applied Chemistry

April 1st-4th, 1970

University College, Cardiff

SUMMARY OF PROGRAMME

Wednesday, April 1st

PHASES, SURFACES AND THERMODYNAMIC LIMIT

- L. Tisza: Thermodynamics of Phase Equilibrium: From the Phase Rule to the Scaling Laws.
- M. H. Coopersmith: The Thermodynamic Description of Phase Transitions.
- A. Munster: Some Aspects of the Thermodynamic Limit.
- J. C. Melrose: Thermodynamics of Surface Phenomena.

FOUNDATIONS

- P. T. Landsberg: Main Ideas in the Axiomatics of Thermodynamics.
- L. Galgani and A. Scotti: On Superadditivity and Convexity Properties of Thermodynamic Functions.
- J. L. B. Cooper: A Qualitative Approach to the Foundations of Thermodynamics.
- W. J. Hornix: The Extension of Classical Phenomenological Thermodynamics to Open Systems.
- G. Sussmann and E. Hilf: General Definition of the Perfect Gas Concept.
- J. Keller: Entropy and Uncertainty Principle.

Thursday, April 2nd

- R. Zwanzig: The Concept of Irreversibility in Statistical Mechanics.
- R. E. Collins and F. G. Hall: Stochastic Processes and the Quantum Evolution of States.
- J. Ford: Irreversibility in Nonlinear Oscillator Systems.
- H. S. Robertson and M. A. Huerta: Entropy Oscillation and the H Theorem for Finite Segments of Infinite, Coupled, Harmonic Oscillator Chains.
- G. Nicolis: Thermodynamic Theory of Stability, Structure and Fluctuations.

"REAL" MATERIALS

- J. U. Keller: On the Validity of the Clausius-Duhem Inequality.
B. D. Coleman: The Thermodynamics of Materials with Memory.
I. Muller: A New Systematic Approach to Non-Equilibrium Thermodynamics.
J. L. Bartelt and F. H. Horne: On the Rational Foundations of the Non-Equilibrium Thermodynamics of Ordinary Fluid Mixtures.
J. E. Fitzgerald: Thermodynamic Restrictions in Nonlinear Rate Type Materials.

Discussion 1: THE LAWS OF THERMODYNAMICS.

Chairman: PROFESSOR M. L. McGLASHAN.

Friday, April 3rd

- M. A. Ruderman: Extreme Regimes of Temperature and Pressure in Astrophysics.
L. A. Schmid: Variational Formulation of Relativistic Fluid Thermodynamics.
R. M. P. Ebert: Carnot-Cycles for General Relativistic Systems.
K. Koebe and E. Hilf: Thermodynamics of Hyperon Stars.
J. V. Narlikar: Time Asymmetry in Electrodynamics and Cosmology.
P. T. Landsberg and K. A. Johns: Ensemble versus Time-Average Probabilities in Relativistic Statistical Mechanics.
J. Harris: Secondary Effects in Irreversible Thermodynamics.
T. H. K. Barron and R. W. Munn: Thermodynamics of Solids under Stress.

Discussion 2: TEMPORAL ASYMMETRY IN THERMODYNAMICS AND COSMOLOGY.

Chairman:

Reporter: DR. O. COSTA DE BEAUREGARD.

Saturday, April 4th

- R. Giles: An Elementary Introduction to Entropy via Irreversibility.
J. Kestin: A Simple, Unified Approach to the First and Second Law of Thermodynamics.
G. Gurney: Principles of Classical Thermodynamics.

Discussion 3: PEDAGOGICAL POINTS IN THE TEACHING OF THERMODYNAMICS.

Chairman: DR. K. G. DENBIGH, F.R.S.

Reporter: PROFESSOR M. W. ZEMANSKY.

INTERNATIONAL CONFERENCE ON YIELD, DEFORMATION AND FRACTURE OF POLYMERS

An international conference on the physical and structural basis of yield, deformation and fracture in polymeric materials is to be held at Churchill College, Cambridge, from March 31st–April 3rd, 1970. The conference is being organised by a Committee representing the following British societies:

British Polymer Physics Group
British Society of Rheology
Institution of the Rubber Industry
Materials and Testing Group of The Institute of Physics
and The Physical Society
Materials Science Club
Plastics and Polymer Group of The Society of
Chemical Industry
Plastics Institute

Twenty-seven contributed papers on original research have been accepted mainly from the United Kingdom, Europe and U.S.A. These will be presented in five subject sessions each of which will be opened by an introductory review given by the Chairman for that session.

The sessions and Chairmen are as follows:

FRACTURE—Thor Smith (U.S.A.)
CRAZING—R. P. Kambour (U.S.A.)
YIELD—R. D. Andrews (U.S.A.)
ANISOTROPY—L. R. G. Treloar (U.K.)
DEFORMATION AND FRACTURE IN ELASTOMERS—
L. Mullins (U.K.)

JOURNAL OF TEXTURE STUDIES

*An International Journal of Rheology, Psychorheology, Physical and
Sensory Testing of Foods and Pharmaceuticals*

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D. J. Tilgner, Sopot., Poland.

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Articles for publication and communications relative to editorial
matters should be sent to:

For North and South America and Australia:

Dr. A. S. SZCZESNIAK,
General Foods Corporation,
Corporate Research Dept.,
White Plains, N.Y. 10602, U.S.A.

For all other countries:

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(A specimen copy is available on loan—Ed.)

Summary of Contents of No. 1, Vol. 1

EFFECT OF MECHANICAL TREATMENT ON THE HARDNESS OF MARGARINE AND BUTTER

J. M. DE MAN, *Dept. of Food Science, University of Guelph, Guelph, Ont., Canada*

Abstract. The work-softening of margarine and butter resulting from passage through perforated plates was determined. Various plates were used differing in size and number of perforations, but identical in the total area of perforations. Greater work-softening was obtained with plates having many small perforations, but the back-pressure in the equipment was higher. Passing the product through two or three plates slightly increased work-softening. Additional mechanical action was provided by a propeller rotating immediately behind the perforated plates. Only small additional work-softening was obtained by this action and little remained after 8 days storage. Increasing the speed of the propeller up to 100 r.p.m. increased work-softening. Increasing it to 300 r.p.m. did not further increase work-softening. It appears that excessive mechanical action has little permanent softening effect on plastic fats.

RELATION OF RHEOLOGICAL PROPERTIES OF TESTA OF PISUM SATIVUM L. TO HISTOLOGICAL CHANGES

SAMUEL ANGEL and AMIHUD KRAMER, *Dept. of Horticulture, University of Maryland, College Park, Md., U.S.A.*

Abstract. The study was undertaken to determine histological distortions occurring in the pea testa (skin) as a result of various force applications.

Multi-directional compression caused bending of macrosclereids and flattening of osteosclereids. Unidirectional pressure caused similar deformations plus eventual separation between cells; shearing caused bending, buckling and wedging of macrosclereids; bruising resulted in cracks between macrosclereids and buckling.

The existence of a pentosan-cellulose complex in the basal and apical ends of the macrosclereids and in the end wall regions of the osteosclereids, as established by R. M. Reeve of the U.S.D.A., and the triangular arrangement of the osteosclereids might explain the ability of the macrosclereids to bend and buckle and of the osteosclereids to spread in the end wall regions. This in turn contributes to the resiliency and toughness of the testa in the face of varied physical forces.

OBSERVATIONS ON STRAWBERRY TEXTURE, A THREE-PRONGED APPROACH

ALINA S. SZCZESNIAK and BERTHA J. SMITH, *General Foods Corporation, Technical Center, Tarrytown, N.Y., U.S.A.*

Abstract. Sensory, instrumental and microscopic methods of evaluation were combined to permit relating textural parameters to structural characteristics of fresh, frozen and rehydrated freeze-dried strawberries. Large cells and thin cell walls appear to account for the ease of textural damage. Degradation of cell walls, cell rupture and plasmolysis caused by senescence or processing are responsible for softening, loss of crispness and easy juice release. A good agreement was obtained between the three methods of texture evaluation.

SENSORY EVALUATION OF FOOD FIRMNESS

ALINA S. SZCZESNIAK and MALCOLM C. BOURNE, *General Foods Technical Center, Tarrytown, N.Y., U.S.A.*

Abstract. How people test foods for firmness without eating them, was studied using 131 respondents and 9 different pairs of foods representing a wide range of firmness. The results were related to correctness of judgment and objective characterisation by the Instron machine. Evidence was obtained that the kind of sensory firmness test

employed depends on the firmness of the food. Viscosity/ consistency, deformation, puncture, and flexure were used as the degree of "firmness" increased from a low (whipped toppings) to a very high (carrots) level.

COLLOIDAL STABILITY OF ICE CREAM MIX

P. SHERMAN, *Unilever Research, Welwyn, Herts., England*

Abstract. The contributions of oil globule size (d_v), emulsifying agent, hydrocolloid stabiliser, and temperature, to the stability of ice cream mix have been investigated.

On ageing the mix at 20°C, the oil globules coalesce in one or two stages, depending on the initial size. When this is less than approximately 0.95 μ , coalescence proceeds rapidly until a critical size is reached. The number of oil globules per unit volume of mix (N) and variations in holding temperature influence the rate of coalescence at this stage. Subsequent coalescence, which is unaffected by N , proceeds at a much slower rate. Mixes with initial globule sizes exceeding 0.95 μ show only this second stage.

It is suggested that the sharp reduction in coalescence rate for globules of diameter greater than 0.95 μ arises from the pronounced increase in the energy barrier to coalescence. Decreasing inter-facial area with increasing diameter of the globules leads to a more rigid emulsifier layer at the oil-water interface.

Milk protein is the main contributor to stability during slow coalescence. The emulsifier exerts only a synergistic effect.

Data are provided to show how the texture of frozen ice cream may be related to the initial size of the globules in the mix from which it is prepared.

MECHANICAL PROPERTIES, RHEOLOGY, AND HAPTAESTHESIS OF FOOD

H. G. MULLER, *Procter Dept. of Food and Leather Science, University of Leeds, Leeds 2, England*

Recently the British Society of Rheology and the Food Group of the Society of Chemical Industry held a joint Symposium in London under the title "Rheology and Texture of Foodstuffs" (S.C.I., 1968). Shortly afterwards the author was asked to write a review of the meeting (Muller, 1967). Although he tried to deal with the papers given there under the two headings of "Rheology" and "Texture," this proved impossible because the demarcation between the two was not clear. At the Symposium itself and at two previous ones (Scott-Blair, 1953; S.C.I., 1958) the papers had not been divided into the two topics either.

OBJECTIVE MEASUREMENTS FOR TEXTURE IN FOODS

ESSEX E. FINNEY, JR., *Instrumentation Research Laboratory, Market Quality Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Md., U.S.A.*

Abstract. Foods are complex systems exhibiting various degrees of elasticity, viscosity, and plasticity. Because of its complex structure and mechanical behaviour, objective measurements of food texture may be influenced by a variety of test conditions, including rate of loading, the magnitude of deformations imposed upon the material, geometry of the loading surface, and localised yielding within the product tested. These sources of variance are discussed. Brief descriptions are given of methods for measuring texture of meats, dairy products, bakery foods, fresh fruits and vegetables, and processed commodities. The paper concludes with a discussion of new techniques for assessing textural qualities of foods based upon an analysis of sound, light transmission, and vibration phenomena.

THE CHEMICAL ENGINEERING JOURNAL

The Journal provides an international forum for the presentation of original work, interpretative reviews and the discussion of the latest developments in chemical engineering.

The scope of the Journal is wide and no limitation except relevance to chemical engineering is placed on the subject matter of papers.

Most space is devoted to fundamental research, the development of engineering methods and the application to chemical engineering problems. However, it is also the policy of the Journal to encourage interpretative reviews explaining newly developing aspects of chemical engineering or the relevance of work in other disciplines to chemical engineering. Mere catalogues of references will not be published.

The criteria for acceptance of papers are originality of thought, quality of work and clarity of style.

All papers will be evaluated by the editors and referees and the delay between submission and publication will not exceed six months in normal circumstances.

Types of contributions

Papers of normal length reporting
original work
Interpretative reviews

Short communications
Letters to the editors
Book reviews

Submission of papers

Papers should be sent to the editors or to an appropriate associate editor chosen on the basis of subject matter, language and geography. Intending authors of reviews are invited to communicate with the editors in the first instance. Instructions to authors are given inside the back cover.

Languages

The principal language of the Journal is English, but papers in French and German are also published.

Frequency

The Journal is published quarterly.

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Department of Chemical Engineering,
University of British Columbia,
Vancouver 8, B.C., Canada.

Professor J. A. Gerster,

Department of Chemical Engineering,
University of Delaware,
Newark, Del. 19711, U.S.A.

Professor O. Molerus,

Lehrstuhl für Mechanische
Verfahrenstechnik,
Universität Erlangen-Nürnberg,
8250 Erlangen, W. Germany.

Professor K. Ostergaard,

Instituttet for Kemiteknik,
Danmarks tekniske Højskole,
2800 Lyngby, Denmark.

Professor O. E. Potter,

Department of Chemical Engineering,
Monash University,
Monash, Victoria, Australia.

Dr. H. R. C. Pratt,

CSIRO,
Box No. 312,
Clayton, Victoria, Australia.

Professor R. C. Reid,

Department of Chemical Engineering,
Massachusetts Institute of Technology
12-191,
Cambridge, Mass. 02139, U.S.A.

Mr. E. S. Sellers,

Humphreys and Glasgow Limited,
22 Carlisle Place,
London, S.W.1, England.

Professor P. Le Goff,
Centre National de la Recherche
Scientifique,
Centre de Cinétique Physique et
Chimique,
Route de Vandoeuvre,
54 Villers-Nancy, France.

Professor J. Happel,
Department of Chemical Engineering,
New York University, University
Heights,
Bronx, N.Y. 10453, U.S.A.

Professor R. Jackson,
Department of Chemical Engineering,
Rice University, Houston, Texas
77001, U.S.A.

Professor G. V. Jeffreys,
Department of Chemical Engineering,
The University of Aston in
Birmingham,
Gosta Green, Birmingham 4, England.

Professor E. Kehat,
Department of Chemical Engineering,
Technion—Israel Institute of
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Professor D. Kunii,
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Professor L. Lapidus,
Department of Chemical Engineering,
Princeton University,
Princeton, N.J. 08540, U.S.A.

Professor J. M. Smith,
Department of Chemical Engineering,
University of California,
Davis, Calif. 95616, U.S.A.

Professor W. Smith,
Department of Chemical Engineering,
University of Nottingham,
Nottingham NG7 2RD, England.

Professor G. Standart,
Department of Chemical Engineering,
University of Manchester Institute of
Science and Technology,
Manchester M60 1QD, England.

Dr. Z. Sterbáček,
Czech Academy of Sciences,
Institute of Microbiology,
Budejovicka 1083,
Praha 4, Czechoslovakia.

Professor D. Venkateswarlu,
Department of Chemical Engineering,
Indian Institute of Technology,
IIT, PO Madras 36, India.

Professor W. L. Wilkinson,
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University of Bradford,
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Professor E. T. Woodburn,
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INORGANIC MACROMOLECULES REVIEWS

The Chemistry, Physics and Technology of Macromolecular Inorganic Compounds and Materials

VOLUME 1 (1970)

ELSEVIER PUBLISHING COMPANY, AMSTERDAM

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Reviews will be published in English, French and German, but manuscripts should preferably be submitted in English.

Manuscripts

Although the Editors will at times solicit review article manuscripts from established authorities in the field covered, unsolicited reviews will also be welcomed. It is, however, requested that subjects for such unsolicited reviews be cleared with the Editors before a manuscript is submitted so that duplication of effort may be avoided.

A brochure containing hints to authors is available free of charge from the publishers.

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Polymer Chemistry of Boron Cluster Compounds—H. A. Schroeder (New Haven, Conn., U.S.A.).

Viscoelasticity of Inorganic Polymers—A. Eisenberg (Montreal, Canada).

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PERGAMON PRESS

Volume 1

Number 1

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- R. Wajsfelner, G. Madelaine, J. Delhay, J. Bricard and B. Liu: Influence of liquid conductivity on latex aerosol charge.
- T. T. Mercer, M. I. Tillery and G. J. Newton: A multi-stage, low flow rate cascade impactor.
- J. Pich: A note on the diffusive deposition of aerosols on a cylinder.
- M. Benarie and S. Panof: Notes sur le prélèvement des particules solides en suspension dans un gaz en écoulement turbulent.

C. N. Davies: The clogging of fibrous aerosol filters.

J. I. T. Stenhouse, J. A. Harrop and D. C. Freshwater: The mechanisms of particle capture in gas filters.

J. Dymnt: Use of a Gotez Aerosol Spectrometer for measuring the penetration of aerosols through filters as a function of particle size.

C. Wakestein: A simple picture of turbulent two-phase pipe flow.

News Item: Filtration Symposium.

EUROPEAN POLYMER JOURNAL

Editor-in-chief: Professor M. Stacey, University of Birmingham

Executive Editor: Professor J. C. Bevington, University of Lancaster

BRATISLAVA CONFERENCE ISSUE— SUPPLEMENT TO VOLUME 5, 1969

The supplement consists of papers presented at the International Conference on Chemical Transformation of Polymers, which took place in Bratislava—June 1968.

Twelve main lectures and forty-two out of the eighty scientific communications are being published—the supplement comprising approximately five hundred and fifty pages.

The proceedings of the conference went on simultaneously in three sections:

1. Radical reactivity in polymer systems.
2. Degradation and stabilisation of polymers.
3. properties of copolymers and of polymer mixtures.

This bi-monthly journal is devoted to encouraging collaboration and the exchange of ideas between scientists active in the broad field of polymer science, particularly in Europe. The present academic, industrial and social importance of polymers and the continuing interest in macromolecular substances both natural and synthetic have emphasised the very real need for a journal of this nature.

THE INSTITUTION OF CHEMICAL ENGINEERS

Announcement of a New Project for Crushing and Grinding

The Institution of Chemical Engineers has initiated a two-year project of a Supplement to "A Bibliography of Crushing and Grinding," W. H. Bickle, H.M.S.O., London, 1958. The work is to be

carried out in co-operation with B.C.U.R.A. Industrial Laboratories and with the support of the Ministry of Technology.

The Institution is pleased to announce that the Editor will be Miss B. M. Parish, B.Sc., and the B.C.U.R.A. Industrial Laboratories will provide her with the administrative and technical facilities for preparing the Supplement. The Institution is also fortunate in having W. H. Bickle as a member of a small Advisory Committee to guide the work. On completion, the Supplement will be published either by the Ministry of Technology or through H.M. Stationery Office.

The Institution wishes to encourage the widest support for the Editor in her arduous task. It is pleasing to note that, already, some offers of information and reference lists have been received. Further contributions would be welcomed from individuals, research associations, companies and universities and these should be sent to:

Miss B. M. Parish, B.Sc.,
B.C.U.R.A. Industrial Laboratories,
Leatherhead,
Surrey,
England.

February, 1970.

MEMBERSHIP LIST

Apologies are sent to those members whose entries in the Membership List are incorrect or incomplete.

The compiler thanks those who have supplied corrected entries and wishes to be advised of any remaining errors. Information should be sent to: Dr. D. W. Hadley, J. J. Thomson Physical Laboratory, University of Reading, Whiteknights, Reading RG6 2AF.

BRITISH SOCIETY OF RHEOLOGY

Computer Program Catalogue Publication Abstract

1. Author
2. Establishment
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3. Program Abstract
.....
Input Data
Output Data
4. Program date
5. Language
6. Computer requirements
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7. Type of Input/Output
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.....
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9. Related programs
.....
10. Available for copy/data processing
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Return to: Dr. J. Harris,
Postgraduate School of Chemical
Engineering,
University of Bradford,
Bradford 7, U.K.

Additional blank abstract sheets are available as required from the above address.

COMPUTER PROGRAMS FOR BRITISH STANDARDS

This paper is addressed to design engineers in the field of fluid flow. A comprehensive computer program for BS. 1042 is now available. It is simple to use and accurately performs the calculations of the Standard, producing the results in a readily usable form.

PROGRAM SPECIFICATION

The detailed specification of the program is based on the publication BS. 1042 : Part 1 : 1964. This deals with the measurement of fluid flow in circular pipes by orifice plates, nozzles and venturi tubes.

There are four basic modules in the program, each of which can be called and used independently. These modules relate to the orifice types as follows:

1. Square edge orifice plate with corner tapplings, D and D/2 tapplings, flange tapplings.
2. Conical entrance orifice plate and quarter circle orifice plate.
3. Nozzle.
4. Venturi nozzle and venturi tube.

Each module will calculate, as required by the user, the following quantities:

1. Rate of flow through orifice.
2. Pressure difference across orifice.
3. Orifice diameter.

The only exception is that pressure difference cannot be calculated for nozzles under critical flow conditions.

The following optional calculations are also available in each module:

1. Accuracy of rate of flow through orifice.
2. Accuracy of pressure difference across orifice.
3. Percentage pressure loss (or efficiency).

The program will deal comprehensively with the fluids air, steam and water and the user will only be required to state which of these is being used. The graphical data relating to these fluids will in most cases be stored in the program as equations. For any other fluid or for mixtures, it will be necessary to input certain parameters such as density and specific gravity of the fluid, or component fluids in the case of mixtures. These parameters, together with details of orifice type and the result to be calculated, will be entered on the input form. Before printing the results, the program will produce a printout of the input data, which will serve as a clear documentation of the particular

computer run. Accuracy will be at least as good as that achieved with manual application of BS. 1042.

The program is written in the A.S.A. standard subset of Fortran IV, for an I.C.L. 1900 series computer with the following configuration:

- 16 K Store
- 1 card reader *or* paper tape reader
- 1 magnetic tape unit *or* disc
- 1 line printer

It is envisaged that with this choice of language and basic machine configuration it will be possible to compile the program on all the equipment in common use at the present time.

The program is the result of work under Mintech's ACTP contract with freelance programmers limited of Chesham.

For further details about the program, contact Mrs. R. Butcher of fpl—**Chesham 4999**.

Recent Elections

NAME AND ADDRESS	INTERESTS
J. M. V. Blanchard, Dept. Appl. Biochem. and Nutrition, Nottingham Univ. School of Agriculture, Sutton Bonington, Loughborough, Leics.	General polymers, polymer solutions, emulsions, suspensions, confectionery, biorheology.
W. Carr, Geigy (U.K.) Ltd., Pigments Divn., Roundthorn Estate, Wythenshawe, Manc.	Solid-liquids, paints and printing inks.
K. Clare, Product Dev. Dept., Grangestone, Girvan, Ayrshire.	Polymers, liquid-liquids, solid-liquids, building and road materials, food- stuffs.
E. M. Dearden (Mrs.), Derbyshire Royal Infirmary, London Rd., Derby, DE1 2Q7.	Liquid-liquids, solid-liquids.
Jean M. Drabble, Dept. of Mech. and Prod. Eng., Notts. Regional College of Tech., Burton St., Notts, NG1 4BU.	Polymers, solid-liquids, biological materials.
P. H. Elworthy, Dept. of Pharmaceutica Tech., Univ. Strathclyde, Glasgow, C.1.	Polymers, liquid-liquids, solid-liquids, particulate solids.
R. A. Fairbairn, Commercial Plastics Ltd., Willington Quay, Wallsend, Northumberland.	Polymers.
C. S. N. Faraday, Turner Brothers Asbestos Co. Ltd., P.O. Box 40, Rochdale, Lancs.	Composites, solid polymers.
R. H. Foster, The City University, St. John St., London, E.C.1.	Particulate solids, clay soil.
G. D. Galvin, Shell Research Ltd., Thornton Research Centre, P.O. Box 1, Chester.	Oils, greases.
P. Georgakopoulos, Univ. of Thessaloniki, Dept. of Pharmacy, Thessaloniki, Greece.	Solid-liquids, particulate solids, gels.
P. F. Gill, B.C.U.R.A. Industrial Labs., Randals Rd., Leatherhead, Surrey.	Metals, alloys, composites, polymers, solid-liquids, particulate solids.
M. M. Hall, Dept. of Materials, College of Aeronautics, Cranfield, Bedford.	Solid polymer, molten polymers, dis- solved polymers.

P. M. Hazzledine,
Dept. of Metallurgy,
Parks Rd., Oxford.

J. W. S. Hearle,
U.M.I.S.T.,
Sackville St.,
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P. J. Jones,
B.P. Chemical (U.K.) Ltd.,
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D. E. Morgan,
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A. M. North,
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C. J. Parkinson,
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Institute of Diseases of the Chest,
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Agricultural Research Council,
Meat Research Institute,
Langford, Bristol. B518 7D7.

R. Samel (Miss),
Unigate Ltd.,
Central Laboratory,
Western Ave.,
Alton, London, W.3.

K. H. Schmidt,
Institut für Makromolekulare Chemie,
Techn. Hochschule, Darmstadt,
Alexanderstrabe 24,
W. Germany.

D. Shaw,
Simon Engineering Ltd.,
Research Divn.,
Stockport, Cheshire.

M. I. Stephenson,
Electrical and Control Eng. Dept.,
Univ. of Surrey, Guildford,
Surrey.

M. Teéni,
Dept. of Civil Engineering,
Univ. of Southampton.

J. C. Williams,
School of Powder Technology,
Univ. of Bradford,
Bradford 7.

Metals, alloys.

Solid polymers, natural fibrous materials.

Solid polymers, molten or dissolved polymers, solid-liquids.

Composites, solid polymers, molten or dissolved polymers, solid-liquid systems, particulate solids.

Composites, solid polymers, molten or dissolved polymers.

Liquid-liquids, solid-liquids, food-stuffs.

Solid polymers, molten or dissolved polymers, liquid-liquids.

Natural fibrous materials, foodstuffs, biological materials.

Liquid-liquids, solid-liquids, particulate solids.

Molten or dissolved polymers.

Natural fibrous materials, solid-liquids, particulate solids.

Solid-liquids, oils, greases.

Particulate solids.

DIARY

1970

14-15 April. Conference—Rheology in Medicine and Pharmacy. B.S.R., School of Pharmacy, London.

20-24 April. Course—The Non-Destructive Testing of Materials. Brunel Univ., London, W.3.

21-22 April. Conference—Progress with Plastics in Engineering, Pera, Melton Mowbray, Leics.

23 April. Conference—Fibre Technology in Engineering, Pera, Melton Mowbray, Leics.

29 April-1 May. Conference—Pintec (Technical). Plastics Institute, Brighton.
May. Conference—"Characterization of rubber networks". Inst. Rubber Indust.

1-5 June. 6 Conference—6th Int. Cont. on Non destructive Testing, Hanover.

16-17 June. Conference—Polymers in High Performance Applications. Joint Soc. of Plast. Engrs. and Plast. Ints. at Inst. Elec. Engrs., London.

1-3 September. Internat. Conference—Hydraulic Transport of Solids in Pipes. B.H.R.A., Coventry.

September. Conference—Furniture. Plastics Institute.

29 Sept.-1 Oct. Conference—Advances in Polymer Science and Technology No. 3. Chemistry of Liquid and Thermoplastic Co.—Polymers Joint I.R.I., P.I., S.C.I., O.C.C.A. and S.D.C.

13-14 October. Conference—Reinforced Plastics. Plastics Inst.

20-22 October. Conference—7th Int. Reinforced Plastics Conf. Brit. Plast. Fed.

1971

4-6 January. Conference—Designing for Plastics. Plast. Inst. at Cranfield.

2-4 February. Conference—Carbon Fibre, Their Composites and Applications. Plast. Inst.

25-27 March. Conference—Exploitation of Polymer Research I.R.I. Plast. Inst., at Loughborough.

22 and 23 April. Conference—Industrial Cont., Leamington Spa. I.R.I.

15-18 May. Conference—Int. Rubber Cont. at Brighton. I.R.I.