

---

# Quarterly Reviews

---

No 4 Vol 24 1970

	Page
<b>CENTENARY LECTURE</b> <b>Mechanisms of Cycloaddition</b>	
By Paul D. Bartlett	473
<b>The Chemistry of Transition-metal Carbonyls:</b> <b>Synthesis and Reactivity</b>	
By E. W. Abel and F. G. A. Stone	498
<b>Acidic and Basic Amide Hydrolysis</b>	
By Charmian O'Connor	553
<b>The Photolysis of Simple Inorganic Anions in</b> <b>Solution</b>	
By Malcolm F. Fox	565
<b>Base-catalysed Isomerisation of Acetylenes</b>	
By R. J. Bushby	585
<b>Diffusion in Ionic Solids</b>	
By J. M. Pollock	601
<b>The Reactions of Hydrazine with Transition-Metal</b> <b>Complexes</b>	
By F. Bottomley	617

**The Chemical Society London**

Quarterly Reviews contains articles by recognised authorities on selected topics from general, physical, inorganic, and organic chemistry. The Journal and Annual Reports interest primarily the research worker: Quarterly Reviews is designed for a wider range of readers. It is intended that each review article shall be of interest to chemists generally and not only to workers in the particular field being reviewed.

The submission of reviews for publication is welcomed, but intending authors are advised to write in the first place to the Editor, The Chemical Society, Burlington House, Piccadilly, London, W1V 0BN. Such preliminary communications should be accompanied by an outline of the ground to be covered (about two quarto pages) rather than by the completed manuscript.

Price to non-fellows £4 10s. 0d. per annum.

#### **The Chemical Society—Endowed Lectures.**

The Council of The Chemical Society has decided that the Endowed Lectures of the Society shall, in future, be published in full in *Quarterly Reviews* to ensure that there will be a permanent record. These will be in addition to the normal Review articles.

© Copyright reserved by The Chemical Society 1970

**QUARTERLY  
REVIEWS**

# THE CHEMICAL SOCIETY

## PATRON:

HER MAJESTY THE QUEEN

### President

G. PORTER, M.A., Ph.D., Sc.D., F.R.I.C., F.R.S.

### Vice-Presidents

who have filled the office of President

H. J. EMELÉUS, C.B.E., M.A., D.Sc., F.R.S.	SIR RONALD NYHOLM, D.Sc., F.R.I.C., F.R.S.
SIR EWART JONES, M.A., D.Sc., F.R.I.C., F.R.S.	J., MONTEATH ROBERTSON C.B.E., M.A., LL.D., F.R.I.C., F.R.S.
SIR HARRY MELVILLE, K.C.B., Ph.D., D.Sc., F.R.I.C., F.R.S.	LORD TODD, M.A., D.Sc., F.R.I.C., F.R.S.

### Vice-Presidents

D. H. R. BARTON, D.Sc., Ph.D., Sc.D., F.R.S.	G. W. KENNER, M.Sc., Ph.D., Sc.D., F.R.S.
F. S. DANTON, M.A., Ph.D., Sc.D., F.R.I.C., F.R.S.	M. STACEY, C.B.E., Ph.D., D.Sc., F.R.I.C., F.R.S.
D. M. HODGKIN, O.M., M.A., Ph.D., D.Sc., F.R.S.	SIR HAROLD THOMPSON, C.B.E., D.Sc., F.R.S.

### Honorary Treasurer

J. W. BARRETT, Ph.D., A.R.C.S., F.R.I.C.

### Honorary Secretaries

C. EABORN, Ph.D., D.Sc., F.R.I.C., F.R.S.	W. KLYNE, M.A., D.Sc., F.R.I.C.
D. H. WHIFFEN, M.A., D.Phil., F.R.S.	

### Ordinary Members of Council

M. F. ANSELL, Ph.D., D.Sc., F.R.I.C.	B. A. HEMS, B.Sc., Ph.D., F.R.I.C., F.R.S.
K. W. BENTLEY, M.A., D.Sc., D.Phil., F.R.S.E.	C. KEMBALL, M.A., Sc.D., F.R.I.C., M.R.I.A., F.R.S.E., F.R.S.
J. C. BEVINGTON, M.A., Ph.D., D.Sc., F.R.I.C.	G. W. KIRBY, M.A., Ph.D.
C. F. CULLIS, M.A., D.Phil., D.Sc., F.R.I.C.	M. L. MCGLASHAN, M.Sc., Ph.D., D.Sc., F.R.I.C.
A. G. DAVIES, Ph.D., D.Sc., F.R.I.C.	C. W. REES, Ph.D., D.Sc., F.R.I.C.
E. J. FORBES, M.A., B.Sc., D.Phil.	A. G. SHARPE, M.A., Ph.D., F.R.I.C.
G. W. A. FOWLES, Ph.D., D.Sc., F.R.I.C.	R. SLACK, M.A., D.Phil., D.Sc.
P. GRAY, M.A.Sc., F.R.I.C.	J. C. SPEAKMAN, Ph.D., D.Sc.
C. H. HASSALL, M.Sc., Ph.D., Sc.D., F.R.I.C.	H. SUSCHITZKY, Ph.D., D.Sc., F.R.I.C.
H. G. HEAL, B.Sc., A.R.C.S. Ph.D.	G. H. WHITHAM, B.Sc., Ph.D., M.A.
	W. WILD, B.Sc., Ph.D., A.R.I.C.

### *Ex Officio*

SIR EWART JONES, M.A., D.Sc., F.R.I.C., F.R.S. (Chairman of the Publications Board)  
A. W. JOHNSON, M.A., Ph.D., Sc.D., F.R.I.C., F.R.S. (Chairman of the  
Joint Library Committee)

### General Secretary

J. R. RUCK KEENE, M.B.E., T.D., M.A.

### Managing Editor

L. C. CROSS, T.D., Ph.D., A.R.C.S.,  
F.R.I.C.

### Librarian

R. G. GRIFFIN, F.L.A.

# QUARTERLY REVIEWS

VOL. 24, 1970

## PUBLICATIONS BOARD

### Chairman

SIR EWART JONES, M.A., D.Sc., F.R.I.C., F.R.S.

J. W. BARRETT, Ph.D., A.R.C.S., F.R.I.C.	SIR RONALD NYHOLM, D.Sc., F.R.I.C., F.R.S.
D. H. R. BARTON, Ph.D., D.Sc., Sc.D., F.R.S.	W. G. OVEREND, Ph.D., D.Sc., F.R.I.C.
R. P. BELL, M.A., F.R.S.	G. PORTER, M.A., Ph.D., Sc.D., F.R.S.
L. CROMBIE, D.Sc., F.R.I.C.	R. A. RAPHAEL, D.Sc., F.R.I.C., F.R.S.
C. EABORN, Ph.D., D.Sc., F.R.I.C.	J. R. RUCK KEENE, M.B.E., T.D., M.A.
C. KEMBALL, Sc.D., M.R.I.A., F.R.S.E., F.R.S.	D. H. WHIFFEN, M.A., D.Phil., F.R.S.
W. KLYNE, M.A., D.Sc., F.R.I.C.	W. WILD, B.Sc., Ph.D., A.R.I.C.

### Managing Editor and Secretary

L. C. CROSS, T.D., Ph.D., A.R.C.S., F.R.I.C.

## REPORTS AND REVIEWS COMMITTEE

### Chairman

L. CROMBIE, D.Sc., F.R.I.C.

P. G. ASHMORE, M.A., Ph.D.	S. F. MASON, M.A., D.Phil.
J. BADDILEY, Ph.D., D.Sc., F.R.S.	C. W. REES, Ph.D., D.Sc., F.R.I.C.
M. P. BERRY, M.A., B.Sc., A.R.I.C.	J. H. RIDD, B.Sc., Ph.D.
D. BRYCE SMITH, M.Sc., Ph.D., D.Sc.	M. R. TRUTER, Ph.D., D.Sc., A.R.C.S.
E. A. V. EBSWORTH, M.A., Ph.D.	E. R. S. WINTER, B.Sc., <sup>2</sup> Ph.D., D.Sc., A.R.C.S., F.R.I.C.
N. N. GREENWOOD, B.Sc., D.Sc.	
T. G. HALSALL, M.A., M.Sc., Ph.D.	

### Managing Editor

L. C. CROSS, T.D., Ph.D., A.R.C.S., F.R.I.C.

### Editor

G. P. POLLARD, M.A.

©

Copyright 1970

LONDON

THE CHEMICAL SOCIETY

# CONTENTS

	PAGE
<b>PRESIDENTIAL ADDRESS. TRANSITION-METAL COMPLEXES OF SOME PERFLUORO-LIGANDS.</b> By Sir Ronald Nyholm, F.R.S. . . . .	1
<b>MOLECULAR COMPLEXES OF WATER IN ORGANIC SOLVENTS AND IN THE VAPOUR PHASE.</b> By Sherril D. Christian, Ahmed A. Taha, and Bruce W. Gash . . . .	20
<b>PHOTOCHEMICAL REACTIONS IN NATURAL PRODUCT SYNTHESIS.</b> By P. G. Sammes . . . . .	37
<b>THE CO-ORDINATION OF AMBIDENTATE LIGANDS.</b> By A. H. Norbury and A. I. P. Sinha . . . . .	69
<b>WAVE FUNCTIONS FOR SMALL MOLECULES BASED ON LINEAR COMBINATIONS OF ATOMIC ORBITALS.</b> By R. G. Clark and E. Theal Stewart . . . . .	95
<b>DEVELOPMENTS IN THE CHEMISTRY OF DIAZO-ALKANES.</b> By G. W. Cowell and A. Ledwith . . . . .	119
<b>STRUCTURE AND PROPERTIES OF AQUEOUS SALT SOLUTIONS.</b> By M. J. Blandamer . . . . .	169
<b>THE THERMAL DECOMPOSITION OF HYDROUS LAYER SILICATES AND THEIR RELATED HYDROXIDES.</b> By N. H. Brett, K. J. D. MacKenzie, and J. H. Sharp . . . .	185
<b>THE STEREOCHEMISTRY OF POLYSULPHIDES.</b> By R. Rahman, S. Safe, and A. Taylor . . . . .	208
<b>THE STUDY OF SIMPLE LIQUIDS BY COMPUTER SIMULATION.</b> By I. R. McDonald and K. Singer . . . . .	238
<b>VOLATILE COMPOUNDS OF THE HYDRIDES OF SILICON AND GERMANIUM WITH ELEMENTS OF GROUPS V AND VI.</b> By John E. Drake and Chris Riddle . . . .	263
<b>TRIMETHYLENEMETHANE AND RELATED <math>\alpha, \alpha'</math>-DISUBSTITUTED ISOBUTENES.</b> By Francis Weiss . . . . .	278
<b>ORGANOTHALLIUM CHEMISTRY.</b> By A. G. Lee . . . . .	310
<b>TILDEN LECTURE. THE BIOCHEMISTRY OF SODIUM, POTASSIUM, MAGNESIUM, AND CALCIUM.</b> By R. J. P. Williams . . . . .	331
<b>CENTENARY LECTURE. ROADS TO CORRINS.</b> By A. Eschenmoser . . . . .	366
<b>THE VAN DER WAALS FLUID: A RENAISSANCE.</b> By M. Rigby . . . . .	416
<b>THE SEPARATION OF POLAR, STERIC, AND RESONANCE EFFECTS IN ORGANIC REACTIONS BY THE USE OF LINEAR FREE ENERGY RELATIONSHIPS.</b> By J. Shorter . . . .	433
<b>APPLICATION OF COMPUTERS IN CHEMICAL ANALYSIS: AMINO-ACID ANALYSIS AND SEQUENCE DETERMINATION.</b> By B. Sheldrick . . . . .	454
<b>CENTENARY LECTURE. MECHANISMS OF CYCLOADDITION.</b> By Paul D. Bartlett . . . . .	473
<b>THE CHEMISTRY OF TRANSITION-METAL CARBONYLS: SYNTHESIS AND REACTIVITY.</b> By E. W. Abel and F. G. A. Stone . . . . .	498
<b>ACIDIC AND BASIC AMIDE HYDROLYSIS.</b> By Charmian O'Connor . . . . .	553
<b>THE PHOTOLYSIS OF SIMPLE INORGANIC ANIONS IN SOLUTION.</b> By Malcolm F. Fox . . . . .	565
<b>BASE-CATALYSED ISOMERISATION OF ACETYLENES.</b> By R. J. Bushby . . . . .	585
<b>DIFFUSION IN IONIC SOLIDS.</b> By J. M. Pollock . . . . .	601
<b>THE REACTIONS OF HYDRAZINE WITH TRANSITION-METAL COMPLEXES.</b> By F. Bottomley . . . . .	617