

PROCEEDINGS
OF THE
ROYAL SOCIETY OF LONDON

SERIES A. MATHEMATICAL AND PHYSICAL SCIENCES

VOL 243

Published by the Royal Society
Burlington House
Piccadilly
London, W. 1

11 February 1958

Printed in Great Britain at the University Press, Cambridge
(Brooke Crutchley, University Printer)

CONTENTS

SERIES A VOLUME 243

No. 1232. 10 December 1957

	PAGE
Address of the President, Sir Cyril Hinshelwood, at the Anniversary Meeting, 30 November 1957	v
Chemical research at the Atomic Energy Research Establishment, Harwell. By R. Spence. (Plate 1)	1
Slow collisions between heavy particles. By D. R. Bates, F.R.S.	15
The flash photolysis of chlorine monoxide. By F. H. C. Edgecombe, R. G. W. Norrish, F.R.S. and B. A. Thrush. (Plate 2)	24
The etching of crystal cleavages. I. Mica. By A. R. Patel and S. Tolansky, F.R.S. (Plates 3 and 4)	33
The etching of crystal cleavages. II. Diamond octahedral cleavages. By A. R. Patel and S. Tolansky, F.R.S. (Plates 5 to 9)	41
The motion of a simple wedge along the water surface. By H. B. Squire	48
On certain integrals occurring in a hydrodynamical problem. By G. F. Miller . .	65
Ultrasonic dispersion in gaseous sulphur dioxide. By J. D. Lambert and R. Salter	78
Calculation of vibrational relaxation times in gaseous sulphur dioxide. By P. G. Dickens and J. W. Linnett, F.R.S.	84
Ultrasonic relaxation and the vibrational specific heat of liquid sulphur dioxide. By R. Bass and J. Lamb	94
The thickness of laminar flames in pre-mixed reactants: optical considerations. By F. J. Weinberg	107
A method for the direct determination of the rate constants for radical-radical interactions in the gas phase. I. The technique of investigation. By F. Moseley and J. C. Robb	119
A method for the direct determination of the rate constants for radical-radical interactions in the gas phase. II. The rate constants for the recombination of methyl radicals. By F. Moseley and J. C. Robb. (Plate 10)	130

No. 1233. 24 December 1957

Vibrational band intensities in substituted anilines. By P. J. Krueger and H. W. Thompson, F.R.S.	143
Electrical anharmonicity of the OH group vibration. By R. Moccia and H. W. Thompson, F.R.S.	154
A correlation of the thermomagnetic and domain behaviour of a single crystal of silicon-iron. By L. F. Bates, F.R.S., D. A. Christoffel, H. Clow and P. F. Davis. (Plate 11)	160
Non-stoichiometric clathrate compounds of water. By R. M. Barrer, F.R.S. and W. I. Stuart	172
Elastic deformation and the laws of friction. By J. F. Archard	190
The elastic scattering of protons by carbon, aluminium, nickel, copper, zinc, niobium, silver and gold. By G. W. Greenlees, L. Gioietta Kuo and M. Petrávič	206
The excitation theory of arcs with evaporating cathodes. By A. von Engel and A. E. Robson	217
The scattering of 9.5 MeV protons by He, C, N, O, F, Ne, A, Kr and Xe nuclei. By W. M. Gibson, D. J. Prowse and J. Rotblat	237
On Schwinger's variational principle. By T. W. B. Kibble and J. C. Polkinghorne	252

	PAGE
A variational method for calculating magnetic shielding constants in molecules. By M. J. Stephen	264
A variational method for calculating nuclear spin-spin interactions in molecules. By M. J. Stephen	274
The use of a high-speed digital computer for the direct determination of crystal structures. II. By W. Cochran and A. S. Douglas	281
Radiocarbon dating and post-glacial vegetational history: Scaleby Moss. By H. Godwin, F.R.S., D. Walker and E. H. Willis. (Abstract)	289
No. 1234. 14 January 1958	
Interferometry of the intensity fluctuations in light. II. An experimental test of the theory for partially coherent light. By R. Hanbury Brown and R. Q. Twiss	291
The fluorescence of diamond. By H. B. Dyer and I. G. Matthews	320
The description of collective motions in terms of many-body perturbation theory. II. The correlation energy of a free-electron gas. By J. Hubbard	336
Diffusion of negative ion vacancies in potassium chloride. By J. Ewles and S. C. Jain	353
Simple solutions of the partial differential equation for diffusion (or heat conduction). By S. C. Jain	359
Heats of adsorption on evaporated nickel films. By D. F. Klemperer and F. S. Stone	375
Mutual friction in a heat current in liquid helium II. IV. Critical heat currents in wide channels. By W. F. Vinen	400
The magnetic susceptibility of oxygen in a clathrate compound. II. By H. Meyer, Mary C. M. O'Brien and J. H. Van Vleck	414
Self-consistent field without exchange for U^{6+} . By E. Cicely Ridley	422
No. 1235. 11 February 1958	
The decomposition of <i>n</i> -hexane. I. By mercury photosensitization. By R. G. W. Norrish, F.R.S. and J. H. Purnell	435
The decomposition of <i>n</i> -hexane. II. By reaction with atomic hydrogen. By R. G. W. Norrish, F.R.S. and J. H. Purnell	449
The range of validity of strong and weak coupling approaches in field theory. By S. F. Edwards	458
Lubrication by lamellar solids. By R. F. Deacon and J. F. Goodman. (Plates 12 to 15)	464
An investigation of droplet oscillation during mass transfer. I. The conditions necessary, and the source of the energy for the oscillations. By D. A. Haydon	483
An investigation of droplet oscillation during mass transfer. II. A dynamical investigation of oscillating spherical droplets. By T. V. Davies and D. A. Haydon	492
The absorption of sound in liquid helium II. By K. Dransfeld, J. A. Newell and J. Wilks	500
Unusual liquid-solid transition effects in a methoxypentamethylflavan. By J. J. Benbow and D. J. C. Wood. (Plates 16 to 19)	518
Shock waves in a liquid containing gas bubbles. By I. J. Campbell and A. S. Pitcher. (Plate 20)	534
Space-group operations and time-reversal for a Dirac electron in a crystal field. By D. F. Johnston	546
Kinetic spectroscopy in the far ultra-violet: the flash photolysis of ethyl compounds. By B. A. Thrush. (Plate 21)	555
Reduction of atmospheric radiocarbon concentration by fossil fuel carbon dioxide and the mean life of carbon dioxide in the atmosphere. By G. J. Fergusson	561
Index	575