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No. 113
FEBRUARY, 1968

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A monthly collection of informal private letters from laboratories of NMR. Information contained herein is solely for the use of the reader. Quotation is not permitted, except by direct arrangement with the author of the letter, and the material quoted must be referred to as a "Private Communication". Reference to the IIT NMR Newsletter by name in the open literature is strictly forbidden.

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Deadline Dates: No. 114: 6 March 1968
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Reminder: For the period August 10, 1967 to August 15, 1968 inclusive, all Newsletter contributions, enquiries, etc., should be addressed as follows:

Dr. Bernard L. Shapiro
 Department of Chemistry
 Stanford University
 Stanford, California 94305

-continued on the outside back cover

SECOND INTERNATIONAL SYMPOSIUM ON
NUCLEAR MAGNETIC RESONANCE

São Paulo (Brasil), 8-11 July 1968

F. F. C. L.,
UNIVERSITY OF SAO PAULO,
CAIXA POSTAL 8105
SAO PAULO, BRASIL.

WORKING COMMITTEE
E. GIESBRECHT.
S. MATHIAS.
L. W. REEVES.

December 29, 1967

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California, 94305
U.S.A.

Dear Barry,

We include a preliminary tentative list of titles for the above symposium. The arrangement into definite sessions will be made on April 20 when all abstracts are due. Further titles may be added later.

We hope to have a full program available soon after this date and will be sending details of a concurrent social program as well. The following sponsors have been associated with the symposium:

The University of São Paulo
The National Research Council of Brazil
The "Fundação de Amparo à Pesquisa do Estado de São Paulo" (FAPESP)
The Brazilian Chemical Society
The Brazilian Association for the Advancement of Science
The Brazilian Academy of Sciences
The National Research Council of Canada
The Ford Foundation.

In order to facilitate the arrangements of programs we would request that authors and participants try to submit abstracts before our definite deadline of April 20.

Thanking you,

Simão Mathias *L.W. Reeves* *E. Giesbrecht*
Simão Mathias L.W. Reeves E. Giesbrecht

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LIST OF TENTATIVE TITLES

Principal Speakers

R. Blinç, Nuklearni Institut "Jozef Stefan", Yugoslavia

H.S. Gutowsky, University of Illinois, U.S.A.

John D. Baldenschwieler, Stanford University, California, U.S.A.

V. J. Kowalewski, Facultad de Ciencias Exactas y Naturales, Buenos Aires, Argentina

Shizuo Fujiwara, The University of Tokyo, Japan

H. Pfeifer, Karl-Marx Universität, East Germany

H. J. Bernstein, National Research Council of Canada, Ottawa, Canada

E. R. Andrew, The University of Nottingham, England

John S. Waugh, Massachusetts Institute of Technology, U.S.A.

Solvent Effects

G. Hertz, Institut für Physikalische Chemie und Elektrochemie der Univ. Karlsruhe, Germany

"Molecular Motions in Hydrogen Bonded Liquids by Nuclear Magnetic Relaxation Times".

John S. Martin, Robert D. Green, The University of Alberta, Canada
"NMR Studies of Anion-Molecule Association".

Edwin D. Becker, National Institute of Health, Maryland, U.S.A.
"NMR Studies of Hydrogen Bonding".

Werner W. Brandt, The University of Wisconsin, U.S.A.
"Comparative NMR and IR Measurements of Relatively Low Association Equilibrium Constants".

P.C. Lauterbur, State University of New York at Stony Brook, U.S.A.
"Solvent Isotope Effects and Chemical Shifts".

John McTague, North American Aviation, California, U.S.A.
"Magnetic Relaxation in Clathrates".

Max T. Rogers, Michigan State University, U.S.A.
"NMR Studies of Substituted Ammonium Salts".

Ted Schaefer, The University of Manitoba, Canada
"Dispersion, Electric Field and Specific Interaction Effects on Coupling Constants and Chemical Shifts of Some Simple Molecules".

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S. Brownstein, National Research Council, Ottawa, Canada
"Intermolecular Interactions in Solution from T_1 Measurements".

C.A. McDowell, P. Raghunathan, University of British Columbia, Vancouver, Canada
"NMR Studies of Molecular Motion in Clathrate Hydrates".

Applications to Inorganic Chemistry

Gordon Troup, Monash University, Victoria, Australia
"A Study of Radiation Damage in Single Crystals of BeO by NMR".

D. F. Evans, Imperial College of Science and Technology, London, England
"NMR Studies of Grignard Reagents and Related Compounds".

M.P. Simonnin, Ecole Nationale Supérieure de Chimie, Paris, France
"Relative Signs of Proton-Phosphorus Constants in Allenic Compounds of Phosphorus".

Daniel Fiat, The Weizman Institute of Science, Rehovoth, Israel
"NMR Studies of the Hydration and Solvation of Ions".

John G. Verkade, Iowa State University of Science and Technology, U.S.A.
" P^{31} Chemical Shifts and $P^{31}-P^{31}$ Spin-Spin Interactions in Metal Complexes".

Gideon Fraenkel, The Ohio State University, U.S.A.
"Exchange and Inversion in Organometallic Compounds".

Harold L. Friedman, State University of New York at Stony Brook, U.S.A.
title not available

Maurice Eisenstadt, State University of New York at Stony Brook, U.S.A.
title not available

Mary L. Good, Basil Catsikis, Louisiana State University in New Orleans, U.S.A.
"NMR Studies of Some Alkyl and Aryl Cyanide Complexes of Rhodium".

Robert W. Taft, University of California, Irvine, U.S.A.
" ^{19}F -NMR Investigation of the Electronic Properties of Tri- and Tetra-Coordinate Phosphorous Substituents".

Biological Applications

M. Sheinblatt, Tel-Aviv University, Israel
"The Conformation of Peptides in Solution".

S. Danyluk, Argonne National Laboratory, Illinois, U.S.A.
"Some Recent NMR Studies of Biological Molecules".

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Oleg Jardetzky, Merck Sharp & Dohme Res. Laboratories, N.J., U.S.A.
"High Resolution NMR Investigations of Protein Binding Sites".

Robert J. Kurland, Carnegie-Mellon University, Pa., U.S.A.
¹H NMR Studies of Hemins, Hemoglobin, etc.

James Shoolery, Varian Associates, California, U.S.A.
"Recent Applications of High Resolution Proton Magnetic Resonance at 220 MHz".

Ian C. P. Smith, Bell Telephone Labs, N.J., U.S.A.
"Binding of Trinucleotide Codons to transfer RNA as Studied by Proton Magnetic Resonance at 220 MHz".

Double Resonance - Coupling Constants - Analysis of Spectra

D. H. Whiffen, National Physical Lab, Teddington, Middlesex, England
"Methods and Results of Heteronuclear Double Resonance".

P. Diehl, Physikalisches Institut der Universität Basel
Special Topics in the Analysis of High Resolution NMR-Spectra.

Weston Anderson, Varian Associates, California, U.S.A.
"Techniques to Determine NMR Line Positions and Splittings with High Precision".

Michael Barfield, The University of Arizona, U.S.A.
"Mechanisms of Contact Nuclear Spin-Spin Coupling".

Paul Haake, University of California, Los Angeles, U.S.A.
¹³C - H Coupling Constants and their Relations to Bonding at Heteroatoms".

Kenneth L. Servis, University of Southern California, U.S.A.
"Mechanism of Fluorine-Fluorine Coupling: 4,5-Difluorophenanthrenes".

Resonance of Non Routine Nuclei

J. B. Stothers, The University of Western Ontario, London, Canada
"Steric (or Conformational) Effects on ¹³C Shieldings in Aliphatic Oxygenated Compounds".

David M. Grant, The University of Utah, U.S.A.
Recent Carbon-13 Magnetic Resonance work.

Gary E. Maciel, Harvard University, Massachusetts, U.S.A.
no title available

George A. Olah, Case Western Reserve University, Ohio, U.S.A.
"Carbon-13 Resonance Investigation of Carbenium Ions".

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NMR Pulse Methods - Relaxation Phenomena - Chemical Shift Anisotropy

Robert L. Vold, University of California, La Jolla, U.S.A.
"Spin Lattice Relaxation in Multilevel Systems".

D. W. Davies, The University of Birmingham, England
"Chemical Shift Anisotropy".

John S. Waugh, Massachusetts Institute of Technology, U.S.A.
"Multiple Pulse NMR Experiments in Solids".

E. J. Wells, Simon Fraser University, B.C., Canada
"Chemical Applications of Rotary Echoes".

J. A. S. Smith, J. Royston, The University of Warwick, England
"Deuteron Magnetic Resonance Studies of Molecular Interactions in Crystals".

J. G. Powles, University of Kent at Canterbury, England.
"Nuclear Spin Relaxation and Molecular Motion in Diamagnetic Crystals".

Karl Hausser, Max-Planck-Institut für Medizinische Forschung, Heidelberg, Germany
"Dynamic Nuclear Polarisation in Liquids and Solids".

A. Loewenstein, TECHNION Israel Institute of Technology, Haifa, Israel
"Relaxation Times of ^{14}N and D".

M. Warmuth, Euratom C.C.R., Ispra, Italy
"OVERHAUSER Effect of Other Nuclei than Protons".

Ragnar A. Hoffman, University of Uppsala, Sweden
"Line Shapes in High-Resolution NMR".

David Ailion, The University of Utah, U.S.A.
"NMR and Slow Motions".

Adam Allerhand, University of Indiana, U.S.A.
title not available

Theodore A xenrod, The City University of New York, U.S.A.
"Restricted Rotation in N-nitrosamines with N-15 labeled compounds".

Melvin P. Klein, University of California, U.S.A.
"Simultaneous Determination of the Individual Longitudinal Relaxation Times of All Lines in a High Resolution NMR Spectrum".

Rapier Dawson, Esso Production Research Company, Texas, U.S.A.
Pulsed NMR in Methane.

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S. MATHIAS.
L. W. REEVES.

A. D. Buckingham, The University, Bristol, England
"High Resolution Spectra of Some Partially Oriented Molecules".

H. Spiesecke, Euratom, C.C.R., Ispra, Italy
"Comparative Studies of the Orientation of Ethane, Ethylene, Allene, and Acetylene with Trichlorobenzene in Nematic Mixtures".

B.P. Dailey, Columbia University in the City of New York, U.S.A.
Solutions in Liquid Crystals.

S. Meiboom, Bell Telephone Laboratories, N.J., U.S.A.
NMR in Liquid Crystal Solvents.

Applications to Organic Chemistry

R.R. Fraser, University of Ottawa, Canada
"The Effect of Stereochemistry on Geminal Proton-proton Coupling Constants".

J.B. Hyne, University of Calgary, Canada
"The Application of High Resolution NMR to the Study of Polysulphides".

J.W. Emsley, University of Southampton, England
"Fluorine Chemical Shifts in Aromatic Compounds".

Claudio Costa Neto, Instituto de Química da Universidade Federal do Rio de Janeiro, Brasil.
"Aromaticity of Hydrogen Bonding Containing Systems".

O. R. Gottlieb, Universidade de São Paulo
"The Structural Determination of Xanthones by NMR Spectroscopy".

Victor Gold, University of London King's College, England
title not available

A.A. Bothner-By, Carnegie-Mellon University, Pa., U.S.A.
title not available

Electron Spin Resonance

Edson Rodrigues, Escola de Engenharia de São Carlos, São Paulo, Brasil
title not available

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Other Speakers

R. J. Gillespie, McMaster University, Ontario, Canada
title not available

H. E. Petch, University of Waterloo, Ontario, Canada
title not available

Recent Additional Titles

David W. Larsen, University of Missouri at St. Louis, U.S.A.
"NMR Studies of Associated Ions in Solution".

Edward F. Carr, University of Maine, U.S.A.
"Influence of Electric Fields on NMR Spectra of Liquid Crystals".

K. L. Williamson, Mount Holyoke College, Mass., U.S.A.
The Bond Angle and Dihedral Angle Dependence of Proton-Fluorine Coupling.

Xorge A. Domínguez, Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico
"Identification of Steroids and Terpenoids by NMR Spectrum of its Products of Catalytic Dehydrogenation and Theoretical Interpretation of the Spectra".

George Bemski, Instituto Venezolano de Investigaciones Científicas, Caracas, Venezuela
"Proton Relaxation in Hemoglobins with Cu⁺⁺".

DOW CORNING

December 11, 1967

Dr. Bernard L. Shapiro
 Stanford University
 Stanford, California 94305

SUBJECT:
 Anomalous shielding constants
 for R_3MH compounds

Dear Dr. Shapiro:

I would like to call attention to the fact that the shielding constants for such compounds as R_3M-H are anomalous, and follow this with a guess on the cause. It is often supposed that in saturated molecules the H'NMR chemical shifts primarily reflect electron densities, with small corrections due to bond anisotropies, electric field effects, etc. However, a consideration of published values of chemical shifts of compounds of the above type show that this is not true. Table I shows that the shielding constant actually decreases considerably as M becomes more electropositive. I would like to suggest that this must be due to a large increase in the paramagnetic contribution to the shift caused by a decrease in ΔE , in the second order perturbation theory average energy approximation. This should also result in an increase in J_{MH} and indeed J_{MH} does increase dramatically--although certainly other important effects are occurring concurrently.

Table I

<u>R</u>	<u>M</u>	<u>τ_{CH_3}</u>	<u>τ_{MH}</u>	<u>J_{MH}</u>
CH ₃	C ¹³	9.0	8.4	128
CH ₃	Si ²⁹	9.80	6.15	184
CH ₃	Sn ¹¹⁹	9.82	5.27	1744
CH ₃	Pb ²⁰⁷	9.15	2.32	2379

- (1) Estimated from data in (3) on CH₄, CH₃CH₃, CH₃CH₂CH₃.
- (2) From M.S. thesis of B. K. Hunter, University of British Columbia, 1966.
- (3) From J. W. Emsley, J. Feeney, and L. H. Sutcliffe, High Resolution NMR Spectroscopy, Pergamon Press, New York (1965).

Yours very truly,

Dwight E. Williams

D. E. Williams

DEW/gb



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January 15, 1968

Dr. Bernard Shapiro
Department of Chemistry
Stanford University
Stanford, California

Dear Barry:

DA60, CAT and EPR Unit for sale

We have for sale a DA60 with internal reference and a CAT and with digital drive on the recorder. We also have for sale a Varian EPR unit with 100 kilocycle modulation, several cavities and a low temperature Dewar. The magnet that goes with the Varian EPR is one of the 3600 series with low impedance power supply. It is a 12-inch magnet and we also have pole pieces for converting it to 35 gigacycles.

Anyone interested should contact me at the above address and I will be glad to discuss the items and prices. We are willing to sell the EMP separate from the EPR unit or as a package deal.

Sincerely yours,

[Signature]
James E. LuValle
Research Director

JELV:jr

DEPARTMENT OF ORGANIC CHEMISTRY
 THE UNIVERSITY
 Address: BLOEMSINGEL 10, GRONINGEN (HOLLAND)
 Tel.: 05900-34841

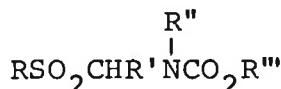
Groningen, January 10, 1968

Dr. Bernard L. Shapiro
 Department of Chemistry
 Stanford University
 Stanford, California 94305
 U.S.A.

Dear Dr. Shapiro:

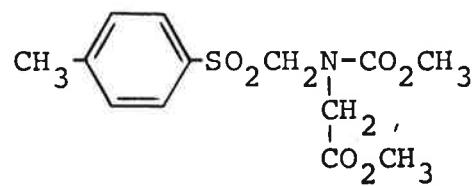
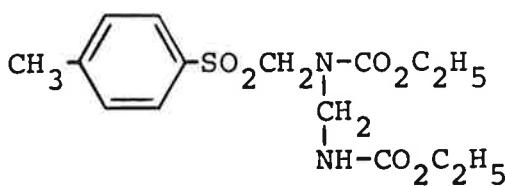
Hindered rotation in alkyl sulfonylmethylcarbamates.

Our interest in the rotational barriers in alkyl sulfonylmethylcarbamates (I)



(preliminary communication: S. van der Werf, T. Olijnsma and J.B.F.N. Engberts, Tetrahedron Letters 1967, 689) led us to the synthesis and NMR analysis of several new carbamates with related structures. The results will be published in due time. The intention of this work is to establish the origin of the rather large difference in chemical shift (about 0.4 ppm) of the ester alkyl groups found in both rotamers. This temperature dependence of the ester absorptions is in contrast to other simple carbamates which only show broadening (if any) of the alkyl groups attached to the nitrogen atom.

Two interesting examples are the sulfonylmethylcarbamates II and III.



In deuteriochloroform at about 37° both compounds showed broadening of one of the ester alkyl signals, all other absorptions are sharp (except the N-H in II). Clearly, the broadened signals are due to the carbalkoxy group attached to the tertiary nitrogen atom. This is in accordance with our previous note, that an arylsulfonyl group in the β-position to the ester function is necessary for a considerable difference in chemical shift of the ester alkyl groups in both rotamers of the sulfonylmethylcarbamates.

Dr. Shapiro

-2-

January 10, 1968

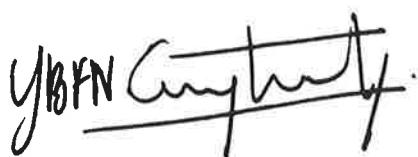
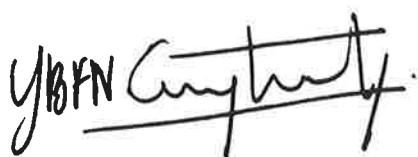
Combining these results with other (unpublished) evidence, we conclude that the inductive effect of the arylsulfonyl moiety alone cannot be responsible for this difference in chemical shift but that electronic interactions in the preferred conformations are of major importance.

Sincerely yours,



S. van der Werf

T. Olijnsma

J.B.F.N. Engberts

THE UNIVERSITY OF LIVERPOOL
DEPARTMENT OF ORGANIC CHEMISTRY

TELEPHONE: ROYAL 6022



THE ROBERT ROBINSON LABORATORIES,
OXFORD STREET,
LIVERPOOL 7.

4th January, 1968.

Dear Prof. Shapiro,

Thanks for your reminder.

I recently obtained the two stereoisomers of perhydrobenzo-dioxane- β and I analysed their PMR spectra. The $\text{OCH}_2\text{CH}_2\text{O}$ fragment of both isomers gave an AA'BB' multiplet with the following spectral parameters (100 MHz spectrometer; solvent:benzene).

R.P.	Isomer	δ_0	δ_{AB}	J	J'	J_A	J_B
76.5	trans	6.099		-12.272	3.119	11.669	2.052
78	cis	30.112		-12.015	6.624	3.227	3.227

On the basis of the above results the cis configuration is assigned to the high-boiling isomer and the trans to the other.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "G. Gatti".

G. Gatti

My permanent address is: Istituto Chimica Ind.,
Politecnico,
Piazza L. Da Vinci 32,
I20133 MILANO, Italy.

THE UNIVERSITY OF GEORGIA

Department of Chemistry

ATHENS, GEORGIA 30601

January 9, 1968

Dr. B. L. Shapiro
Department of Chemistry
Stanford University
Stanford, California

Dear Dr. Shapiro:

I am describing below some results which were recently obtained at Mellon Institute as part of my postdoctoral studies with Dr. Bothner-By. I hope you will accept this contribution as my subscription to the IITNMR Newsletter.

Among the aromatic diazines, pyridazines and pyrimidines have been examined in detail while investigations of pyrazines have been much more limited in scope. In Table I are reported the results of a complete analysis of the NMR spectra of eight monosubstituted pyrazines. Spin-tickling experiments were carried out on 2-chloro- and 2-fluoropyrazine. The results from 2-chloropyrazine demonstrate that J_{35} must be opposite in sign from J_{36} and J_{56} . Making the usual assumption that vicinal H-H couplings are positive,^{1,2} the absolute sign of J_{35} in Table I is given as being negative. Results from 2-fluoropyrazine establish the following in relation to signs of the various couplings: J_{35} opposite to J_{56} , opposite to J_{36} , J_{26} opposite to J_{25} , and J_{26} same as J_{24} . As before, J_{35} is deduced to be negative; and J_{36} and J_{56} , to be positive. Heteronuclear-spin-tickling experiments carried out by Don Davis establish the following for the H-F couplings: J_{26} and J_{23} are negative, and J_{25} is positive (relative to the vicinal H-H coupling).

The effect of substituents on chemical shifts is roughly parallel to that in monosubstituted benzenes.³ The effect of substituents on coupling constants is likewise similar to that found for monosubstituted benzenes³ and pyridines.⁴

Dr. B. L. Shapiro

Page 2

January 9, 1968

The small and normal value of J_{56} in 2-aminopyrazine as compared with J_{56} in other monosubstituted pyrazines confirms that 2-aminopyrazine exists in the amino form. For 2-hydroxypyrazine, J_{56} is larger by 1.4 Hz than J_{56} in other monosubstituted pyrazines. Thus, this increase in J_{56} indicates some double bond fixation, reflecting the existence of 2-hydroxypyrazine in the amide form.

In order to confirm the assignments, we examined the C¹³ satellites of 2,3-dideutero-pyrazine. We found J_{56} to be 2.49 Hz which is in agreement with the monosubstituted pyrazines, but not with the analysis of the C¹³ satellite signals of pyrazine reported earlier.⁵ We hope to report on this discrepancy in the near future.

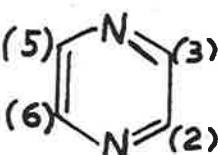
Sincerely yours,

Richard H. Cox
Assistant Professor

RHC:mjd

1. M. Karplus, J. Am. Chem. Soc., 84, 2458 (1962).
2. P. C. Lauterbur and R. J. Kurland, Ibid., 84, 3405 (1962).
3. S. Castellano and R. Kostelnik, Tetra. Letters, in print.
4. W. Brügel, Z. Elektrochem., 66, 159 (1961).
5. K. Tori and M. Ogatta, Chem. Pharm. Bull., (Tokyo), 12, 272 (1964).

TABLE I
PROTON NMR PARAMETERS OF MONOSUBSTITUTED PYRAZINES



Substituent	Solvent ^a	^b 2	3	5	6	^c J_{35}	J_{36}	J_{56}	J_{23}	J_{25}	J_{26}
2-OH	DMSO	9.79*	7.92	7.29	7.40	-0.05	1.34	3.91			
2-NH ₂	DMSO	6.32*	7.94*	7.70	7.90	-0.28	1.54	2.77			
2-OCH ₃	DMSO	3.96*	8.31	8.22	8.22	-0.35	1.39	2.86			
2-CH ₃	CDCl ₃	2.57*	8.47	8.38	8.45	-0.20	1.48	2.56	±0.21*	±0.45*	±0.70*
2-Cl	DMSO	--	8.71	8.60	8.46	-0.40	1.43	2.61	--	--	--
2-F	DMSO	--	8.73	8.70	8.42	-0.46	1.33	2.67	-8.17	4.72	-1.43
2-CO ₂ CH ₃	DMSO	3.99*	9.22	8.93	8.86	-0.30	1.49	2.43	--	--	--
2-CONH ₂	DMSO	7.90* 8.28*	9.25	8.90	8.76	-0.01	0.51	2.49	--	--	--

^aDMSO = Dimethylsulfoxide.

^bIn ppm downfield from internal tetramethylsilane.

^cIn Hz.

* Shift or coupling constant of methyl protons at the given numbered position.

The Goodyear Tire & Rubber Company

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RESEARCH DIVISION
142 GOODYEAR BLVD.

January 12, 1968

Dr B L Shapiro
Department of Chemistry
Stanford University
Stanford, California 94395

Dear Dr Shapiro:

Molecular Structure of Tri-Substituted Olefins by NMR

Please credit this contribution to the account of Dr H Y Chen.

We have been interested recently in trying to determine the cis, trans structure of some tri-substituted olefins by NMR. This problem arises from the fact that there is disagreement in the naming of the compounds. With only one exception (1) the reported literature is in agreement on the naming of the following cis, trans isomer pairs; 3-methyl-2-pentene, 3,4-dimethyl-2-pentene, 3-methyl-2-hexene, 3-methyl-3-hexene. The API (American Petroleum Institute Project #44) has revised its naming of the first two isomer pairs, but the latter two isomer pairs remain unchanged despite the evidence in the literature.

Greenlee and Wiley (2) suggested that mono-olefins of the 3-methyl-2-alkene type be named with the cis isomer having the lower boiling point. Shortly thereafter, the API changed the nomenclature of the first two pairs. Hivey (3) by Gas Chromatography and Higgins et al. (4) by synthetic means suggested in addition to the corrected isomers that the latter two pairs be changed. Rummens (1) using IR believes the API naming should be left the way it was originally, but his line of reasoning is open to question (compare this article to the one by Greenlee and Wiley).

At present the latter two isomer pairs are still not changed which lead us to take a look at these compounds to see if NMR could clarify the problem. We have found a definite relationship among these compounds. From the chemical shift data, both the α -CH₂ and α -CH₃ groups have $\delta_{cis} > \delta_{trans}$ relative to TMS which follows the same pattern as polyisoprene (5). Also the separation of the α -CH₃ doublet is greater for the cis isomers than the trans isomers. The naming of these compounds is based on the assumption that the nomenclature of the latter two isomer pairs is reversed in agreement with our results and the results found in the literature. The olefinic peaks have

- 2 -

δ cis < δ trans with the exception of the 3-methyl-2-hexene. This does not change our argument since the spectra and structure of the cis, trans isomers are identical to 3-methyl-2-pentene with the exception of an additional CH₂ group. All the olefinic peaks are well resolved for the cis compounds but not so for the trans compounds. This is due to the greater trans (JH-CH₃) coupling across the olefinic bond. The article by Stehling and Bartz (6) has investigated numerous mono-olefins by NMR and should serve as excellent background material. A detailed analysis of these and other related compounds will be forthcoming in the near future.

Sincerely yours,

David K. Ravage

Spectroscopy Department
RESEARCH DIVISION

David K Ravage
bj 1/12/68

References:

- (1) F H A Rummens, Rec Trav Chim, 84, 1003 (1965).
- (2) K W Greenlee and V G Wiley, J Org Chem, 27, 2304 (1962).
- (3) R A Hivey, Anal Chem, 35, 1921 (1963).
- (4) G M C Higgins, B Saville, and M B Evans, J Chem Soc, 702, (1965).
- (5) H Y Chen, Anal Chem, 34, 1793 (1963).
- (6) F C Stehling and K W Bartz, Anal Chem, 38, 1467 (1966).

113-18

DIVISION OF PURE CHEMISTRY
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January 15th, 1968

Prof. B.L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

'Partial-Saturation' using Nuclear Magnetic Double Resonance

Dear Barry,

To confirm the relative signs of the ^1H - ^{19}F coupling-constants in the gauche (g) and trans (t) isomers of 1,1,2,2-tetrabromofluoroethane (TBFE) we performed a double-resonance experiment based on the fact that the time taken for an internal rotation through which the molecule can convert itself from one isomeric form to another is much smaller than the life-times (T_1 and T_2) of the nuclear spin-states. Thus, the nuclear spin-states are conserved during internal rotation and if the transition $\alpha\beta \rightarrow \alpha\alpha$ in one isomer is irradiated by applying a radiofrequency-field (H_2) of an appropriate frequency (v_2), then the same transition of the other isomer would be affected. By working at a temperature at which the rate of interconversion is slow enough to allow the observation of individual lines from different isomers but fast enough so that during the life-time of one rotameric-state population changes between the spin-states due to relaxation are small, one can achieve 'partial-saturation' as shown in the figure. The upper trace (a) shows the normal 56.445 MHz ^{19}F spectrum of TBFE at -85°C relative to CFCl_3 . The two lines at 3926 and 3950 Hz are due to the t isomer ($|J_{\text{t}}^{\text{HF}}| = 24.0$ Hz) while the unresolved doublet at 2783 Hz is due to the g isomer. When a double resonance field ($\frac{1}{2\pi} \gamma H_2 \sim 3$ Hz) is applied so that its frequency v_2 coincides with one of the transitions due to the t isomer, saturation of one of the transitions of the g isomer is achieved allowing observation of the line-shape of the other. Trace (b) is obtained with $v_2 = 3950$ Hz

2.

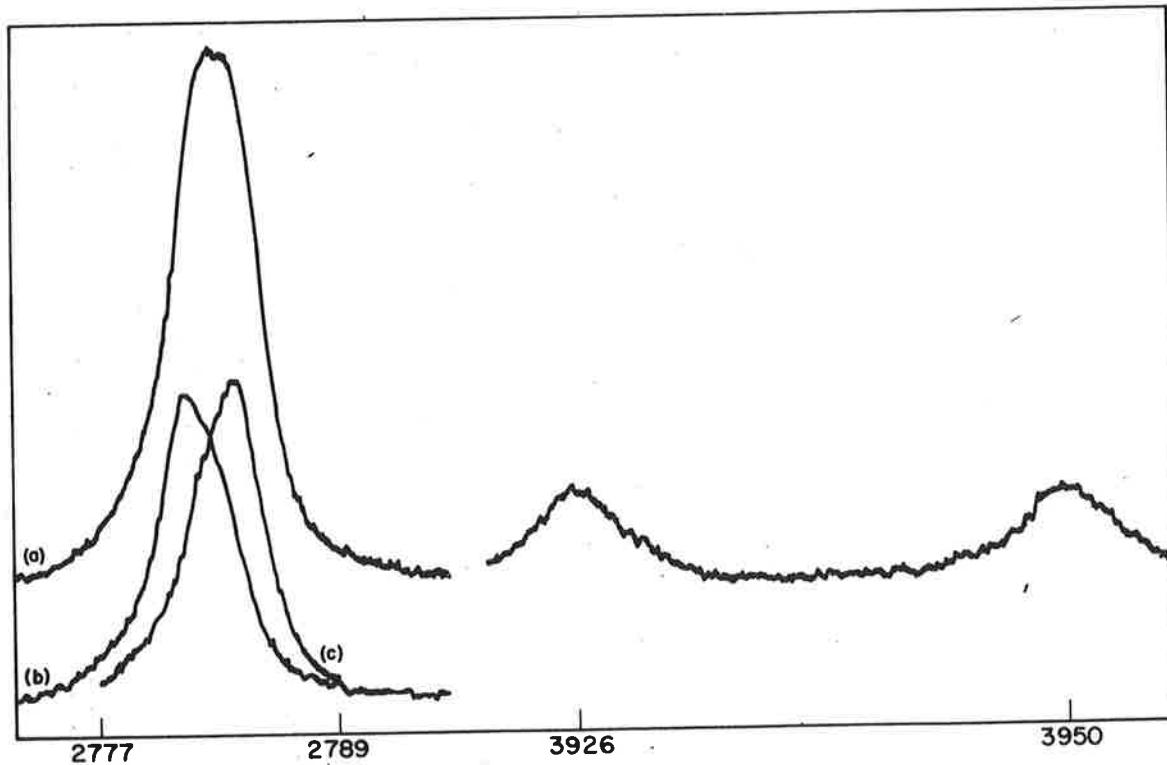
and (c) with $\nu_2 = 3926$ Hz. The results are compatible only with the assignments in which J_{g}^{HF} and J_t^{HF} have the same sign and give $J_{\text{g}}^{\text{HF}} = 1.7$ Hz.

G. Govil

G. Govil

H.J. Bernstein

H.J. Bernstein



Institut für Elektrowerkstoffe

EINIGERMADES FORSCHUNGSINSTITUT DER FRAUNHOFER-GESTALTUNG

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University

Stanford, California 94305
USA

INSTITUTSDIREKTOR
PROF. DR. R. MECKE

Neue Ruf-Nr. 31391

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78 FREIBURG I. BR.

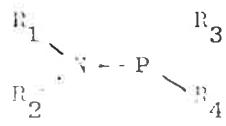
FICKERSTRASSE 4

16. Januar 1968

Protoneuressonanzspektroskopische Untersuchungen an Aminophosphinen

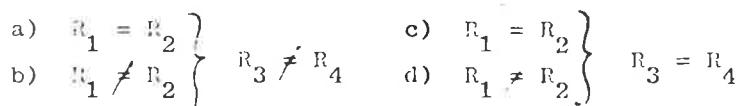
Sehr geehrter Herr Dr. Shapiro,

wir synthetisierten eine Reihe von substituierten Aminophosphinen und untersuchten die Temperaturabhängigkeit der Protonenresonanzen im Bereich zwischen +180°C und -100°C:

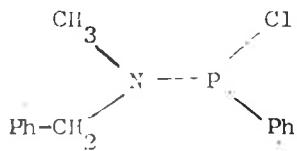


R_1, R_2 : Alkylgruppen z.B. CH_3 , C_2H_5 ,
iso-Propyl, ClH_2 -Phenyl.
 R_3, R_4 : Cl oder Phenyl.

und zwar die vier Fälle:



Die interessanteste Verbindung war das Methylbenzylaminochlorphenylphosphin:



Bei dieser Verbindung konnten wir zwischen zwei verschiedenen kinetischen Prozessen unterschiedlicher Geschwindigkeit unterscheiden:

- 1) Dem langsamem Cl-Austausch ($T_a = T_c \approx +80^\circ\text{C}$). Bei diesem Prozess kehrt sich die Konfiguration am Phosphor um.
- 2) Der schnellen Rotation um die N — P — Bindung oder die Inversion am Stickstoff ($T_a = T_c \approx -50^\circ\text{C}$).

- 2 -

Der Chlor austausch wurde mit Hilfe der PR-Signale der CH_2 -Gruppe (AB-Teil eines ABX-Spektrums; X = Phosphor) nachgewiesen: Bei höherer Temperatur ($T > +80^\circ\text{C}$) werden die beiden Methylenprotonen äquivalent (A_2X -Spektrum). Die Austauschgeschwindigkeit k dieses Prozesses ist stark vom Lösungsmittel und von der Konzentration abhängig (S_{N}_2 -Reaktion).

Bei tiefen Temperaturen ($T < -50^\circ\text{C}$) wird der zweite oben genannte kinetische Prozess für die PR-Spektroskopie eingefroren. Das Tieftemperaturspektrum zeigt die Signale zweier energetisch verschiedener Konformationen.

Es ist anzunehmen, dass es sich bei dem zweiten Prozess um eine Rotation um die N — P-Bindung handelt und nicht um eine N-Inversion, denn bei den Amino-phosphinen mit zwei gleichen Substituenten am Phosphor ($R_3 = R_4$) waren die beiden Methylenprotonen der Benzylgruppe bis -110°C äquivalent.

Eine ausführliche Publikation mit Spektren wird im Laufe der nächsten Monate in der Zeitschrift f. Naturforschung Teil b erscheinen.

Mit freundlichen Grüßen

H. Friebolin D. Imbery

(H. Friebolin) (D. Imbery)

INSTITUT FÜR ORGANISCHE CHEMIE DER TECHNISCHEN HOCHSCHULE BRAUNSCHWEIG

PROF. DR. PHIL., DR. MED. h. c. H. H. INHOFFEN

(Dr. Albert Gossauer)

33 BRAUNSCHWEIG
SCHLEINITZSTRASSE
Tel. Hochschule 4781
Durchwahl Institut 4782225
Vorwahl 0531

17. November 1967

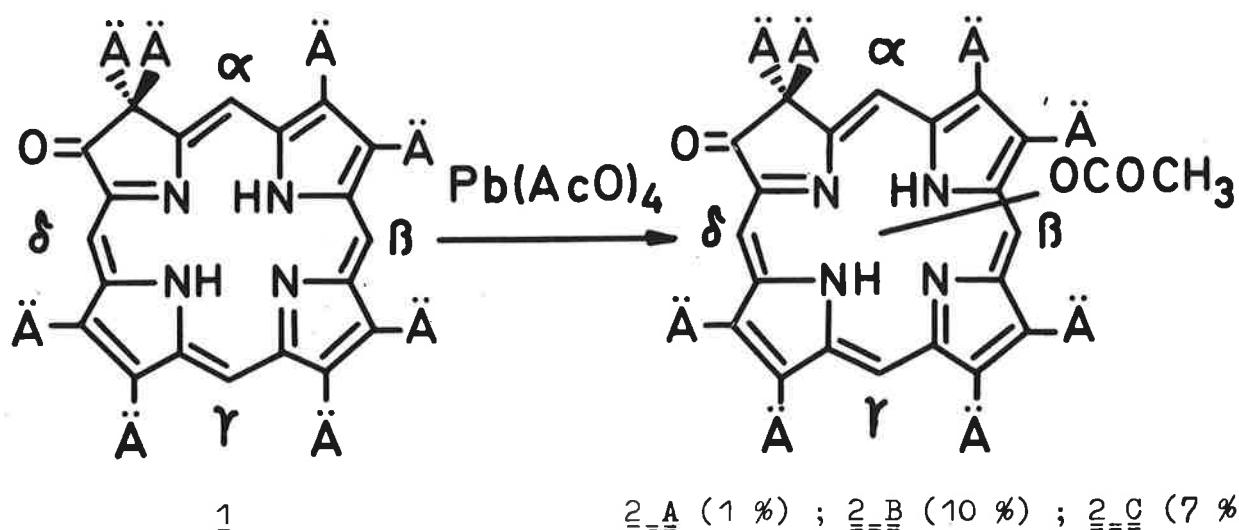
Herrn
 Professor Dr. Bernard L. Shapiro
 Department of Chemistry
 Illinois Institute of Technology
C H I C A G O , I L L . 60616

U. S. A.

Sehr geehrter Herr Professor Shapiro !

Konstitutionszuordnung dreier isomerer meso-substi-
tuiert Porphinderivate

Durch direkte Acetoxylierung des Octaäethyl-gemini-porphyrin-monoketons 1 mit Bleitetraacetat in einem inerten Lösungsmittel wurden drei isomere Reaktionsprodukte erhalten, deren Konstitution aufgrund ihrer Kernresonanzspektren aufgeklärt wurde.



Das scharfe Singulett bei 2,88 - 2,99 ppm mit einer Intensität ,

die drei Wasserstoffatomen entspricht, wird der CH_3 -Gruppe des Acetylrestes zugeordnet. Da nur drei Methinwasserstoffatomsignale vorhanden sind, muß sich die Acetoxygruppe in einer meso-Stellung befinden. Das bei den drei Isomeren auftretende Signal um 9,1 ppm wird wie bei 1¹⁾ dem den geminalen Äthylgruppen benachbarten Methinwasserstoffatom zugeordnet. Es ist also in keinem Fall Substitution an dieser meso-Stellung eingetreten.

Auffallend ist die Aufspaltung der Methylen- und Methyl-Signale der geminalen Äthylgruppen, die nur bei den Isomeren 2 A und 2 B vorkommt. Bei diesen muß der Acetylrest senkrecht zur Molekülebene stehen, so daß dadurch die beiden sich oberhalb und unterhalb derselben befindlichen geminalen Äthylgruppen nicht mehr äquivalent sind. Eine δ -ständige Acetoxygruppe kann jedoch - wie Molekülmodelle zeigen - wegen der geringeren Raumbeanspruchung der peripheren Ketogruppe durch die Molekülebene durchschwingen. Dadurch wird die erwähnte Dissymmetrie aufgehoben. Dem Isomeren 2 C, dessen Spektrum keine Aufspaltung der geminalen Äthylgruppensignale zeigt, kommt demgemäß die Konstitutionsformel mit der δ -ständigen Acetoxygruppe zu.

Zuordnungstabelle der Signale

	δ -Werte in CDCl_3 -Lösung (0,05 m)					Varian HA-100	
	α -H S	ms-H S	CH_3CO S	per.- CH_2 - M	gem CH_2 Q	per.- CH_3 , M	gem CH_3 T
<u>1</u>	9,13	9,95 9,87 9,85	---	4,19-3,81	2,76	1,98-1,77	0,44
<u>2 A</u>	9,13	9,95* 9,70	2,89	4,16-3,38	2,76 2,72	1,96-1,71	0,47 0,41
<u>2 B</u>	8,96*	9,79 9,78	2,88	4,13-3,41	2,73 2,69	1,94-1,68	0,44 0,43
<u>2 C</u>	9,05	9,92* 9,68	2,99	4,11-3,81	2,70	1,95-1,75	0,35

S=Singulett, T=Triplet (J_{H-H}= 4 Hz), Q=Quartett (J_{H-H}= 4 Hz), M=Multiplett.

Für die beiden Isomeren $\underline{\underline{2}}\text{A}$ und $\underline{\underline{2}}\text{B}$ kommen also die β - und γ -meso-substituierten Konstitutionsformeln in Frage. Die Zuordnung war mit Hilfe des Kernresonanzspektrums²⁾ des meso-Acetoxy-octaäthylporphins als Referenzsubstanz möglich. Das Intensitätsverhältnis (2:1) der beiden den Methinwasserstoffatomen entsprechenden Signale erlaubt, sie den β - und δ -ständigen Wasserstoffatomen bzw. dem γ -ständigen Wasserstoffatom zuzuordnen. Beide Signale sind in Bezug auf das vom Octaäthylporphin entsprechende Signal zu höheren Feldstärken verschoben, und zwar ist diese Verschiebung für das der Acetoxygruppe gegenüberstehende Methinwasserstoffatom-Signal größer (0,30 ppm) als für das den β - und δ -ständigen Methinwasserstoffatomen entsprechende Signal (0,14 ppm).

Durch Vergleich der Kernresonanzspektren der drei isomeren Reaktionsprodukte mit dem von $\underline{1}$ im Bereich der Methinwasserstoffatomsignale kann man feststellen, daß auch hier das jeweils in der Tabelle mit einem * gekennzeichnete Signal stärker zu höheren Feldstärken verschoben ist als die zwei anderen. In Analogie zu dem meso-Acetoxy-octaäthylporphin wird dieses Signal jeweils dem der Acetoxygruppe gegenüberliegenden Methinwasserstoffatom zugeordnet, so daß beim Isomeren $\underline{\underline{2}}\text{A}$ die Acetoxygruppe β -ständig, beim Isomeren $\underline{\underline{2}}\text{B}$ γ -ständig und beim Isomeren $\underline{\underline{2}}\text{C}$ - wie bereits erwähnt - δ -ständig sein muß. Das bei der niedrigsten Feldstärke (9,95 ppm) liegende Signal bei $\underline{1}$ sollte daher rückschließend dem γ -ständigen Methinwasserstoffatom zuordnen sein.

Mit vorzüglicher Hochachtung

Ihr

Albert Gossauer

- 1) R.Bonnet, D.Dolphin, A.W.Johnson, D.Oldfield und G.F.Stephen-son Proc. Chem. Soc. 1964, 371.
- 2) J.H. Fuhrhop, Dissertation Braunschweig, 1966.

Physikalisches Institut
der Karl-Marx-Universität
701 Leipzig, Linnéstr. 5
Direktor Prof.Dr.A.Lüsche

Leipzig, 19.1.1968

Dr. Bernard J. Shapiro
Department of Chemistry
Stanford University
Stanford
California 94305

Spektrenberechnung

Sehr geehrter Herr Dr. Shapiro,

wir haben in den letzten Jahren unter anderem nach Bogen gesucht, den Aufwand bei der Spektrenberechnung möglichst zu verringern, da uns nur ein kleiner und relativ langsamer Rechenautomat (4000 Speicherplätze) zur Verfügung steht. Dabei wurde in einem von Arnold /1, 2/ geschaffenen Rechenprogramm das dort verwendete Iterationsverfahren von Reilly und Swalen (RS) durch das von Castellano und Bothner-By (CB) ersetzt und vergleichende Untersuchungen durchgeführt. Es zeigt sich, daß beide Verfahren bezüglich Mittelung der Frequenzmeßfehler und Anforderungen an die Startparameter gleichwertig sind. CB benötigt in Fällen mit mehr als zwei nichtäquivalenten Spins weniger zuzuordnende Linien ($\gamma/2n(n+1)$ statt 2^n-1) und konvergiert bei AB- und ABC-Systemen stärker als RS. RS hat den Vorzug des geringeren Speicherplatzbedarfes und der kürzeren Rechenzeit (grob gerechnet etwa ein Viertel im Vergleich zu CB beim verwendeten Rechenautomaten ZRA-1). Dadurch wird die langsame Konvergenz mehr als ausgeglichen.

Der ZRA-1 besitzt eine maschinengebundene Befehlsverschlüsselung, so daß die Rechenprogramme nicht für andere Automaten verwendbar sind.

Mit freundlichen Grüßen

hoH

B. Motl

/1/ Arnold,K., Ann.Phys. Lpz. 18, 138 (1966)
/2/ Arnold,K., Diplomarbeit, Leipzig 1965

PURDUE UNIVERSITY
DEPARTMENT OF CHEMISTRY
LAFAYETTE INDIANA 47907

January 19, 1968

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

Dear Barry:

Though our major effort at the moment is devoted to nmr studies on fluorine-labelled surfactants, we're still following with interest new developments related to

Anomalous Shifts for Protons in Hydrocarbons
and would like to report on a new experiment, prompted by reading Zürcher's discussion in *Progress in nmr Spectroscopy*, Vol. 2, p. 245-246.

Zürcher's view, which I'll not restate in detail, is that anomalies like the upfield shifts in hexahydromesitylene (see IIT NMR #83, p. 2) arise from solvent-solute interactions. They should then disappear in the gaseous state; however, obtaining the required gaseous-state spectra may be rather difficult, and we haven't tried it yet.

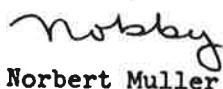
It has been noted several times (Evans, J. Chem. Soc. 877 (1960); Bovey and Yanari, *Nature* 186, 1042 (1960); M. Laskowski, personal communication) that F¹⁹ nmr spectra and UV spectra in fluorocarbon solvents resemble gaseous-state spectra much more than spectra in other organic solvents. It therefore seemed likely that if the proton shift anomalies do indeed reflect solvent-solute interactions, they ought at least to be reduced in magnitude when the solvent is changed from hydrocarbon to fluorocarbon.

A sample of mesitylene was hydrogenated (Adams catalyst) and cyclohexane was added to the isomeric 1,3,5 trimethylcyclohexanes without separating the cis from the trans. A-60 spectra were run on the resulting mixture, neat and as a 5% solution in a fluorocarbon "FC-75" obtained from 3M Company. In the hydrocarbon mixture high-field signals were found as expected (see O. R. Hughes, M. S. Thesis, Purdue University, 1964; also Segre and Musher, *JACS* 89, 706 (1967)), the two most prominent peaks lying at +53.7 and +63.6 Hz from the cyclohexane resonance. In FC-75 the spectrum is virtually identical, the shifts being now +54.9 and +65.3, all \pm 0.3 Hz.

This result, together with our previous finding (*J. Chem. Phys.* 37, 1172 (1962)) that the spectra are essentially unaffected by solvent changes when CS₂, benzene, CH₃I and TMS are used, seems to indicate rather strongly that these anomalous shifts do not reflect a solvent effect. This is also suggested by the fact that in the trimethylcyclohexanes the adjacent methyl groups affect the axial and equatorial ring protons so differently, as pointed out in my earlier letter.

I wish I could offer a convincing alternative explanation; as they say in the World of Sports, Maybe Next Year! With best regards.

Sincerely,


Norbert Muller

THE JOHNS HOPKINS UNIVERSITY
SCHOOL OF MEDICINE
725 N. WOLFE STREET · BALTIMORE, MARYLAND 21205

DEPARTMENT OF PHYSIOLOGICAL CHEMISTRY

TELEPHONE 955-5000
 AREA CODE 301

January 25, 1968

Dr. B. L. Shapiro
 Department of Chemistry
 Stanford University
 Stanford, California 94305

Short Title: Substrate-induced Conformational Change
 of a Protein.

Dear Barry,

In our continuing studies on the conformational variations of proteins of the chymotrypsinogen family we have observed what appears to be a case of a rather large substrate induced conformational change for dimethionine sulfoxide chymotrypsin. This derivative is about 40% more unfolded in its native state than is chymotrypsin and its NMR spectrum in the aliphatic methyl region is markedly sharper than that of chymotrypsin. (See Hollis et al., P.N.A.S., 58, 758 (1967).) In the case of the diphenylcarbamyl derivative of dimethionine sulfoxide chymotrypsin the NMR spectrum reverts to an appearance nearly identical to that of native chymotrypsin. The diphenylcarbamyl derivative seems to be similar to the acyl intermediate of the enzymic reaction (Erlanger and Cohen, J.A.C.S., 85, 348 (1963)). We believe that this change results from a refolding induced by the binding of the inhibitor, thus undoing the conformation change resulting from oxidation of Met 180. Further details will be given in a forthcoming paper.

Sincerely,

Rodney L. Biltonen
Rodney L. Biltonen

Donald P. Hollis
Donald P. Hollis

DPH:pag

ILLINOIS INSTITUTE OF TECHNOLOGY
CHICAGO, 60616

DEPARTMENT OF CHEMISTRY

January 22, 1968

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

Dear Barry:

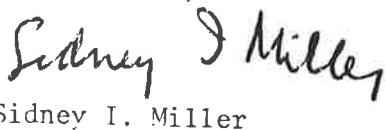
Removal of an Impurity in TMS

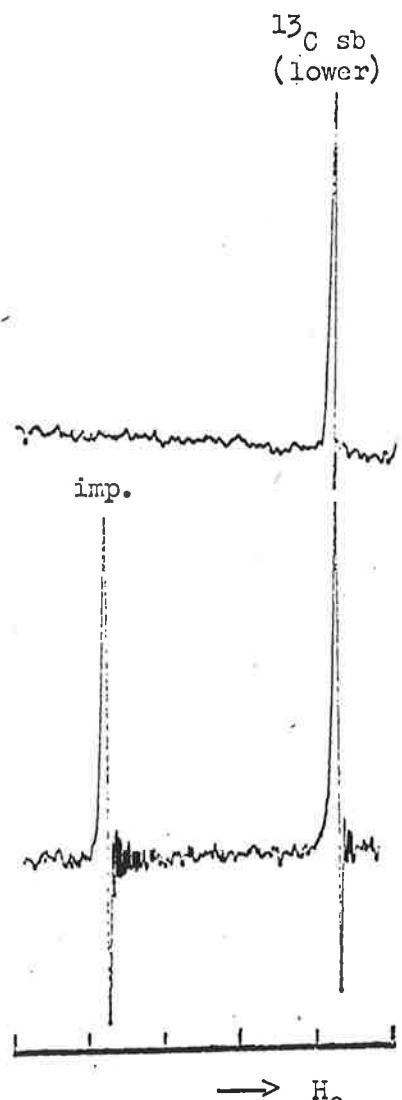
In the course of a study of phenyltrimethylammonium chemical shifts, we noted the presence of small traces of an impurity in stock TMS. For neat TMS, spurious signals appeared in the nmr as a singlet at δ ca. 2.03 ppm (as determined from the lower ^{13}C sideband of TMS), and in the IR at ca. 1720 cm^{-1} . From IR and nmr evidence, the impurity is thought to be acetone. The presence of this impurity in two bottles of TMS from one supplier and the fact that one of these was freshly opened by another research group suggests that the contamination was not our work.

On standing over type 13X molecular sieves for 24 hours, the TMS lost the spurious signals, as the "before" and "after" spectra indicate. Type 4A sieves were inefficient, i.e. they seemed to decrease the concentration of impurity only slightly. One further note: Dr. M. Ohnishi of Professor K. D. Kopple's group at I.I.T. removed this impurity by washing the TMS with water.

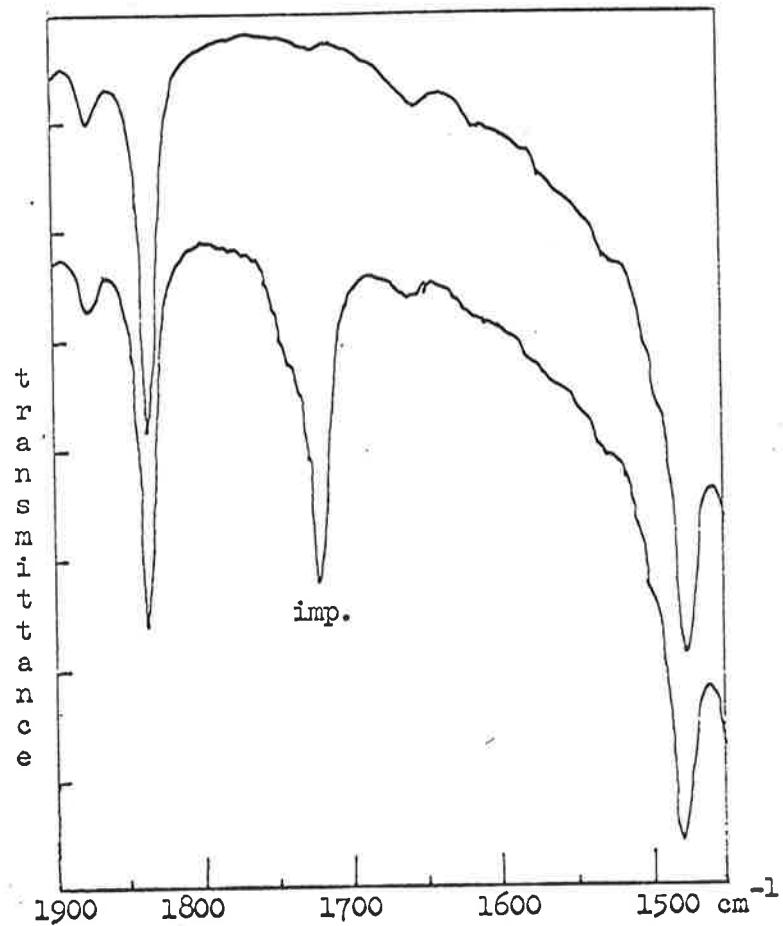
Sincerely,


Gary R. Wiley


Sidney I. Miller



(each div. = 0.33 ppm or 20 Hz.)



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DEPARTMENT OF CHEMISTRY

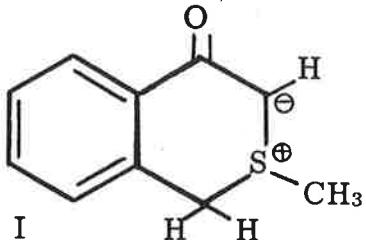
IRVINE, CALIFORNIA 92664

January 22, 1968

Dr. Bernard L. Shapiro
 Department of Chemistry
 Stanford University
 Stanford, California 94305

Dear Barry:

We recently had occasion to prepare a stable sulfonium ylid of structure I, and we noted with some interest that the nmr spectrum of I in CDCl_3 at normal probe temperature showed the ylid proton to be a broad singlet ($\nu_{1/2} = 7 \text{ cps}$) centered at 3.9 ppm.



Temperature studies over the range -40° to $+75^\circ$ showed a pronounced change in line shape and chemical shift for the resonance of the ylid proton but no significant changes in the rest of the spectrum. At -40° , the ylid resonance sharpened to $\nu_{1/2} \sim 4 \text{ cps}$, $\delta = 4.15 \text{ ppm}$. With increasing temperature, the signal moved progressively upfield and became progressively broader. At $+75^\circ$, the line width, $\nu_{1/2}$, was approximately 10 cps centered at 3.5 ppm. The observed changes in the spectrum with temperature were entirely reversible.

Similar broad resonances for the methine protons of stable sulfonium ylids have been observed by several groups of workers^{1, 2, 3}, and, in the case of ylids II and III, the spectra have been shown to be temperature dependent, and the rate process resulting in line broadening has been ascribed to rotation



II



III

Dr. Shapiro

-2-

January 23, 1968

about the enolate C-C bond.^{2,3} This explanation cannot account for line-broadening in the case of the cyclic ylid I since rotation about the enolate C-C bond is not possible. We have found, however, that the ylid proton of I exchanges rapidly with water, and we wish to suggest that the temperature dependence of the methine resonance of I is simply due to chemical exchange with trace amounts of water that are retained by I in the course of its preparation and workup.

This raises the question as to whether or not the rate process involving acyclic ylids might also be a chemical exchange process. We have, therefore, prepared ylid II under anhydrous conditions by the reaction of sodium hydride with dimethylphenacylsulfonium bromide in tetrahydrofuran. The ylid prepared in this manner gives an nmr spectrum in ethanol-free chloroform or anhydrous acetonitrile in which the methine resonance is "sharp," $\nu_1 = 1$ cps. As expected, addition of trace amounts of water to a solution of II in acetonitrile results in a dramatic line broadening of the methine resonance.

Our results with ylids I and II, and several others which we have prepared, demonstrate that the line shape of the methine resonance is critically dependent on the presence of trace quantities of hydroxylic compounds. A rate process involving conformational changes such as proposed for ylids II and III may well be observable but cannot be evaluated reliably from the line-shape of the methine resonance.

Sincerely yours,

Marjorie C. Caserio
Stephen H. Smallcombe
Robert Holland
Richard Fish

Marjorie C. Caserio
Stephen H. Smallcombe
Robert G. Holland
Richard H. Fish

MCC/mp

1. K. W. Ratts and A. N. Yao, J. Org. Chem., 31, 1185 (1966).
2. B. M. Trost, J. Am. Chem. Soc., 89, 138 (1967).
3. J. Casanova, Jr., and D. A. Rutolo, Jr., Chem. Communications (23) 1224 (1967).

NORTHWESTERN UNIVERSITY
EVANSTON, ILLINOIS 60201

DEPARTMENT OF CHEMISTRY

January 24, 1968

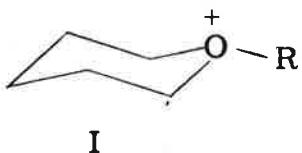
Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

Dear Barry:

The Stereomutation of Oxygen and Arsenic

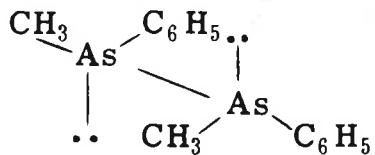
As almost all the earlier nmr work in the field of atomic inversions has been concerned with the properties of nitrogen, we have initiated a program to broaden the scope of knowledge in this field to include other atoms. Our first results, reported in 1966,^{1,2} described the inversion properties of diphosphines. We report in this letter the first kinetic measurements of inversion about oxygen and arsenic.

For observation of a conventional unimolecular inversion, the central atom must be trivalent and tetrahedral, with an electron lone pair serving as the fourth "substituent." Such an arrangement is

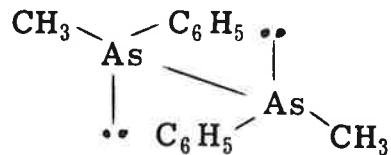


found in oxonium salts (I, II). Reaction in an nmr tube of an ether with an alkyl halide and silver tetrafluoroborate in sulfur dioxide produces the oxonium salt and silver halide. The spectra of the methyl and ethyl derivatives of tetrahydropyran (I) indicate rapid inversion even at -70°. The Baeyer-strained ethylene oxide system (II, R ≡ CH₃, C₂H₅, i-C₃H₇), however, produces the expected A₄ → AA'BB' transition with a T_C near -40° and an E_a of about 10 kcal/mole.

The experimental problem is reversed for arsenic, since this atom exhibits considerable configurational stability. The system we selected for study was 1,2-dimethyl-1,2-diphenyldiarsine (III), which



III-dl



III-meso

Dr. Bernard L. Shapiro
Page Two
January 24, 1968

can exist in dl and meso modifications. The barrier was expected to be lower in III than in monoarsines because of enhanced p_{π} - d_{π} bonding and phenyl conjugation in the transition state. The nmr spectrum of III contains two methyl peaks of unequal intensity due to the distinct diastereoisomers. The coalescence of these peaks into a single sharp resonance above 200° ($T_c \sim 180^{\circ}$, $E_a \sim 28$ kcal/mole) indicates a rapid interconversion of the dl and meso forms through inversion about arsenic.

Sincerely yours,

Joe

Joseph B. Lambert

George F. Jackson III.

George F. Jackson, III

Dale H. Johnson

Dale H. Johnson

JBL / kc

1. J. B. Lambert and D. C. Mueller, IIT NMR Newsletter, No. 94, 26 (1966).
2. J. B. Lambert and D. C. Mueller, J. Am. Chem. Soc., 88, 3669 (1966).

THE QUEEN'S UNIVERSITY OF BELFAST

SCHOOL OF PHYSICS AND
APPLIED MATHEMATICSDEPARTMENT OF
APPLIED MATHEMATICSBELFAST 7
N. IRELANDTELEPHONE: 30111
EXT. 344

Dr. Bernard Shapiro,
Department of Chemistry,
Stanford University,
STANFORD, CALIFORNIA 94305

26 Jun '68

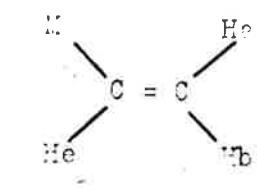
Dear Dr. May,

Once upon a long time ago, we¹ analysed a number of 3-spin proton spectra of vinyl-metallic compounds. The results are contained in my dissertation. Since then, some books and reviews have been written, sometimes with special sections on 3-spin systems, which do not include our data. The only conclusion that I am willing to accept is that the authors were not aware of our work. I hope that you will therefore accept the following, as a subscription, being a compilation of our results.

Some of the systems we looked at had already been studied, some have been reported on after we had completed our measurements and others have apparently not yet been analysed. In most cases our data is believed to be more accurate than that already in the literature and accordingly we wish to report all our 3-spin data indiscriminately in the table that follows.

In the interest of brevity we do not repeat² the long list of references to previous work (where applicable) on these compounds. I hope that you and the workers concerned will excuse this omission.

1. Steven S. Danyluk and I.
2. Jean Cowley, Ph.D Thesis, University of Toronto, Universities microfilms 66-1063 (1964).

Footnotes:

* errors in the δ 's and J's range from ± 0.01 to ± 0.4 .

- i) We thank A.G. Brook for supplying compounds and Ray Freeman for some 100MHz tickling spectra;
- ii) the shifts apply in general to 3 mole% to 0.1% solutions, in CCl_4 ; iii) Literature² values only;
- iv) slight degeneracy problems; v) low field quartet obscured, Pb^{207} satellites used; vi) severe degeneracy net, parameter errors are large; vii) single broad line, J's obtained by extrapolation from the other chloro compounds.

Table of vinyl-proton NMR data at 60 MHz in Hz to low
field of TMS (i,ii)

<u>Compound</u>	<u>notes</u>	δ_a^*	δ_b	δ_c	J_{ab}^*	J_{ac}	J_{bc}
CVi ₄	iii	300.3	306.0	349.0	2.0	18.5	8.75
Si Vi ₄	iv	346.2	363.4	367.1	3.61	20.40	14.68
Ge Vi ₄		341.0	361.8	372.7	3.07	20.07	13.45
Sn Vi ₄		345.1	372.6	383.3	3.14	20.69	13.78
Pb Vi ₄		345.0	383.5	419.1	2.02	19.57	12.17
\emptyset_3 C Vi		292.2	322.0	410.0	1.16	17.00	10.43
\emptyset_3 Si Vi		346.1	377.6	399.1	3.59	20.21	14.58
\emptyset_3 Ge Vi		342.9	374.2	398.4	2.40	19.87	13.76
\emptyset_3 Sn Vi		354.0	385.3	404.5	3.08	20.55	13.54
\emptyset_3 Pb Vi	v	355.0	392.8	436.6	1.87	19.82	11.95
Me ₃ Si Vi		337.7	351.8	366.7	3.75	20.38	14.71
Me ₂ Si Vi ₂		341.0	355.9	367.1	3.82	20.48	14.89
Me Si Vi ₃		343.1	359.1	366.4	3.61	20.47	14.69
\emptyset_2 Si Vi ₂		347.8	367.5	387.1	3.69	20.30	14.59
\emptyset Si Vi ₃		347.8	366.6	377.3	3.69	20.38	14.63
Me ₂ Cl Si Vi		350.6	360.4	368.4	2.89	20.28	15.05
Me Cl ₂ Si Vi	vi	363.2	368.7	370.3	2.88	20.63	14.00
\emptyset_2 Cl Si Vi		354.1	365.2	383.3	3.17	20.11	14.58
\emptyset Cl ₂ Si Vi	vi	363.2	367.0	372.5	2.52	20.49	14.90
Cl ₃ Si Vi	vii	377.5	377.5	377.5	2.4	20.4	14.9
Ge ₂ Vi ₆		335.6	357.5	371.6	2.93	20.07	13.32

Yours sincerely,
 Sean
Sean Cavley

TITLE: Vinyl group PMR data in Organo-metallics.

113-36

PHYSIKALISCHES INSTITUT
DER UNIVERSITÄT BASEL
KLINGELBERGSTRASSE 82 — TEL. 430422
VORSTEHER: PROF. DR. P. HUBER
Prof. Dr. P. Diehl
Dr. C. L. Khetrapal

Basel, January 29, 1968

Prof. B.L. Shapiro
Department of Chemistry
Stanford University

Stanford

California 94305

U.S.A.

Re: NMR-spectra of oriented Molecules

Dear Barry,

In an earlier communication we have reported some of our results on the temperature, concentration and spinning speed dependence of the NMR-spectra of oriented molecules. In the meantime we have been able to understand the decrease of orientation as a function of spinning speed and to measure at speeds up to 20 Hz as well as to predict possible speeds of 250 Hz at 50 kilogauss without destruction of orientation.

The present letter deals with our further studies on oriented molecules:

(1). We have studied the spectra of pyrazine and p-benzoquinone in the nematic phase of p-p'-di-n-hexyloxyazoxybenzenes from the point of view of studying the geometry of these molecules. The angles between the CH and the CC bonds have thus been derived.

(2). We have applied the direct method of analysis to oriented systems. It turned out that contrary to isotropic systems the oriented systems of 2, 3 and 4 nuclei without symmetry do not provide enough relations from line positions to allow an analysis if all the parameters (shifts, indirect and direct couplings) are unknown. This situation is demonstrated in the figure.

In order to still solve the problems, we suggest to include intensity information in terms of moment relations. Thus e.g. the oriented two spin system (AB) has 3 unknowns and two relations from line positions. The infinite number of solutions for a given line position is reduced to two if the intensity information is included in terms of the second moment. Finally tickling should be able to decide which of these is correct.

An even worse situation may arise if the chemical shifts and the indirect couplings are relatively small or zero. The oriented 3-spin system without symmetry (AA'A'') (typically a 7-line spectrum) can be shown to have an infinite number of solutions even if line position and intensity are considered (Should be an interesting experience for iterative programs!)

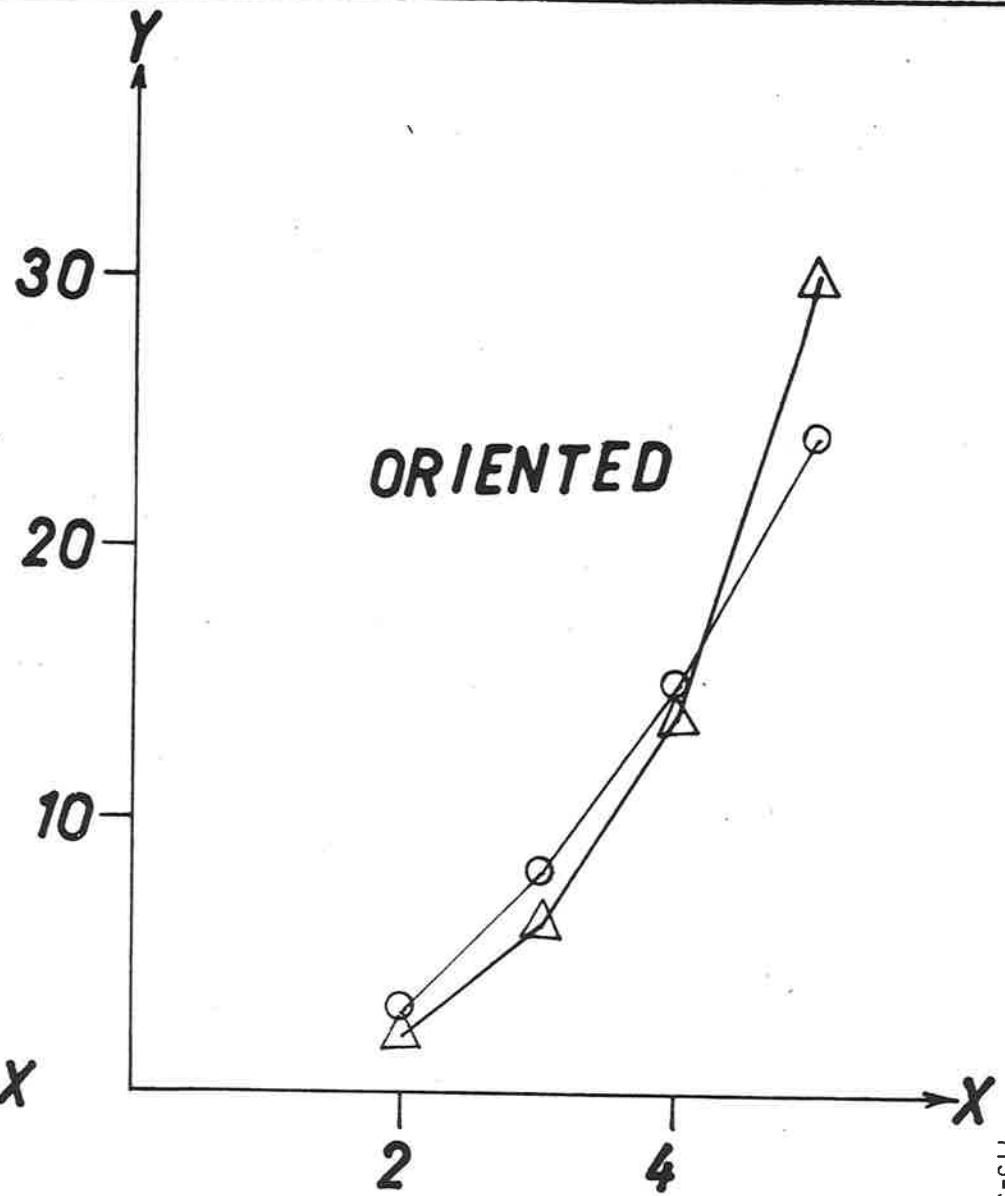
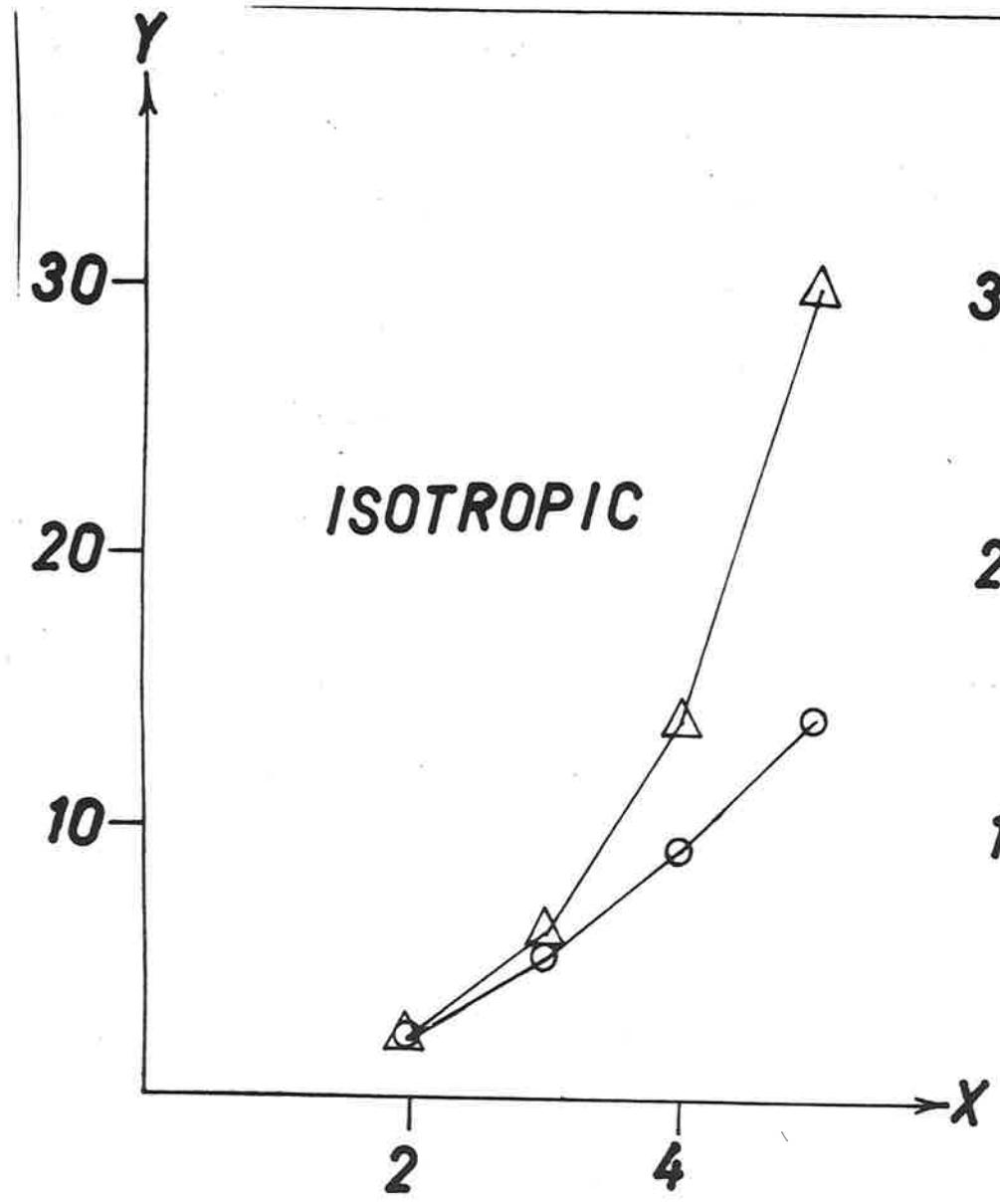
Yours sincerely

Pebro

(P. Diehl)

C. L. Khetrapal

(C. L. Khetrapal)



113-37

*X-NQ. OF SPINS (GENERAL); Y- NO. OF UNKNOWN(S) & EQUATIONS
 (Δ)*

THE UNIVERSITY OF ROCHESTER
 COLLEGE OF ARTS AND SCIENCE
 RIVER CAMPUS STATION
 ROCHESTER, NEW YORK 14627

DEPARTMENT OF CHEMISTRY

January 29, 1968

Dr. Bernard L. Shapiro
 Department of Chemistry
 Stanford University
 Stanford, California 94305

Dear Barry:

Computer Fitting Exchange Modified AB Spectra

I was interested to see¹ that our neighbors in Buffalo have been using an iterative procedure to obtain rate data from nmr lineshapes, since we have been busy in a similar area. Mrs. A. Turner has incorporated a Fortran version of the complete Alexander line shape equations² for an AB system undergoing intramolecular exchange into a general non-linear least squares regression program. This is written in Fortran II for a 7074 computer.

The spectrum may be calculated in terms of the mean lifetime (τ), the chemical shift (ν_{AB}), the coupling constant (J_{AB}), the line width in the absence of exchange (W), and a scaling factor (K). Our program is written in such a way that we can instruct the computer to iterate on any or all of these parameters, starting with guessed values which yield a calculated spectrum reasonably close to the experimental spectrum. In practice, we treat W as a constant, obtaining a value from spectra determined under conditions of minimal exchange broadening. J_{AB} can also be treated as a constant once its value has been established. So far we have let ν_{AB} vary since there seemed to be a possibility that it might be temperature dependent. Our usual procedure, therefore, is to have the computer iterate on three parameters. Since an AB spectrum is symmetrical we have restricted computation to half the spectrum.

Although we have now successfully fitted a number of calculated and experimental spectra of conformers with widely varying lifetimes we are still not completely satisfied with our program, which needs some more work done on it to improve its efficiency. It does not work as well as our earlier program for the two site, zero-coupling case³ although both use the same basic non-linear least squares program. We will probably find it necessary to tailor our general program to fit these specific applications.

Yours sincerely,

L. D. Colebrook

- (1) G. Templeman, IITNMR 111-41.
- (2) S. Alexander, J. Chem. Phys., 37, 967 (1962).
- (3) L. D. Colebrook, IITNMR 84-6.

PHYSIQUE EXPERIMENTALE MOLECULAIRE
(Spectroscopie Hertzienne)
FACULTÉ DES SCIENCES
9, Quai Saint-Bernard - 75 - PARIS 5^e
Tour 32 - 2^e Etage
Tél. : 336-25-25 - Poste 40-53

113-39
Paris, le 30 Janvier 1968

Docteur Bernard L. SHAPIRO
Department of Chemistry
Stanford University
STANFORD
CALIFORNIA 94305
(U.S.A.)

Tautométrie de composés hétérocycliques

Cher Docteur Shapiro,

Dans le cadre d'une étude générale de la tautométrie des composés hétérocycliques, nous avons été amenés à étudier d'abord plus spécialement les dérivés du phényl-4-amino-2-thiazole et de la phényl-4-imino-2-thiazoline.

Dans le cas des dérivés N-alkylés, les composés à structure thiazole se caractérisent par un phényle en -4 présentant une structure à deux massifs tandis que pour les thiazolines les cinq protons du groupement phényle donnent un signal unique. De plus, le proton en -5 de l'hétérocycle thiazole est situé vers les champs faibles par rapport à celui du cycle thiazoline.

Dans le cas des dérivés acylés, chloroacrylés et à la fois N-alkylés et acylés nous retrouvons la différence remarquable signalée plus haut concernant le groupement phényle en -4. Mais la position du signal du proton en -5 de l'hétérocycle ne permet pas, contrairement au cas des dérivés N-alkylés, de fixer la structure thiazole ou thiazoline.

L'étude par R.M.N. des noyaux benzéniques fixés sur des hétérocycles a été abordée récemment par L.G. Tensmeyer (¹) qui se réfère, en outre, à un mémoire de B.M. Lynch et Y.Y. Hung (²). Ces auteurs ont remarqué, au cours de l'examen des spectres de R.M.N. des divers composés étudiés que le phényle se caractérisait

1) soit par deux multiplets nettement séparés dans le cas où l'hétérocycle et le phényle sont coplanaires.

La distance entre ces deux multiplets permet une évaluation approximative de l'effet d'anisotropie magnétique de l'hétérocycle sur les protons en ortho du phényle.

2) soit par un seul multiplet dans le cas où la coplanéité est en partie détruite.

3) soit par un singulet dans le cas où les deux cycles ne sont plus coplanaires. Les protons de l'hétérocycle en α par rapport au phényle sont déplacés vers les champs forts. Ces observations concordent parfaitement avec les nôtres.

... /

Nous présentons nos résultats sous forme de tableau indiquant les déplacements chimiques en p.p.m. (T.M.S. en référence interne, concentration molaire de l'ordre de 1%).

Ainsi, l'examen des signaux du groupement phényle en -4 suffit, à lui seul, pour fixer avec certitude la structure thiazole ou thiazoline des composés étudiés.

Avec nos sentiments cordiaux,

Madame Marguerite SELIM, Mlle Gabrielle MARTIN

et René FREYMAN

1. -, L. G. PENSMEYER. NMR Letters, 1966, n° 93, 42-44.

2. - B. M. LYNCH et Y. Y. HUNG- Can. H. Chem., 1964, 42, 1605-1614

Thiazoles	Groupement phényle en -4			δ du proton en -5 sur l'hétérocycle	Solvant
	Multiplet δ_o (ortho)	Multiplet δ_m (meta et p-para)	$\delta_p - \delta_{ap}$		
<chem>CN1C=CC=C1</chem>	7,78 7,88 7,84	7,35 7,32 7,40	0,43 0,56 0,44	6,71 6,90 7,00	CCl_4 CH_3COCH_3 DMSO deutéré
<chem>CN1C=CC(C)C1</chem>	7,65 7,75 7,88 7,89	7,30 7,35 7,36 7,37	0,35 0,40 0,52 0,52	6,60 6,73 6,93 7,06	CCl_4 CH_3COCH_3 DMSO deutéré
<chem>CN1C=CC(C)C(C)1</chem>	7,80 7,80 7,91 7,90	7,27 7,33 7,35 7,39	0,53 0,47 0,56 0,51	6,57 6,63 6,93 7,06	CCl_4 CH_3COCH_3 DMSO deutéré
<chem>CN1C=CC(C)C(=O)C1</chem>	7,82 7,91 7,92	7,40 7,39 7,40	0,42 0,52 0,52	7,15 7,54 7,59	CCl_4 CH_3COCH_3 DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C1</chem>	7,94 7,98	7,37 7,41	0,57 0,57	7,19 7,65	CCl_4 DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)Cl</chem>	7,84 7,91	7,36 7,39	0,48 0,52	7,19 7,62	CCl_4 DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C2=CC=C2</chem>	7,85 7,93	7,49 7,43	0,36 0,50	7,18 7,66	CCl_4 DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,82 7,90	7,40 7,40	0,42 0,50	7,11 7,56	CCl_4 DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C2=CC=C2</chem>	7,91	7,39	0,52	7,61	DMSO deutéré

Thiazolines	Groupement phényle en -4			δ du proton en -5 sur l'hétérocycle	Solvant
	Singulet δ en ppm				
<chem>CN1C=CC=C1</chem>	7,38			5,70	CCl_4
<chem>CN1C=CC(C)C1</chem>	7,43			5,83	CDCl_3
<chem>CN1C=CC(C)C(C)1</chem>	7,47			5,98	CH_3COCH_3
<chem>CN1C=CC(C)C(C)C(=O)C1</chem>	7,50			6,17	DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C2=CC=C2</chem>	7,56			7,59	DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,42			6,35	CCl_4
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,55			6,72	CH_3COCH_3
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,52			6,73	DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,61			7,98	DMSO deutéré
<chem>CN1C=CC(C)C(C)C(=O)C(=O)C(=O)C(=O)C(=O)C(=O)C2=CC=C2</chem>	7,51			6,86	DMSO deutéré

THE UNIVERSITY OF WISCONSIN
MADISON 53706

DEPARTMENT OF CHEMISTRY

PLEASE ADDRESS REPLY TO:
1112 WEST JOHNSON STREET
MADISON, WISCONSIN 53706

January 31, 1968

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

Cross-Correlation in
Dipole-Dipole Relaxation

Dear Dr. Shapiro:

It is well known that when nuclear relaxation is due to dipole-dipole coupling among 3 or more spins, cross-terms of the type $\langle H_i H_j \rangle$ occur in the relaxation expressions. While these terms are generally neglected, it has been proven that they can be neglected in only a few special cases, [CF. P. S. Hubbard, Phys. Rev. 109, 1153 (1958); ibid. 128, 650 (1962)].

I have recently concerned myself with the A resonance of AX_3 groups (trigonal symmetry), a case slightly different than that considered by Hubbard. In the process, I have investigated the conditions under which cross-correlation can be neglected. The entire treatment is rather lengthy—it is available in preprint form and will be published in J. Phys. Chem. early this year—but the conclusions can be briefly stated.

Neglecting these terms does NOT depend on (a) the extreme narrowing approximation or (b) the assumption of isotropic re-orientation of the molecule. (These assumptions were made by Hubbard and in most other work in this area.)

Neglecting these terms DOES depend critically on (a) the high temperature approximation $\hbar\omega_0 \ll kT$ and (b) high symmetry.

Briefly stated: in the special case considered (AX_3), if the total spin of a group of equivalent species S is $S(T) = \sum_i S(i)$, then cross-correlation can be neglected if

$$\langle S^2(T) \rangle = \sum_i \langle S^2(i) \rangle.$$

No other cases are worked out in detail, but the method used should be useful in other cases.

Yours very truly,


Joseph H. Noggle
Assistant Professor

varian/611 hansen way/palo alto/california 94303/u.s.a./415/326-4000



January 31, 1968

Professor B. L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

Dear Barry,

One Silly Millihertz¹

Among the many experimental challenges presented by NMR, one of the most intriguing is the possibility of defeating the line broadening that arises from inhomogeneity of the magnet. In this respect the spin echo and double resonance techniques are related. If we think of the sample as an assembly of a large number of spin "isochromats", the scrambling of these individual frequencies by the non-uniform field distribution can in principle be reversed or circumvented. The trick in spin echo experiments is the refocussing effect of a 180° pulse; double resonance experiments which depend on intramolecular coupling mechanisms carry a certain immunity to inhomogeneity broadening since the applied field is very uniform over molecular distances.

This can be exploited to detect previously unresolvable fine structure on NMR lines using many diverse double irradiation techniques². We would like to describe here an adaptation of a classic experiment by Bloembergen, Purcell and Pound³ which permits us to "look inside" the magnet inhomogeneity broadening and thus make some precise frequency measurements. The idea is to saturate a very narrow region of a sharp high resolution line (ω_{ab}) creating a "hot spot" or region of localized saturation, the remainder of the active sample volume being essentially unaffected. Bloembergen et al. call this "burning a hole in the line". In addition to this "primary hole" in ω_{ab} , there is also a secondary hole in any line ω_{bc} that is regressively connected to ω_{ab} , due to the perturbation of the spin population on the common level b. (The progressive configuration gives rise to a "spike", usually a very poorly defined feature experimentally.)

Unfortunately a line with a hole closely resembles the profile observed in a spin tickling experiment where the coherence effect of H_2 produces a line splitting effect, and where field inhomogeneity broadening is partially compensated, generating what also appears to be a very narrow "hole".

1. We apologize to those readers fortunate enough to be outside the range of American tobacco advertisements.
2. R. Freeman and Bo Gestblom, J. Chem. Phys. 47, 2744 (1967).
3. N. Bloembergen, E. M. Purcell and R. V. Pound, Phys. Rev. 73, 679 (1948).



Professor B. L. Shapiro

-2-

January 31, 1968

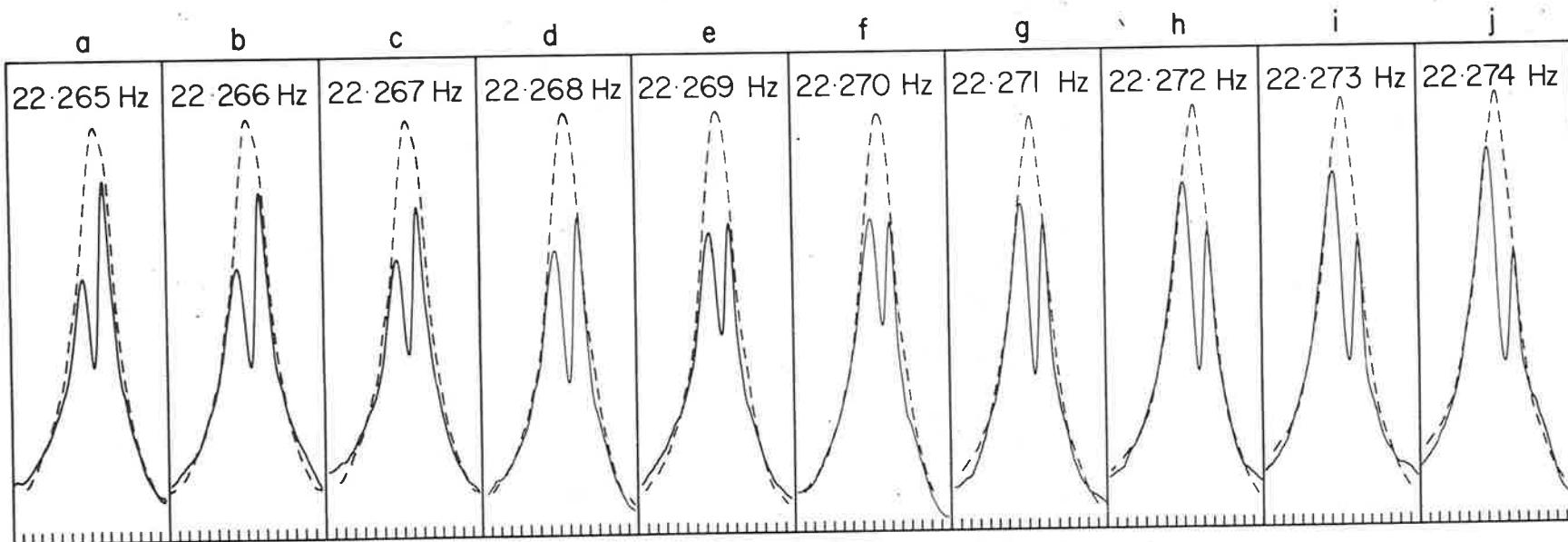
Although both effects, saturation and splitting, clearly operate together, we believe we can show that at the low rf levels we use (three or four microgauss) the population effect is dominant in determining the observed profile. The tickling effect does contribute it seems, because we have no really unequivocal evidence of a hole on an unconnected transition as yet, although this is theoretically possible for a pure population effect⁴.

The hole burning experiment puts certain new demands on the NMR spectrometer, particularly on the stability of the three audiofrequency oscillators required to generate sidebands for the irradiation, observing, and control fields. Line-broadening influences other than field inhomogeneity must be carefully excluded. Special attention was therefore given to the problems created by excessive sweep rate, residual field-frequency instability, radiation damping, natural line widths, unresolved fine structure, power broadening, and instability in the gradients of the magnet field. Attention to these details resulted in a single resonance line with a full width of 0.03 Hz, while a typical hole was about 0.01 Hz wide.

The profile of a line in which a hole has been burned is extremely sensitive to the frequency of the irradiation field. The figure shows an experimental demonstration of this claim, the profile of a line ω_{bc} being recorded while the frequency used to irradiate a regressive line ω_{ab} is varied in steps of 1 millihertz. Were it not for distortion due to the finite sweep rate, exact centering of the irradiation field on line ω_{ab} would give a perfectly centered hole in ω_{bc} , permitting a very accurate determination of the separation $\omega_{ab} - \omega_{bc}$ by noting the frequency of the observing field at the center of the hole. Sweep rates as low as 15 millihertz/minute were used and the residual errors due to finite sweep rate cancelled by making recordings in both sweep directions. The precision of these frequency difference measurements was estimated to be of the order ± 1 millihertz.

This suggests some unusual new applications. An extremely weak physical perturbation of the nuclear precession frequencies should now be detectable, and one immediately thinks of isotope effects on shifts or coupling constants, very weak molecular alignments, non-linear chemical shielding, etc. We have been able to show that even the observing rf field H_1 at a normal non-saturating level of

4. V. Siniivee and E. Lippmaa, Comm. Estonian Academy of Science, 14, 564 (1965).



HUNDREDTHS OF HERTZ

4 microgauss displaces certain lines of a complex spectrum a detectable amount (2 millihertz), in a fashion analogous to the Bloch-Siegert shift⁵. In another experiment we measured the transition frequencies of an ABC spectrum to provide input data for the iterative analysis programs MARIP⁶ and LAOCOON⁷. Both programs gave identical calculated frequencies (when rounded off to the nearest 0.1 millihertz), and agreed with the experimental frequencies with a mean deviation of 0.8 millihertz. Measurements along these lines might be compared with theoretical frequencies (obtained without iteration) to test the accuracy of the spin Hamiltonian on which so much analysis work is based.

5. F. Bloch and A. Siegert, Phys. Rev. 57, 522 (1940).

6. J. D. Swalen and C. A. Reilly, J. Chem. Phys. 37, 21 (1962).

7. S. M. Castellano and A. A. Bothner-By, J. Chem. Phys. 41, 3863 (1964).

Yours sincerely,

Ray
Ray Freeman

Bo Gestblom
Bo Gestblom*

* Now at the Institute of Physics,
University of Uppsala, Sweden.



NORTHERN ILLINOIS UNIVERSITY

DEKALB, ILLINOIS 60115

THE MICHAEL FARADAY LABORATORIES
DEPARTMENT OF CHEMISTRY

February 2, 1968

Area Code 815

Telephone 753-1181

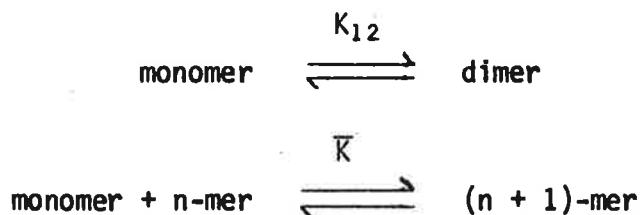
Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, California 94305

HYDROGEN BONDING IN AMIDES

Dear Barry:

We are presently carrying out hydrogen bonding studies of N-methylacetamide, N-isopropylacetamide and N-t-butylacetamide in carbon tetrachloride and dioxane at varying temperatures. The measurement of chemical shifts of the nitrogen proton plotted against mole fraction of NMA in dioxane are shown in Figure 1.

The method of analysis of the data to obtain K_{12} and \bar{K} has been described.¹



Our computer program accepts estimates of K_{12} and \bar{K} , uses them with the experimental data, and yields the sum of the squares of the deviations of the chemical shifts from a least-squares plot along with the chemical shift of the monomer and of the H-bonded proton.¹ We are currently modifying the program to allow the computer to vary K_{12} and \bar{K} , and thus more quickly find the set which gives the smallest deviations.

Our goals are to find (1) the enthalpies of self-association of the amides (2) how these enthalpies are affected by solvent and by the structure of the amide (3) if the chemical shift of the H-bonded proton in the amide-amide bond is sensitive to solvent and/or temperature effects, and (4) how the monomer chemical shift is changed by the solvent.

I would like to acknowledge the assistance of Mr. Chang Y. Chang and Mr. Lester Isbrandt, who are now graduate students at Northern Illinois University and at Michigan State University, respectively, with this project.

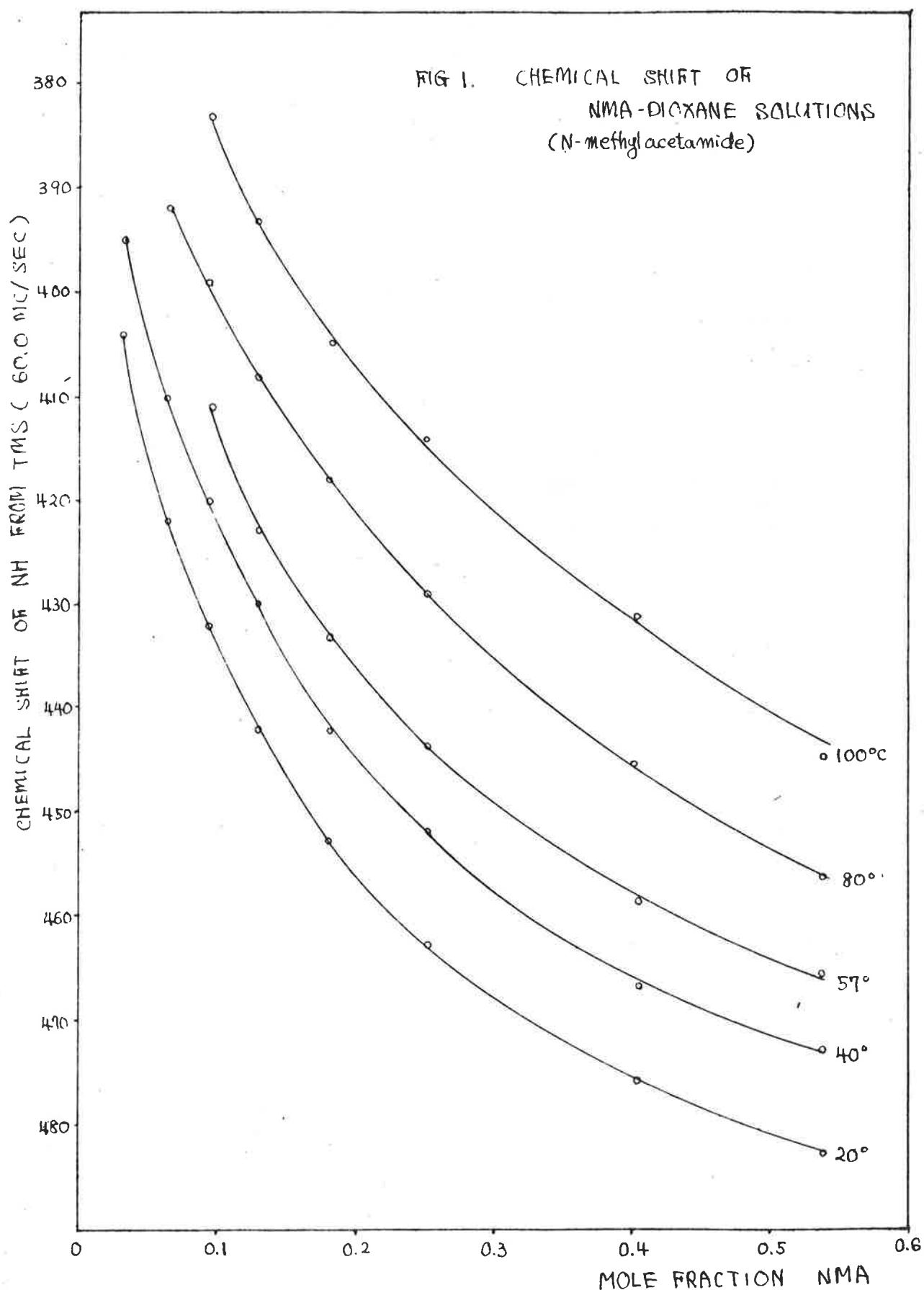
Sincerely yours,

A handwritten signature in cursive ink, appearing to read "Lori".

Laurine LaPlanche Graham

LLG:plk

1. L. A. LaPlanche, H. B. Thompson and M. T. Rogers, *J. Phys. Chem.*, 69, 1482 (1965).



CARNEGIE-MELLON UNIVERSITY
DEPARTMENT OF CHEMISTRY - 4400 FIFTH AVENUE - PITTSBURGH, PA. 15213

OFFICE OF THE CHAIRMAN

30 January 1968

Dr. Bernard L. Shapiro
Department of Chemistry
Stanford University
Stanford, Calif. 94305

Dear Barry:

We hasten to send you a title of our own for our recent letter (IIT NMR 112, 60), as the one you devised seems to us to be an unwarranted admonition. Our suggestion would be "Symmetry no Stymie for LAOCOON".

Sincerely,

W. L. Mock

W. L. Mock

Turc

S. M. Castellano

M. P. Williamson

M. P. Williamson

Bothner-By

A. A. Bothner-By

P. S. Suggested title for this letter (we won't fall into that trap again): "Seria risu risum, seriis discutere".

CARNEGIE-MELLON UNIVERSITY

BIBLIOGRAPHY

"Olefinierungen mit Phosphor-Yliden, I. Mechanismus und Stereochemie der Wittig-Reaktion"
M. Schlosser und K. F. Christmann
Ann. Chem. 708, 1 (1967)

"Untersuchungen über Schiffische Basen, VI. Protonenresonanz-Untersuchungen zur syn-anti-Isomerisierung von Iminen"
D. Wurmb-Gerlich, F. Vögtle, A. Mannschreck und H. Staab
Ann. Chem. 708, 36 (1967)

"Protonenresonanz-Untersuchungen zur syn-anti-Isomerie bei Imino-kohlensäureestern und Imino-thiokohlensäureestern"
F. Vögtle, A. Mannschreck und H. A. Staab
Ann. Chem. 708, 51 (1967)

"Nachweis innermolekularer Beweglichkeit durch NMR-Spektrometrie, II. cis-trans-Isomerie bei Kernsubstituierten Acetaniliden"
H. Kessler und A. Rieker
Ann. Chem. 708, 57 (1967)

"Fluor-Derivate biogener aliphatischer Aminosäuren"
H. Lettré und U. Wölcke
Ann. Chem. 708, 75 (1967)

"Arylierte Phenanthrole aus 2,4,6-Triphenyl-chinolen und Acetylcarbonsäuren"
K. Dimroth und H. Perst
Ann. Chem. 708, 86 (1967)

"Bicyclische Verbindungen, IX. Einfluß der Struktur auf die Umlagerungsfähigkeit bicyclischer Verbindungen"
W. Kraus
Ann. Chem. 708, 127 (1967)

"Zur Kenntnis der Nef-Reaktion, V. Umsetzung von β -Nitro- β -methyl-styrol und 1-Nitro-1-phenyl-2- β -chlor-phenyl- β -ethylen mit Acetessigester"
F. Boberg, A. Marei und K. Kirchhoff
Ann. Chem. 708, 142 (1967)

"Chemie nucleophiler Carbene, XII. Untersuchungen an Benzo- und Naphtho-2,1-dithiazolium-Salzen"
H.-W. Wanzlick, H.-J. Kleiner, I. Lasch, H. U. Küldner und H. Steinmaus
Ann. Chem. 708, 155 (1967)

"Über die Bestandteile des Reife, XIV. Über die Sterine von Candida utilis"
H. Morimoto, I. Imada, T. Murata und N. Matsumoto
Ann. Chem. 708, 230 (1967)

"Des Oxadiazoles 1,3,4 : Synthèses et Étude des Propriétés des Dérivés de l'acide (Phénol-5 Oxadiazol-1,3,4 Yl-2) Acétique"
R. Milcent
Ann. Chim. 2, 169 (1967)

"De l'acide Triméthyl-2,2,6 Tétrahydropyranne Dicarboxylique-3,6 cis (Acide Cinéolique) et de ses Dérivés"
V. M. Thuy
Ann. Chim. 2, 183 (1967)

"Dehydration of 3-Acetylglutaric Acid"
E. Winterfeldt
Angew. Chem. Intern. Ed. Engl. 6, 172 (1967)

"Rearrangements of the Triasterane System"
U. Biethan, H. Klusacek and H. Musso
Angew. Chem. Intern. Ed. Engl. 6, 176 (1967)

"2-Aminoethylation of Indole and of 2-Methylindole"
E. Pfeil and U. Harder
Angew. Chem. Intern. Ed. Engl. 6, 178 (1967)

"The Structure of the Juvenile Hormone"
H. Röller, K. H. Dahm, C. C. Sweely and B. M. Trost
Angew. Chem. Intern. Ed. Engl. 6, 179 (1967)

"Detection of Hydrogen Bridges between Inosine and Other Nucleosides by NMR Spectroscopy"
K. H. Scheit
Angew. Chem. Intern. Ed. Engl. 6, 180 (1967)

"Novel Rearrangement Processes of Transition Metal Carbene Complexes"
E. O. Fischer and R. Aumann
Angew. Chem. Intern. Ed. Engl. 6, 181 (1967)

"Preparation and Reactions of Diazetidine Derivatives"
E. Fahr, W. Fischer, H. P. Flemming, A. Jung, K. H. Keil, K. Königsdorfer, J. Markert, L. Sauer, F. Scheckenbach and R. Thiedemann
Angew. Chem. Intern. Ed. Engl. 6, 183 (1967)

"Fluorothiocarbonyl Isothiocyanate"
A. Haas and W. Klug
Angew. Chem. Intern. Ed. Engl. 6, 940 (1967)

"Substituent Effects of β -Trimethylsilyl Groups in Bis-, Tetrakis-, and Hexakis-(trimethylsilyl)- p -xylanes"
H. Bock and H. Alt
Angew. Chem. Intern. Ed. Engl. 6, 942 (1967)

"Linear Relation between Chemical Shifts of the ^{31}P Resonance and Hammett Constants"
A. Schmidpeter and H. Brecht
Angew. Chem. Intern. Ed. Engl. 6, 945 (1967)

"Ring Contraction on Oxidation of Phenyl-substituted Resorcinols"
H. Güsten, G. Kirsch and D. Schulte-Forlinde
Angew. Chem. Intern. Ed. Engl. 6, 948 (1967)

"New High-temperature Initiators"
Ch. Richardt and G. Hamprecht
Angew. Chem. Intern. Ed. Engl. 6, 949 (1967)

"Isomeric Peroxy Esters of Sugar Carboxylic Acids"
M. Schulz and P. Berlin
Angew. Chem. Intern. Ed. Engl. 6, 950 (1967)

"Stereosechemistry of the Cycloaddition of Sulfonyl Isocyanates and N -Sulfinylsulfonamides to Enol Ethers"
F. Effenberger and G. Kiefer
Angew. Chem. Intern. Ed. Engl. 6, 951 (1967)

"Chemical Shifts of NMR Signals of the Acetyl Protons of β -Penta-O-acetylglucose"
K. Heyns, W.-P. Trautwein, and F.G. Espinosa
Angew. Chem. Intern. Ed. Engl. 6, 955 (1967)

"Fluoro-coenzyme Q₁ (Fluoroubiquinone-5)"
H. Schumacher and H. Machleidt
Angew. Chem. Intern. Ed. Engl. 6, 957 (1967)

"Pyrazolo[3,4- b]pyridines"
H. Dorn and A. Zubek
Angew. Chem. Intern. Ed. Engl. 6, 958 (1967)

"The Structures of Lythrarine, Lythrarine, and Lythramine, Novel Alkaloids from Lythrum Anceps Makino"
E. Fujita, K. Fuji, K. Bessho, A. Sumi and S. Nakamura
Tetrahedron Letters 4595 (1967)

"Relationship between NMR Deshielding Effects and Nitrite Photolysis in $3\alpha,5\alpha$ -Cyclocholestane- 6β -OL"
H. Sugimoto, T. Tsuneno and T. Masamune
Tetrahedron Letters 4605 (1967)

"The Preferred Half-Chair Conformation of Ring A in $5(10)$ -Estrenes"
S. G. Levine, D. M. Feigl, and N. H. Eudy
Tetrahedron Letters 4615 (1967)

"The Photochemistry of Fenchone in Hydroxylic Medium"
P. Yates and A. G. Fallis
Tetrahedron Letters 4621 (1967)

"Spin Coupling in N-Acyldihydroisoindoles"
J. T. Gerig
Tetrahedron Letters 4625 (1967)

"NMR Spectral Parameters of Monosubstituted Benzenes: Halobenzenes"
S. Castellano, R. Kostelnik and C. Sun
Tetrahedron Letters 4635 (1967)

"A Proton Magnetic Resonance Solvation Study of Aluminum Chloride in Dimethylsulfoxide-Water Mixtures"
A. Fratiello and R. Schuster
Tetrahedron Letters 4641 (1967)

"New Convenient Syntheses of Substituted Cyclobutenes"
L. A. Paquette and J. C. Philips
Tetrahedron Letters 4645 (1967)

"Terpenoids of the Micromerias.—I. Two New Triterpenic Acids Isolated from Micromeria Benthami Webb et Berth."
J. Bermejo, J. L. Bretón, G. de la Fuente and A. G. González
Tetrahedron Letters 4649 (1967)

"Sesquiterpenoids from the Essential Oil of Cyperus Rotundus"
V. H. Kapadia, V. G. Naik, M. S. Wadia and Sukh Dev
Tetrahedron Letters 4661 (1967)

"Macrocyclic Orthoester of Glucose: A New Type of Sugar Derivative"
N. K. Kochetkov and A. F. Bochkov
Tetrahedron Letters 4669 (1967)

"Structure of Spiroethers Derived from Products of the Yeast Fermentation of the 3-Methoxy-14-Seco-D-Homo- $1,3,5(10),9(11)$ -Estratetraenone- $14,17\alpha$ "
L. M. Kogan, V. E. Gulaya, and I. V. Torgov
Tetrahedron Letters 4673 (1967)

"Triterpene Hydrocarbons from Oleandra Wallichii"
G. N. Pandey and C. R. Mitra
Tetrahedron Letters 4683 (1967)

"Derivatives of 5-Methylisoindolo [1,2-b]-Benzimidazole, a New Aromatic System"
W. G. Salmon
Tetrahedron Letters 4689 (1967)

"Zur Stereochemie der 1,2-Cycloaddition an das Bicyclo [2.1.0]system"
W. R. Roth und M. Martin
Tetrahedron Letters 4695 (1967)

"Die ungewöhnlichen Reaktionen des Diazomethans mit der Phthalidcarbonsäure"
H. Inouye, T. Okuda, N. Nagakura und M. Okigawa
Tetrahedron Letters 4713 (1967)

"Zanthorin, ein Anthrachinonpigment aus Xanthoria Elegans (Link) Th.Fr."
W. Steglich, W. Lösel und W. Reininger
Tetrahedron Letters 4719 (1967)

"Photochemische Reaktionen von Aromaten mit Konjugierten Dienen. III. Neue Addukte von Benzol und Naphthalin an Isopren. Untersuchungen zum Reaktionsmechanismus"
K. Kraft and G. Koltzenburg
Tetrahedron Letters 4723 (1967)

"Qualitative Structural Chemistry in Solution. The Complete R-Value Analysis of Six-membered Rings"
J. B. Lambert and R. G. Keske
Tetrahedron Letters 4755 (1967)

"Spectral Properties of exo- and endo-Tricyclo[3.2.1.0]^{2,4} octan-8-ones"
R. E. Pincock and J. Haywood-Farmer
Tetrahedron Letters 4759 (1967)

"Aziridines XVII. Reactions of 7-Benzyl-2,5-Diphenyl-3,4,7-Triaza-2,4-Norcaradiene"
H. W. Heine and J. Irving
Tetrahedron Letters 4767 (1967)

"The Synthesis of Hexose Derivatives from Cyclitols Part I. The Synthesis of (+)-Allose Derivatives from myo-Inositol"
H. Fukami, H.-S. Koh, T. Sakata, and M. Nakajima
Tetrahedron Letters 4771 (1967)

"Diterpenes of the Cascarillin Group from Dodonaea spp"
P. R. Jefferies and T. G. Payne
Tetrahedron Letters 4777 (1967)

"Daphniphyllum Alkaloids. Part II. The Isolation and the Structures of the Alkaloids from Daphniphyllum Macropodum Miquel"
T. Nakano and Y. Saeki
Tetrahedron Letters 4791 (1967)

"Non Equivalence Magnetique en Resonance Nucleaire III-Diastereoisomères Comportant une Dissymétrie Allénique et Phenomenes Associes de Non Equivalence Magnetique"
M. L. Martin, R. Mantione et G. J. Martin
Tetrahedron Letters 4809 (1967)

"Notiz über die Umsetzung von Phenylacetylene-Jodid BZW. Bromid mit β -Dicarbonylverbindungen"
K. E. Schulte, H. Walker und J. Feldkamp
Tetrahedron Letters 4815 (1967)

"A New Class of Triterpenoids from Ailanthus Malabarica DC—Derivatives of Malabaricane"
A. Chawla and S. Dev.
Tetrahedron Letters 4837 (1967)

"Chemical Examination of Diospyros Species-Part V.: A Novel Aromatisation of Ring B and Other Reactions of Bauerenol"
L. Ramachandra Row and C. Sankara Rao
Tetrahedron Letters 4845 (1967)

"Synthesis of a Mixture of (+)-Dehydrojuvabione and Its Stereoisomer"
K. Mori and M. Matsui
Tetrahedron Letters 4853 (1967)

"The Structure of Diospyrol, the Principle from the Fruit of Diospyros Mollis"
K. Yoshihira, S. Natori and (in part) (Miss) P. Kanchanapee
Tetrahedron Letters 4857 (1967)

"Difluorothiophosphoryl Fluorosulfate"
M. Lustig
Angew. Chem. Intern. Ed. Engl. 6, 959 (1967)

"Detection of Intramolecular Mobility in Quinoid Systems by NMR Spectroscopy"
H. Kessler
Angew. Chem. Intern. Ed. Engl. 6, 977 (1967)

"Molecular Structure and Magnetic Anisotropy of Amides"
K. Todt and H. Paulsen
Angew. Chem. Intern. Ed. Engl. 6, 989 (1967)

"Zur Konformation heteroaromatischer S- α -D-Glucoside.
28. Mitt. Über Glykoside von Heterocyclen"
P. Nuhn, W. Bley und G. Wagner
Arch. Pharm. 300, 926 (1967)

"Darstellung von ω -Aminosäuren aus Cyclanon-Mannichbasen.
I. Mitt.: Photochemische Reaktionen mit Mannichbasen"
H. J. Roth und E. Schumann
Arch. Pharm. 300, 948 (1967)

"Hydrierungen von m-Kresoläthern mit Platin-Rhodium nach Nishimura"
F. Zymalkowski und T. Yupiterat
Arch. Pharm. 300, 969 (1967)

"Studies on the Chemistry of Lichens. 25. A Stereo-specific Synthesis of (+)-roccellic Acid"
B. Åkermark and N.-G. Johansson
Arkiv Kemi 27, 1 (1967)

"Studies on the Chemistry of Lichens. 26. A Stereo-specific Synthesis of (+)-norrangiformic Acid"
B. Åkermark
Arkiv Kemi 27, 11 (1967)

"Tautomerism in Substituted Benzofulvenes"
P. Ahlberg and G. Bergson
Arkiv Kemi 27, 59 (1967)

"Proton Magnetic Resonance of Pyrimidines. III. Signs of Proton Spin Couplings.
B. Rodmar (née Mathiasson), S. Rodmar, A. Ali Khan and S. Gronowitz
Arkiv Kemi 27, 87 (1967)

"The Synthesis of Some Highly Substituted Benzene Derivatives and Several New Biphenyls"
R. E. Carter and L. Dahlgren
Arkiv Kemi 27, 257 (1967)

"Syntheses of Tetrahydronaphthyridines"
F. Haglid
Arkiv Kemi 26, 489 (1967)

"Optically Active Bithienyls. VIII. On the Synthesis of 3,3',6,6'-tetramethyldiphenic Acid"
S. Gronowitz and G. Hansen
Arkiv Kemi 27, 145 (1967)

"Optically Active Bithienyls. IX. On the Synthesis of 2,2'-dicarboxy-4,4'-dimethyl-3,3'-bithienyl"
S. Gronowitz and S. Hagen
Arkiv Kemi 27, 153 (1967)

"A Solvent Effect on the Conformation of Aromatic Nitro Groups"
I. D. Rae
Australian J. Chem. 20, 2381 (1967)

"The Chemical Constituents of Australian Zanthoxylum Species. IV. Two New Coumarins from Z. Suberosum C. T. White (Syn. Z. Dominianum Merr. & Perry; Z. Ovalifolium Wight)
G. B. Guise, E. Ritchie, R. G. Senior, and W.C. Taylor
Australian J. Chem. 20, 2429 (1967)

"Pyridinium Ylids in Synthesis. III. Synthesis of Indolizines"
C. A. Henrick, E. Ritchie, and W.C. Taylor
Australian J. Chem. 20, 2467 (1967)

"Cyclic Nitrones. II. Reactions of a Cyclic α -Keto Nitrone with Acetic Anhydride, Acetone, and Methyl Acetoacetate"
R. F. C. Brown, W. D. Crow, L. Subrahmanyam, and C. S. Barnes
Australian J. Chem. 20, 2485 (1967)

"The Alkaloids of Cynoglossum Australae R.Br. and C. Amabile Stapf & Drummond"
C. C. J. Culvenor and L. W. Smith
Australian J. Chem. 20, 2499 (1967)

"A New Monoterpene Alkaloid (RW47) from Rauwolfia Verticillata (Lour.) Bail. of Hong Kong"
H. R. Arthur, S. R. Johns, J. A. Lamberton, and S. N. Loo
Australian J. Chem. 20, 3505 (1967)

"Spontaneous Reactions of 1,3-Substituted 1,4-Dihydro-pyridines with Acids in Water at Neutrality. II. Nuclear Magnetic Resonance Studies"
K. S. Choi and S. G. A. Alivisatos
Biochem. 7, 190 (1968)

"Isolation and Identification of 5-Hydroxy-4-ketovaleric Acid as a Product of α -Ketoglutarate: Glyoxylate Carboligase"
M. A. Schlossberg, D. A. Richert, R. J. Bloom, and W. W. Westerfeld
Biochem. 7, 333 (1968)

"Metabolism of Ethylmalic Acids by Pseudomonas aeruginosa"
R. Rabin, I. I. Salamon, A. S. Bleiweis, J. Carlin, and S. J. Ajl
Biochem. 7, 377 (1968)

"Model Reactions for the Biosynthesis of Thyroxine. XII. The Nature of a Thyroxine Precursor Formed in the Synthesis of Thyroxine from Diiodotyrosine and Its Keto Acid Analog"
A. Nishinaga, H. J. Cahnmann, H. Kon, and T. Matsuura
Biochem. 7, 388 (1968)

"Interaction between Diacetylchitobiose Methyl Glycoside and Lysozyme as Studied by NMR Spectroscopy"
E. W. Thomas
Biochem. Biophys. Res. Commun. 29, 628 (1967)

"14 α -Hydroxyoestrone, a New Oestrogen Metabolite"
R. Knuppen, O. Haupt and H. Breuer
Biochem. J. 105, 971 (1967)

"ADDENDUM: "Chemical Synthesis of Cholest-7-ene-3 β ,5 α -diol"
S. M. Dewhurst, R. S. A. Kelly, J. Hudec and M. Akhtar
Biochem. J. 105, 1194 (1967)

"An Octadecatrienoic Acid from Lamium purpureum L. Seed Oil Containing 5,6-Alenic and trans-6-Olefinic Unsaturation"
K. L. Mikolajczak, M. F. Rogers, C. R. Smith, jun. and I. A. Wolff
Biochem. J. 105, 1245 (1967)

"Ternary Complexes in Solution. Influence of 2,2'-Bipyridyl on the Stability of 1:1 Complexes of Co²⁺, Ni²⁺, Cu²⁺, and Zn²⁺ with Hydrogen Phosphate, Adenosine 5'-Monophosphate, and Adenosine 5'-Triphosphate"
H. Sigel, K. Becker and D. B. McCormick
Biochim. Biophys. Acta 148, 655 (1967)

"Die Methylierung von Inosin und Uridylyl-(3'-5') Inosin Durch Dimethylsulfat"
K.-H. Scheit and A. Holz
Biochim. Biophys. Acta 149, 344 (1967)

"Structures of New Gibberellins in Immature Seeds of
Canavalia Gladiata"
N. Takahashi, N. Murofushi, T. Yokota and S. Tamura
Tetrahedron Letters 4861 (1967)

"Occurrence of Isousnic Acid in Lichens with Reference
to 'Isodihydrousnic Acid' Derived from Dihydrousnic
Acid"
S. Shibata and H. Taguchi
Tetrahedron Letters 4867

"cis-4 α ,5,8,8 α -Tetrahydro-6,7-Di-(Bromomethyl)naphthoquinone
from 2,3-Di-(Bromomethyl)-1,3-Butadiene"
G. B. Butler and R. M. Ottenbrite
Tetrahedron Letters 4873 (1967)

"Additional Evidence for Homoallenyl Participation"
T. L. Jacobs and R. Macomber
Tetrahedron Letters 4877 (1967)

"The Nuclear Magnetic Resonance Spectrum of Protopine:
Rate of Racemization and Ring Inversion"
F. A. Anet and M. A. Brown
Tetrahedron Letters 4881 (1967)

"Terpene Alcohols of *Helichrysum Dendroideum*"
H. A. Lloyd and H. M. Fales
Tetrahedron Letters 4891 (1967)

"Photochemical Reactions of Enamides"
N. C. Yang and G. R. Lenz
Tetrahedron Letters 4897 (1967)

"Thermal Rearrangements of cis-Bicyclo[6.2.0]Deca-9-
enes and a New Cope Rearrangement"
P. Radlick and W. F. Nical
Tetrahedron Letters 4901 (1967)

"Asymmetric Induction. II. On the Extent of Bond
Breaking and Making in the Transition States of Some
Additions of Carbonyls"
G. J. Karabatsos and T. H. Althuis
Tetrahedron Letters 4911 (1967)

"Cyclic Ethylene Ketals of Strained α -Chlorinated Ketones"
R. J. Steedman, L. D. Davis and L. S. Miller
Tetrahedron Letters 4915 (1967)

"3,4-Diazacyclopentadienone Oxides. Derivatives of a
New Heterocyclic System"
J. P. Freeman and D. L. Surbey
Tetrahedron Letters 4917 (1967)

"Synthesis in the Series of Lycopodium Alkaloids. VII.
The Synthesis of 12-epi-Lycopodine"
H. Dugas, (Mrs.) M. E. Hazenberg, Z. V lenta and K.
Wiesner
Tetrahedron Letters 4931 (1967)

"Additions Dipolaires 1-3 Avec Les Cetoxyimes Syntheses
d'Isoxazolidines"
A. Lablache-Combier, M.-L. Villaume et R. Jacquesy
Tetrahedron Letters 4959 (1967)

"Fragmentierungsreaktionen an Carbonylverbindungen mit
 β -Sträfigen Elektronennegativen Substituenten, VIII.
Reaktion Komplexer Hydride mit β -Tosyloxyaldehyden"
F. Nerdel, H. Kaminski und D. Frank
Tetrahedron Letters 4973 (1967)

"Photooximierung von Norbornan-1,4,7-d₃ und Adamantan-1,
3,5,7-d₄"
E. Müller und U. Trese
Tetrahedron Letters 4979 (1967)

"Das Azabullvalensystem"
P. Wegener
Tetrahedron Letters 4985 (1967)

"Beitrag zur Radikalischen Chlorierung von Alkylchloriden"
W. Mack
Tetrahedron Letters 4993 (1967)

"The Structure of (4+2) π Type Tropone Photodimer"
T. Tezuka, Y. Akasaki and T. Mukai
Tetrahedron Letters 5003 (1967)

"The Constitution and Stereochemistry of ϵ -Caesalpin"
A. Balmain, K. Bjamer, J. D. Connolly and G. Ferguson
Tetrahedron Letters 5027 (1967)

"Spektroskopische und theoretische Untersuchungen am
Borazolmolekül und seinen Bortrihalogenoderivaten"
K. Hensen and K. P. Messer
Theoret. Chim. Acta 9, 17 (1967)

"Electrolyte Solutions in Dimethyl Sulphoxide. Part 3.
Rubidium Iodide"
J. M. Crawford and R. P. H. Gasser
Trans. Faraday Soc. 63, 2758 (1967)

"Notiz über die Bromierung und Enolacetylierung von
3 β ,28-Diacetoxy-30-nor-19 β H-lupan-20-on"
F. Fischer, P. Palitzsch und S. Huneck
Z. Chem. 7 390 (1967)

"Untersuchungen der kernmagnetischen Resonanz von
Phosphorverbindungen, XIV. Chemische Verschiebungen
von Phosphinen, Phosphoniumsalzen und Diphosphino-
Nickel(II)-chloriden"
E. Fluck und J. Lorenz
Z. Naturforsch. 22b, 1095 (1967)

"³¹P-Kernresonanz-Untersuchungen an festen Additions-
verbindungen des TiCl₄ und SnCl₄ mit PCl₅"
W. Wieker und A.-R. Grimmer
Z. Naturforsch. 22b, 1220 (1967)

"Rotationsisomerie im Glycidaldehyd"
D. Wendisch
Z. Naturforsch. 22b, 1227 (1967)

"5-tert.-Butyldihydroxyrogallol und 5-Methyldihydro-
pyrogallol, zwei neue 6-Ring-aci-Reduktone"
P. Thieme
Z. Naturforsch. 22b, 1230 (1967)

"NMR Data Tables for Organic Compounds"
F. A. Bovey
Vol. 1. New York, Interscience (1967)

"Synthesis and Catalytic Hydrogenation of 3 α ,19-Dihydro-oxyclestan-5-ene and Its Derivatives"
Y. Watanabe, Y. Mizuhara, and M. Shiota
J. Org. Chem. 33, 468 (1968)

"The Preparation of Some Phenoxyphosphine Derivatives by the Friedel-Crafts and Diazo Reactions"
J. B. Levy, L. D. Freedman and G. O. Doak
J. Org. Chem. 33, 474 (1968)

"Unprecedented Orientation in the Nitration of Certain 3-Hydroxypyridines"
R. C. De Selms
J. Org. Chem. 33, 478 (1968)

"Opium Alkaloids VI. Isolation of N-Methyl-14-O-desmethyllepiphyroxine"
E. Brochmann-Hanssen, K. Hirai, B. Nielsen, S. Pfeifer, I. Mann, and L. Kühn
J. Pharm. Sci. 57, 30 (1968)

"Synthesis and Antibacterial Activity of Certain 3-Substituted Benzoxazolinones"
R. S. Varma and W. L. Nobles
J. Pharm. Sci. 57, 39 (1968)

"Preparation of Some Phenyl Pyridyl Ethers with Antifungal and Antibacterial Properties"
R. O. Muhlhäuser and E.C.Jorgensen
J. Pharm. Sci. 57, 151 (1968)

"Effect of Molecular Conformation on Interaction of Organic Species in Water. Benzamides and Anisamides with Theophylline and Riboflavin"
M. Nakano and T. Higuchi
J. Pharm. Sci. 57, 183 (1968)

"Peyote Alkaloids IV. Structure of Peyonine, Novel β -Phenethylpyrrole from *Lophophora williamsii*"
Govind J. Kapadia and R. J. Hight
J. Pharm. Sci. 57, 191 (1968)

"Conformation of 1-Methoxy-2-propanol in Dilute Solution"
T. Hirano and T. Tsuruta
J. Phys. Chem. 71, 4184 (1967)

"The Acid Dissociation Constants of Substituted Methane-diphosphonic Acids: A Correlation with P^{31} Magnetic Resonance Chemical Shift and with Taft σ' "
R. J. Grabenstetter, O. T. Quimby and T. J. Flatt
J. Phys. Chem. 71, 4194 (1967)

"Electronic and Molecular Structure of Selected Unsubstituted and Dimethyl Amides from Measurements of Electric Moments and Nuclear Magnetic Resonance"
W. P. Purcell and J. A. Singer
J. Phys. Chem. 71, 4316 (1967)

"The Reversible Hydration of 2- and 4-Pyridinecarboxaldehydes. I. Equilibrium Studies"
Y. Pocker, J. E. Meany and B. J. Nist
J. Phys. Chem. 71, 4509 (1967)

" 1 H and 19 F Nuclear Magnetic Resonance Spectra of Tris(p-fluorophenyl)phosphine Oxide and Dimethyl p-Fluorophenylphosphonate"
C. E. Griffin, J. J. Burke, F. E. Dickson, M. Gordon, H. H. Hsieh, R. Obrycki, and M. P. Williamson
J. Phys. Chem. 71, 4558 (1967)

"NMR Studies on Orientation of Liquid Crystals of Poly- γ -Benzyl-L-Glutamate in Magnetic Fields"
S. Sobajima
J. Phys. Soc. Japan 23, 1070 (1967)

" C^{13} -H Coupling in Hydrocarbon Molecules"
E. Hiroike
J. Phys. Soc. Japan 23, 1079 (1967)

"Stereoregularity of Polyacrylonitrile Determined by NMR"
G. Svegliado, G. Talamini and G. Vidotto
J. Polymer Chem., Pt. A-1, 5, 2875 (1967)

"Homopolymers and Vinyl Chloride Copolymers of Vinyl Esters of Chlorinated Fatty Acids from *Umbelliferae* and *Limnanthes douglasii*"
R. Liepins and C. S. Marvel and F. C. Magne
J. Polymer Chem., Pt. A-1, 5, 2899 (1967)

"Organometallic Polymers. I. Synthesis of Ferrocene-Containing Poly(phosphine Oxides) and Poly(phosphine Sulfides)"
C. U. Pittman, Jr.
J. Polymer Chem., Pt. A-1, 5, 2927 (1967)

"A Rotatable Low Temperature Crystal Holder for Nuclear Magnetic Resonance Studies"
D. Warner
J. Sci. Instr. 44, 1028 (1967)

"Vinylpolymerisation. 175. Mitt. Polymerisation von Methylencyclobutanen"
K. Takemoto und M. Izubayashi
Makromol. Chem. 109, 81 (1967)

"Studies on Polymers from Cyclic Dienes. VII. Cationic Polymerization of Methylcyclopentadiene"
C. Aso and O. Ohara
Makromol. Chem. 109, 161 (1967)

"The Decarboxylation of Itaconic Acid Polymers"
B. E. Tate
Makromol. Chem. 109, 176 (1967)

"The Thermal Degradation of Poly(Methyl Acrylate). Part II. The Mechanism of Chain Breaking"
G. G. Cameron and D. R. Kane
Makromol. Chem. 109, 194 (1967)

"Equivalence in Anisotropic N.M.R. Spectrs: The Spectrum of Ethyl Iodide in the Nematic Phase"
C. M. Woodman
Mol. Phys. 13, 365 (1967)

"Proton Relaxation Times in 7 LiCl and 6 LiCl Solutions"
B. P. Fabricant and S.S.Goldberg
Mol. Phys. 13, 323 (1967)

"The 19 F Magnetic Resonance Absorption of CF_4 and SF_6 in Their Clathrate Hydrates"
C. A. McDowell and P. Raghunathan
Mol. Phys. 13, 331 (1967)

"The Signs of the Vicinal and Long-range Coupling Constants in Mercury Dimethyl"
R. R. Dean and W. McFarlane
Mol. Phys. 13, 343 (1967)

"N.M.R. Studies of Electrolytes in Binary Solvent Mixtures. II. Aqueous Mixtures of Acetone, Acetonitrile, Dimethylacetamide, N,N-dimethylformamide, Dimethylsulfoxide, Dioxane, Ethanol, Methanol, N-methylformamide, Tetrahydrofuran, and Tetramethylurea"
A. Fratiello, R. E. Lee, D. P. Miller and V. M. Nishida
Mol. Phys. 13, 349 (1967)

" N^{14} Chemical Shifts in Thioamides"
P. Hampson and A. Mathias
Mol. Phys. 13, 361 (1967)

"N.M.R. Measurements of Large Hyperfine Splitting Constants of Radical Ions in Solution"
G. W. Canters and E. de Boer
Mol. Phys. 13, 395 (1967)

IN |

"Reaction of Trisdialkylaminophosphines with Aromatic Aldehydes. I. The Nitrobenzaldehydes. Formation of 2,2,2-Trisamino-1,3-2-dioxaphospholanes and Their Conversion into Epoxides"
F. Ramirez, A. S. Gulati and C. P. Smith
J. Org. Chem. 33, 13 (1968)

"Reaction of Trialkyl Phosphites with Polycyclic α - and β -Quinones. Anthraquinone, the Pyrenequinones, and the Naphthoquinones"
F. Ramirez, S. B. Bhatia, A. V. Patwardhan, E. H. Chen and C. P. Smith
J. Org. Chem. 33, 20 (1968)

" α -Bromo- α -Ketol Phosphates and Enediol Bisphosphates"
F. Ramirez, K. Tasaka, N. B. Desai, and C. P. Smith
J. Org. Chem. 33, 25 (1968)

"The Reactions of Some Alicyclic 1,2-Dihalopolyfluoro Olefins with Ethanolic Potassium Hydroxide. The Effect of Ring Size on Product Distribution"
J. D. Park, R. J. McMurtry, and R. Sullivan
J. Org. Chem. 33, 33 (1968)

"The Mechanism of the Addition of Chlorine to Olefins with Iodobenzene Dichloride"
D. D. Tanner and G. C. Gidley
J. Org. Chem. 33, 38 (1968)

"Intramolecular Alkylation as an Approach to Cyclic Sulfones and Sulfides"
W. E. Truce, K. R. Hollister, L. B. Lindy, and J. E. Parr
J. Org. Chem. 33, 43 (1968)

"Perhydroindan Derivatives. VIII. Bridghead Alkylation via Cyclopropane Intermediates"
H. O. House and C. J. Blankley
J. Org. Chem. 33, 47 (1968)

"Preparation and Decomposition of Unsaturated Esters of Diazoacetic Acid"
H. O. House and C. J. Blankley
J. Org. Chem. 33, 53 (1968)

"The Use of β -Keto Sulfones as Synthetic Intermediates"
H. O. House and J. K. Larson
J. Org. Chem. 33, 61 (1968)

"Dimethyloxosulfonium 2-(Methylamino)benzoylmethylide. A New Stable Ylide and Its Use in Heterocyclic Syntheses"
A. M. van Leusen and E. C. Taylor
J. Org. Chem. 33, 66 (1968)

"A New Rearrangement of Sulfonium Ylides"
K. W. Ratts and A. N. Yao
J. Org. Chem. 33, 70 (1968)

"Highly Strained Bicyclic Systems. XII. Synthesis and Solvolysis of 1,5,5-Trimethylbicyclo[2.1.1]hex-2-yl p -Toluenesulfonate"
J. Meinwald, J. C. Shelton, G. L. Buchanan, and A. Courtin
J. Org. Chem. 33, 99 (1968)

"The Partial Synthesis of 18,19-Dinor Steroids"
W. F. Johns
J. Org. Chem. 33, 109 (1968)

"The Synthesis of Furo[2,3-c]pyridine Derivatives"
M. P. Mertes, R. F. Borne and L. E. Hare
J. Org. Chem. 33, 133 (1968)

"Dimeric Dihydropyridines Derived from 3-Cyanopyridine"
D. L. Coffen
J. Org. Chem. 33, 137 (1968)

"Reactions of O-Benzoyl Oximes with Sodium Hydride. Substituted Isoxazoles and the Neber Rearrangement"
W. B. Renfrow, J. F. Witte, R. A. Wolf, and W. R. Bohl
J. Org. Chem. 33, 150 (1968)

"The Photolysis of Some 1,6-Dienes. Total Synthesis of (+)- α -Bourbonene"
M. Brown
J. Org. Chem. 33, 162 (1968)

"Thio Sugars. Synthesis of the Adenine Nucleosides of 4- β -D-xylose and 4-Thio-D-arabinose"
E. J. Reist, L. V. Fisher and L. Goodman
J. Org. Chem. 33, 189 (1968)

"Indole and 4-Aminoindole Nucleosides"
E. Walton, F. W. Holly and S. R. Jenkins
J. Org. Chem. 33, 192 (1968)

"The Behavior of 2-Carbomethoxy- and 2-Acetyl-1,4-benzoquinone in the Nenitzescu Indole Synthesis"
G. R. Allen, Jr. and M. J. Weiss
J. Org. Chem. 33, 198 (1968)

"Reductive Ring Openings of Glutarimides and Barbiturates with Sodium Borohydride"
Y. Kondo and B. Witkop
J. Org. Chem. 33, 206 (1968)

"The Formation of N-Substituted Pyrazoles from the Pyrolysis of Certain α , β -Unsaturated Azines"
R. L. Stern and J. G. Krause
J. Org. Chem. 33, 212 (1968)

"A General Method for Preparing 2-Acetamidoacetanilides Having a Second Functional Group in the 2 Position and Affording an Access to 3-Acetamido-1,3-dihydro-2H-1,4-benzodiazepin-2-ones"
S. C. Bell, R. J. McCaully and S. J. Childress
J. Org. Chem. 33, 216 (1968)

"Base-Catalyzed Isomerization of Vinylcyclohexene and Dipentene"
S. Bank, C. A. Rowe, Jr., A. Schriesheim, and L. A. Naslund
J. Org. Chem. 33, 221 (1968)

"The Reaction of Hindered Phenols with Diazomethane"
J. S. Meek, J. S. Fowler, P. A. Monroe and T. J. Clark
J. Org. Chem. 33, 223 (1968)

"The Synthesis and Decomposition of Alkyl Nitronic Esters of 2,6-Di-t-butyl-4-nitrophenol"
J. S. Meek and J. S. Fowler
J. Org. Chem. 33, 226 (1968)

"Photocyclizations of Compounds Containing Two Anthracene Rings"
D. E. Applequist, M. A. Lintner, and R. Searle
J. Org. Chem. 33, 254 (1968)

"The Kinetics of the Reaction of 1-Phenyl-1H-tetra-
zole-5-thiol Sodium Salt with Substituted 1,4-Naphthoquinone 2,3-Epoxides"
D. F. O'Brien
J. Org. Chem. 33, 262 (1968)

"Application of Bisthio Carbanions to the Elaboration of 2-Cyclohexenone Systems"
E. J. Corey and D. Crouse
J. Org. Chem. 33, 298 (1968)

"A New Synthetic Route to Cyclic Mono- and Diketone Derivatives via Bisthio Carbanions"
D. Seebach, N. R. Jones, and E. J. Corey
J. Org. Chem. 33, 300 (1968)

"Mass Spectrometry in Structural and Stereochemical Problems. CXLVI. Mass Spectrometric Fragmentations Typical of Sterols with Unsaturated Side Chains"
S. G. Wyllie and C. Djerassi
J. Org. Chem. 33, 305 (1968)

"Anodic Methoxylation of Tertiary Amines"
P. J. Smith and C. K. Mann
J. Org. Chem. 33, 316 (1968)

"The Copper-Catalyzed Reaction of Benznorbornadiene with Benzoyl Peroxide and *t*-Butyl Perbenzoate. Nuclear Magnetic Resonance Spectra of *anti*-7-Benznorbornadiene Derivatives"
M. E. Brennan and M. A. Battiste
J. Org. Chem. 33, 324 (1968)

"Reactions of Phosphorus Compounds. XIII. Preparations and Reactions of Cyclopropyltriphenylphosphonium Bromide"
E. E. Schweizer, C. J. Berninger, and J. G. Thompson
J. Org. Chem. 33, 336 (1968)

"The Chemistry of Sulfonyl Isothiocyanates. I."
J. W. McFarland and R. W. Houser
J. Org. Chem. 33, 340 (1968)

"The Reaction of Sulfuryl Fluoride and Sulfonyl Fluorides with Fluoro Olefins"
S. Temple
J. Org. Chem. 33, 344 (1968)

"Preparation and Unusual Mass Spectra of 3,4,4-Trimethyl-5-oxo-*trans*-2-hexenoic Acid and Related Compounds"
R. Srinivasan and K. L. Rinehart, Jr.
J. Org. Chem. 33, 351 (1968)

"The Synthesis of Some 3,7-Dialkyl-3,7-Dialkyl-3,7-diazabicyclo[3.3.1]nonanes and a Study of Their Conformations"
J. E. Douglass and T. B. Ratliff
J. Org. Chem. 33, 355 (1968)

"The Reaction of Chlorosulfonyl Isocyanate with Bridged Bi- and Tricyclic Olefins 1-2"
E. J. Mariconi and W. C. Crawford
J. Org. Chem. 33, 370 (1968)

"Structural Isomer Distribution in Ring Polymers of Propylene Oxide"
R. J. Katnik and J. Schaefer
J. Org. Chem. 33, 384 (1968)

"Diels-Alder Reactions Involving Azonia Polycyclic Aromatic Compounds and Nucleophilic Dienophiles"
D. L. Fields, T. H. Regan, and J. C. Dignan
J. Org. Chem. 33, 390 (1968)

"The Synthesis of *cis*- and *trans*-2-Isoamyl-3,4-dimethyl-2,3-dihydrobenzofuran"
E. C. Hayward, D. S. Tarbell, and L. D. Colebrook
J. Org. Chem. 33, 399 (1968)

"The Favorskii Rearrangement of *cis*- and *trans*-Carvone Tribromides. I. Primary Amines"
J. Wolinsky, R. O. Hutchins, and T. W. Gibson
J. Org. Chem. 33, 407 (1968)

"The Nuclear Magnetic Resonance and Ultraviolet Spectra of Some Neutral and Protonated Cyclohexadienones"
E. C. Friedrich
J. Org. Chem. 33, 413 (1968)

"Synthesis and Nuclear Magnetic Resonance Analysis of Cyclopropyl- and 1-Bicyclo[n.1.0]alkylamines"
D. L. Muck and E. R. Wilson
J. Org. Chem. 33, 419 (1968)

"A Synthesis of Homoallylic Alcohols"
J. K. Crandall, D. B. Banks, R. A. Colyer, R. J. Watkins, and J. P. Arrington
J. Org. Chem. 33, 423 (1968)

"The Mechanism of Formation of 1-Phenylcyclobutene upon Reaction of 1-Phenyl-1,4-dichloro-1-butene with Magnesium"
A. J. Fry and R. H. Moore
J. Org. Chem. 33, 425 (1968)

"The Reactions of Acidic Reagents with Diene-Quinone Adduct Epoxides. II."
W. J. Musliner, H. S. Wilgus, III, and J. W. Gates, Jr.
J. Org. Chem. 33, 427 (1968)

"Constituents of *Brucea sumatrana* Roxb. I. Brusatol"
K. Y. Sim, J. J. Sims, and T. A. Geissman
J. Org. Chem. 33, 429 (1968)

"A Stereoselective Synthesis of α - and β -Agarofuran"
J. A. Marshall and M. T. Pike
J. Org. Chem. 33, 435 (1968)

"The Reaction of Isocyanic Acid with Trifluoroacetic Anhydride. Preparation of Trifluoroacetyl Isocyanate and 2,2,2,2',2',2'-Hexafluorodiacetamide"
W. C. Firth, Jr.
J. Org. Chem. 33, 441 (1968)

"Coupling of Monobromoperfluoroalkanecarboxylic Esters"
Y. K. Kim and O. R. Pierce
J. Org. Chem. 33, 442 (1968)

"A Study of the *p*-Methoxybenzylidene Derivatives of Succinic and Malonic Acids"
H. O. House and J. K. Larson
J. Org. Chem. 33, 448 (1968)

"Thermolysis Reactions of Biphenylene"
L. Friedman and P. W. Rabideau
J. Org. Chem. 33, 451 (1968)

"A Ring-Enlargement Procedure. I. The Decomposition of the Magnesium Salts of 1-(α -Bromobenzyl)-1-cycloalkanols"
A. J. Sisti
J. Org. Chem. 33, 453 (1968)

"A Convenient Synthesis of N-Substituted 2,4-Diaryl-pyrroles"
A. Padwa, R. Gruber, and D. Pashayan
J. Org. Chem. 33, 454 (1968)

"A Novel Synthesis of 1,4-Benzoxathians"
E. E. Smissman and T. L. Lemke
J. Org. Chem. 33, 456 (1968)

"Direct Synthesis of 1,1,4,4-Tetraethylpiperazinium Dichloride"
D. M. Soignet and J. B. McKelvey
J. Org. Chem. 33, 460 (1968)

"A New Isoflavone Glycoside from *Baptisia australis*"
K. R. Markham, W. T. Swift, III, and T. J. Mabry
J. Org. Chem. 33, 462 (1968)

"Nucleosides. XLVI. Selectively Methylated Derivatives of Spongouridine"
J. F. Codington, R. J. Cushley and J. J. Fox
J. Org. Chem. 33, 466 (1968)

"Synthetic Steroids. Part II. The Deconjugation of Δ^4 -3-Oxo-steroids. An Improved Method for the Preparation of 3 β -Hydroxyandrost-5-ene-11,17-dione"
R. W. Kelly, I. McClenaghan and P. J. Sykes
J. Chem. Soc., C, Org. 2375 (1967)

"Gallotannins. Part XV. Some Observations on the Structure of Chebulinic Acid and its Derivatives"
E. Haslam and M. Uddin
J. Chem. Soc., C, Org. 2381 (1967)

"Steroids and Walden Inversion. Part LXI. Chlorination of 5 α -Cholestan-2-one"
C. W. Shoppee and S. C. Sharma
J. Chem. Soc., C, Org. 2385 (1967)

"Cyclic Quaternary Ammonium Salts. Part V. Pyrido[1,2-a]pyrazin-5-ium Salts"
E. E. Glover and M. J. R. Loadman
J. Chem. Soc., C, Org. 2391 (1967)

"Studies on the Steroidal Components of Domestic Plants. Part LIII. Structure of Diogenin"
M. Ogata, F. Yasuda, and K. Takeda
J. Chem. Soc., C, Org. 2397 (1967)

"A New Benzofuran from the Seeds of *Styrax officinalis* L."
R. Segal, I. Milo-Goldzweig, S. Sokoloff and D. V. Zaitscheck
J. Chem. Soc., C, Org. 2402 (1967)

"Reaction of the Cyclohexane-1,2-diols and Methyl 4,6-O-Benzylidene- α -D-glucosidic and galactosidic with Methylenes Halides"
J. S. Brimcomb, A. B. Foster (the late) E. D. Jones, and J. J. Willard
J. Chem. Soc., C, Org. 2404 (1967)

"Fluorocarbohydrates. Part XVII. Formation of 2,5-Anhydro-1-deoxy-1,1-difluoro-D-mannitol by Fluorination of Acetylated Glucals"
K. R. Wood and P. W. Kent
J. Chem. Soc., C, Org. 2422 (1967)

"Steroids and Related Natural Products. Part XLII. 14 α -Methyl Cholestanes"
J. C. Knight, J. L. Belletire, and G. R. Pettit
J. Chem. Soc., C, Org. 2427 (1967)

"Nitration of Some 2,3-Dihydro-1,4-Diazepinium Perchlorates"
C. Barnett
J. Chem. Soc., C, Org. 2436 (1967)

"Reactions of Phosphines with Acetylenes. Part IV. A Stable 1,2-Diphosphorane. Restricted Rotation in a Stable Alkylidene Diphosphorane"
M. A. Shaw, J. C. Tebby, and R. S. Ward, D. H. Williams
J. Chem. Soc., C, Org. 2442 (1967)

"Overcrowded Molecules. Part III. The Synthesis and Photorearrangement Reactions of 2,3-Bis(diphenylmethylene)-1-indanone and 4b,5-Dihydro-5,10-triphenyl-11-diphenylmethylenel-11H-benz[b]fluorene"
H. G. Heller, D. Auld, and K. Salisbury
J. Chem. Soc., C, Org. 2457 (1967)

"Biosynthesis of Phenols. Part XIII. Structural Relationships of Alkaloids of *Demerata Greenheart*"
K. C. Chan, M. T. A. Evans, C. H. Hassall, and A. M. W. Sangster
J. Chem. Soc., C, Org. 2479 (1967)

"Cyclopropanes from $\alpha\beta$ -Unsaturated Esters by the Dimethylsulphoxonium Methylide Reaction"
S. R. Landor and N. Punja
J. Chem. Soc., C, Org. 2495 (1967)

"Extractives from Guttiferae. Part VII. The Isolation and Structure of Seven Xanthones from *Calophyllum scribnerianum* Henderson and Wyatt-Smith"
B. Jackson, H. D. Locksley, and F. Scheinmann
J. Chem. Soc., C, Org. 2500 (1967)

"2,3-Dihydro-2-hydroxybenzo[b]furan-3-one, the Cyclic Hemiacetal of 2-Hydroxyphenylglyoxal"
R. Howe, B. S. Rao, and H. Heyneker
J. Chem. Soc., C, Org. 2510 (1967)

"The Conversion of *cis*- into *trans*-Abienol: Some Reactions with Mercuric Acetate"
J. S. Mills
J. Chem. Soc., C, Org. 2514 (1967)

"Calciferol and its Relatives. Part VIII. Ring a Intermediates for the Synthesis of Tachysterol"
P. R. Bruck, R. D. Clark, R. S. Davidson, W. H. H. Günther, P. S. Littlewood and B. Lythgoe
J. Chem. Soc., C, Org. 2529 (1967)

"Syntheses of Heterocyclic Compounds. Part XX. Synthesis and Reactions of 1,2-Diisubstituted Benzimidazoles"
R. Garner and H. Suschitzky
J. Chem. Soc., C, Org. 2536 (1967)

"The Structure of Sorbifolin, a Chromone from *Spathelia sorbifolia* L."
W. R. Chan, D. R. Taylor and C. R. Willis
J. Chem. Soc., C, Org. 2540 (1967)

"Extractives of *Mammea americana* L. Part I. The 4-Alkylcoumarins. Isolation and Structure of Mammea B/BA, B/BB, B/BC, and C/BB"
L. Crombie, D. E. Games, and A. McCormick
J. Chem. Soc., C, Org. 2545 (1967)

"Extractives of *Mammea americana* L. Part II. The 4-Phenylcoumarins. Isolation and Structure of Mammea A/AA, A/A cyclo D, A/BA, A/AB, and A/BB"
L. Crombie, D. E. Games, A. McCormick
J. Chem. Soc., C, Org. 2553 (1967)

"Studies in the Synthesis of Thiazolopyridines and Bisthiazolopyridines. Part II"
J. A. Baker and S. A. Hill
J. Chem. Soc., C, Org. 2562 (1967)

"Base-catalysed Reactions of Glyoxal. Part III. 1,2-Bis-(2-oxoimidazolidin-1-yl)ethane-1,2-diols"
J. Chem. Soc., C, Org. 2565 (1967)

"The Structure of Nalgiolaxin"
A. J. Birch and K. S. J. Stapleford
J. Chem. Soc., C, Org. 2570 (1967)

"Aurofusarin"
J. S. Gray, G. C. J. Martin and W. Rigby
J. Chem. Soc., C, Org. 2580 (1967)

"The Constituents of Native Umbelliferae. Part I. Courmarins from Dill (*Anethum graveolens* L.)"
R. T. Aplin and C. B. Page
J. Chem. Soc., C, Org. 2593 (1967)

"Relations Entre le Déplacement Chimique du Proton de Molécules Organiques et Diverses Grandeur Physico-chimiques"
G. Martin et F. Tonnard
J. Chim. Phys. 64, 1549 (1967)

"Étude par Résonance Magnétique Nucléaire de Quelques Dérivés Bromés du Naphthalène"
J. Pavlöt et J. Hoarau
J. Chim. Phys. 64, 1415 (1967)

"Synthetic Research in the Field of Polyene Compounds XXVII. Oxidation of the 6-Chromanols of Vitamin K_{2/15} and K_{2/20} with Atmospheric Oxygen"
E. I. Kožlov, E. A. Obol'nikov, and G. I. Samokhvalov
J. Gen. Chem. (USSR) (English Transl.) 37, 509 (1967)

"Radical Reactions of Tetrafluorohydrazine. V. The Synthesis of β -Difluoramino-N'-Fluorodiimide N-Oxides"
S. F. Reed, Jr.
J. Org. Chem. 32, 3869 (1967)

"Derivatives of Thiacyclobutene (Thiete). II. Reactions of 7-Thiabicyclo[4.2.0]-1(8)-octene 7,7-Dioxide"
D. C. Dittmer and F. A. Davis
J. Org. Chem. 32, 3872 (1967)

"Reactions of gem-Dihalocyclopropanes with Electrophilic Reagents. Formation of Allyl Derivatives and/or Dienes"
S. R. Sandler
J. Org. Chem. 32, 3876 (1967)

"Peroxynitrates. The Unstable Products of Olefin Nitration with Dinitrogen Tetroxide in the Presence of Oxygen. A New Route to α -Nitro Ketones"
D. R. Lachowicz and K. L. Kreuz
J. Org. Chem. 32, 3885 (1967)

"Control of Lithium Aluminum Hydride Reduction of Cyclic Dicarboxylic Acid Anhydrides to Produce γ -Lactones or Diols"
J. J. Bloomfield and S. L. Lee
J. Org. Chem. 32, 3919 (1967)

"Oxidative Coupling of Alkylbenzenes by Nitric Acid"
I. Puskas and E. K. Fields
J. Org. Chem. 32, 3924 (1967)

"Base-Catalyzed Reactions of Isocyanates. The Synthesis of 2,4-Dialkylallophanates"
H. Ulrich, B. Tucker, and A. A. R. Sayigh
J. Org. Chem. 32, 3938 (1967)

"The Synthesis of Unsaturated Esters by a Semicatalytic Reaction of Nickel Carbonyl"
J. B. Mettalia, Jr., and E. H. Specht
J. Org. Chem. 32, 3941 (1967)

"The Synthesis of α -Hydroxy Esters from α -Keto Acetals"
J. E. Thompson
J. Org. Chem. 32, 3947 (1967)

"Conformational Studies in the Ethyl 3-t-Butylcyclobutanecarboxylate System"
G. M. Lampman, K. E. Apt, E. J. Martin and L. E. Wangen
J. Org. Chem. 32, 3950 (1967)

"[3.2]Metacyclophanes. Transannular Cyclization and Ring Expansion"
R. W. Griffin, Jr. and R. A. Coburn
J. Org. Chem. 32, 3956 (1967)

"The Reactions of exo- and endo-5-Chloromethylnorbornene with Sodium"
P. K. Freeman, V. N. Mallikarjuna Rao, D. E. George, and G. L. Fenwick
J. Org. Chem. 32, 3958 (1967)

"Bicyclo[3.3.1]nonanes. III. Preparation and Reactions of Bicyclo[3.2.2]nonanes"
J. P. Schaeffer, L. S. Endres, and M. D. Moran
J. Org. Chem. 32, 3963 (1967)

"Synthesis of 8 α - and 9 β -B-Norestrone"
J. H. Burckhalter and F. C. Sciavolino
J. Org. Chem. 32, 3968 (1967)

"Substituent Effects on 6-Substituted 3-Hydroxy-4-pyrone"
G. Choux and R. L. Benoit
J. Org. Chem. 32, 3974 (1967)

"The Synthesis of 16 β -Aminopregn-5-ene-3 β ,20 β -diol and Related Compounds"
M. Heller and S. Bernstein
J. Org. Chem. 32, 3978 (1967)

"Some Reactions of 16 β -Aminopregn-5-ene-3 β ,20 β -diol"
M. Heller and S. Bernstein
J. Org. Chem. 32, 3981 (1967)

"Terpene-Formaldehyde Reactions. I. α -Terpinene"
A. T. Blomquist and J. D. Meador
J. Org. Chem. 32, 3986 (1967)

"The Influence of Bulky Substituents on the Syntheses of 4-Hydroxy-3,5-dialkyl Flavanoids"
J. H. Adams
J. Org. Chem. 32, 3992 (1967)

"The Silver Tetrafluoroborate Induced Rearrangement of N-Chloroketimines"
R. N. Loepky and M. Rotman
J. Org. Chem. 32, 4010 (1967)

"Lead Tetraacetate. V. Effects of a Phenyl Group on the Formation of Ethers from Phenyl-Substituted Alkyl Alcohols"
S. Moon and P. R. Clifford
J. Org. Chem. 32, 4017 (1967)

"10,12-Dihydrocyclohept[b]fluorene and Other Derivatives of Cyclohept[f]indene"
M. G. Griffith and J. A. Dixon
J. Org. Chem. 32, 4020 (1967)

"Radical Reactions of Tetrafluorohydrazine. III. Addition to Olefins"
R. C. Petry and J. P. Freeman
J. Org. Chem. 32, 4034 (1967)

"The Reaction of Diazomethane with a Methylenecyclo-propene"
R. S. Pyron and W. M. Jones
J. Org. Chem. 32, 4048 (1967)

"Chemistry of Furazan Derivatives. II. The Reaction of Dibenzoylfuroxanes with Diazomethane"
A. R. Daniewski, M. Witanowski, and T. Urbanski
J. Org. Chem. 32, 4050 (1967)

"The Ring Opening and Defluorination of N-Cyclopropyl- α,α,α -trifluoro- m -toluamide with Lithium Aluminum Hydride"
H. J. Brabander and W. B. Wright, Jr.
J. Org. Chem. 32, 4053 (1967)

"Synthesis and Selected Reactions of 3-Methyl-2,5-dihydrothiophene 1-Oxide"
D. W. Kreh and R. C. Krug
J. Org. Chem. 32, 4057 (1967)

"The Structure of Phthalaldehydic Acid"
J. Kagan
J. Org. Chem. 32, 4060 (1967)

"Syntheses of Substituted Phosphetanes and Related Derivatives"
S. E. Cremer and R. J. Chorvat
J. Org. Chem. 32, 4066 (1967)

"Alumina-Catalyzed Dehydration of 1-Ferrocenylethanol. Formation of 1,3-Diferrocenyl-1-butene"
S. I. Goldberg, W. D. Loeble and T. T. Tidwell
J. Org. Chem. 32, 4070 (1967)

"Sur l'acide phénanthridone-6 carboxylique-4"
A. Resplandy et P. Le Roux
Compt. Rend., Ser. C, 265, 1181 (1967)

"Synthèse d'acides et d'esters α -halogénogluconiques"
M. Le Corpe et E. Levas
Compt. Rend., Ser. C, 265, 1189 (1967)

"Préparation des benzyl-3 phényl-4 méthyl (ou éthyl)-4 pyrrolidinediones-2,5 diastéréoisomères et détermination de leurs structures par résonance magnétique nucléaire"
G. Morel et A. Foucaud
Compt. Rend., Ser. C, 265, 1193 (1967)

"Correspondence of the Laws of the Delocalization of the Spin Density from Data on the EPR of Radicals and the NMR of Molecules and Complexes of Paramagnetic Ions"
E. E. Zaev, Yu. N. Molin, G. M. Zhdanov and Academician V. V. Voevodskii
Dokl.: Phys. Chem. Sect. (English Transl.) 173, 285 (1967)

"Correlation Between Proton Spin-Lattice Relaxation and Intramolecular Vibrations in Liquid C_2-C_{10} Normal Alcohols"
S. -Kh. G. Kashaev and N. K. Gaisin
Dokl.: Phys. Chem. Sect. (English Transl.) 173, 289 (1967)

"Alkylation Reactions of Carbanions of the 7-Oxabicyclo-[2.2.1]-Heptane Series"
N. S. Zefirov, Yu. A. Ustnyuk, T. M. Pozdnyakova and V. A. Zefirova
Dokl.: Chem. Sect. (English Transl.) 174, 509 (1967)

"Interaction of Amido Esters of Trivalent Phosphorous Acids with Mannich Phenolic Bases"
B. E. Ivanov, A. B. Ageeva and Yu. Yu. Samitov
Dokl.: Chem. Sect. (English Transl.) 174, 513 (1967)

"Addition of Silicon Hydrides to Vinylpyridines"
N. S. Nametkin, I. N. Lyashenko, T. I. Chernysheva, S. N. Borisov and V. A. Pestunovich
Dokl.: Chem. Sect. (English Transl.) 174, 546 (1967)

"Addition of Hydrogen-containing Siloxanes to Vinyl-pyridines"
N. S. Nametkin, I. N. Lyashenko, V. A. Pestunovich, T. I. Chernysheva, S. N. Borisov, and M. G. Voronkov
Dokl.: Chem. Sect. (English Transl.) 174, 572 (1967)

"Über Addukte aus Cyclooctatetraen und Schwefeldichlorid"
P. Y. Blac, P. Diehl, H. Fritz und P. Schläpfer
Experientia 23, 896 (1967)

"Natural Coumarins: Part VIII—Some Reactions of Imperatorin & Related Products"
E. A. Abu-Mustafa, B. A.H. El-Tawil & M. B. E. Fayez
Indian J. Chem. 5, 283 (1967)

"Dispiroimidazolidinethiones"
M. D. Nair and S. M. Kalbag
Indian J. Chem. 5, 290 (1967)

"2,3,5,6-Tetrachloro-1,4-bis(trimethylsiloxy) Benzene"
S. P. Narula
Indian J. Chem. 5, 346 (1967)

"Terpenoids: CI - Synthesis of 2,3-Secochlesta-1,3-diene"
L. J. Patil and A. S. Rao
Indian J. Chem. 5, 393 (1967)

"The Reduction of α -Carbonylcarboxylic Acid Complexes of Pentaaminacobalt(III) by Chromous, Vanadous, and Hexaammineruthenium(II) Ions"
H. J. Price and H. Taube
Inorg. Chem. 7, 1 (1968)

"The Catalytic Species in the Activation of Rhodium(III) Complexes of Reducing Agents or Hydride-Producing Compounds"
J. V. Rund
Inorg. Chem. 7, 24 (1968)

"Stereochemistry of Oxidative Addition Reactions of Iridium(I) Complexes"
J. P. Collman and C. T. Sars, Jr.
Inorg. Chem. 7, 27 (1968)

"The Reaction of Dimethylaminodifluorophosphine with Copper Chlorides"
K. Cohn and R. W. Parry
Inorg. Chem. 7, 46 (1968)

"Reactions of Tris(dialkylamino)phosphines with Dialkylchloramines"
D. B. Denney and S. M. Felton
Inorg. Chem. 7, 99 (1968)

"Syntheses and Proton Magnetic Resonance Spectra of Some Arsonium and Phosphonium Compounds"
H. H. Sisler and S. R. Jain
Inorg. Chem. 7, 104 (1968)

"Nuclear Magnetic Resonance Studies on Pentacoordinate Silicon Fluorides"
F. Klanberg and E. L. Muettterties
Inorg. Chem. 7, 155 (1968)

"A Phosphorus-31 Nuclear Magnetic Resonance Study of Tertiary Phosphine Derivatives of Group VI Metal Carbonyls. II. "Mixed" Ligand Complexes"
S. O. Grim, D. A. Wheatland, and P. R. McAllister
Inorg. Chem. 7, 161 (1968)

"Nuclear Magnetic Resonance in Polycyclic Compounds. III. Evidence of $P^{31}-H^1$ Spin-Spin Sign Changes in the PCH Bonds of a New Polycyclic Phosphine"
E. J. Boros, R. D. Compton and J. G. Verkade
Inorg. Chem. 7, 165 (1968)

"Nuclear Magnetic Resonance Spectra of Cobalt Ammine Complexes with Isomeric Ligands"
M. Lacy and L. Pratt
Inorg. Chem. 7, 167 (1968)

"Further Evidence of Stereochemical Nonrigidity in Five- and Seven-Coordinate Structures"
F. N. Tebbe and E. L. Muettterties
Inorg. Chem. 7, 172 (1968)

"Studies of Lanthanide Adducts by Means of ^{31}P and ^{1}H Magnetic Resonances and Optical Spectroscopy"
T. H. Siddall, III, W. E. Stewart, and D. G. Karraker
Inorg. Nucl. Chem. Letters 3, 479 (1967)

SAT | "The Use of Proton Magnetic Resonance Spectroscopy in Assigning the Absolute Configuration of Coordination Complexes Containing Optically Active Propylene-diamine Ligands"
J. G. Brushmiller and L. G. Stadtherr
Inorg. Nucl. Chem. Letters 3, 525 (1967)

"Indirect Spin Saturation. III. Propagation of Demagnetization"
Marvin D. Rausch
J. Am. Chem. Soc. 90, 219 (1968)

"Boron-Nitrogen Cage Structures. 1,2,4,5-Tetraaza-3,6-diborine Dimers"
J. J. Miller and F. A. Johnson
J. Am. Chem. Soc. 90, 218 (1968)

"Ionic and Free-Radical Addition of Bromine Azide to Olefins"
A. Hassner and F. Boerwinkle
J. Am. Chem. Soc. 90, 216 (1968)

BL | "The Second Moment of the Broad-line N.M.R. Absorption of a Proton Bonded to a Quadrupolar Nucleus"
G. M. Sheldrick
Mol. Phys. 13, 399 (1967)

ANAL | "The Analysis of an ABXY N.M.R. Spectrum Using Sub-spectral and Direct Methods"
P. Diehl and R. J. Chuck
Mol. Phys. 13, 417 (1967)

"A Precise Determination of the H-H and H-F Couplings in Fluorobenzene"
J. E. Loemker, J. M. Read, Jr., and J. H. Goldstein
Mol. Phys. 13, 433 (1967)

"Signs of the Nuclear Spin-spin Coupling Constants in Ammonia"
Mol. Phys. 13, 491 (1967)

"A Novel Reaction of a Nitro Sugar with Alcohols"
M. L. Wolfrom, U.G. Nayak and T. Radford
Nat. Acad. Sci. 58, 1848 (1967)

PP | Proton Magnetic Resonance Studies of the Helix-Coil Transition in Polypeptides"
E. M. Bradbury, C. Crane-Robinson, and H.W. E. Rattle
Nature 216, 862 (1967)

"Influence of Paramagnetic Impurities on the De Haas-van Alphen Effect and Fluctuations of the Knight Shift"
D. G. Dolgopolov
Phys. Metal Metallog. (USSR) (English Transl.) 22, 6 (1966)

"Determination of the Gradient Elastic Tensor in Sodium Iodide by Means of Nuclear Magnetic Resonance"
R. W. Astrue and H. O. Hooper
Phys. Rev. 164, 1206 (1967)

"Nuclear Magnetic Resonance of ⁵⁷Fe in Dilute Alloys of Fe"
E. F. Mendis and L. W. Anderson
Phys. Rev. Letters 19, 1434 (1967)

OV | "Overhauser Effect in Semiconducting Crystalline TCNQ-Complexes"
H. Götz, H. Schulze, and K. Werner
Phys. Stat. Sol. 24, K95 (1967)

"Alkaloid Studies—LVIII. The Alkaloids of Six *Aspidosperma* Species"
R. R. Arndt, S. H. Brown, N. C. Ling, P. Roller, C. Djerassi, J. M. Ferreira, F. B. Gilbert, E. C. Miranda, S. E. Flores, A. P. Duarte, and E. P. Carrazzoni
Phytochem. 6, 1653 (1967)

"Flavonoids of *Baptisia Australis* (Leguminosae)"
P. Lebreton, K. R. Markham, W. T. Swift, III, Oung-Boran, and T. J. Mabry
Phytochem. 6, 1675 (1967)

"Structures of Acutumine and Acutumidine"
K. Goto, M. Tomita, Y. Okamoto, T. Kikuchi, K. Osaki, M. Nishikawa, K. Kamiya, Y. Sasaki, and K. Matoba
Proc. Japan Acad. 49 (1967)

"A Time-dependent Dyson Expansion—the Nuclear Resonance Signal in a Rotating Single Crystal"
W. A. B. Evans and J. G. Powles
Proc. Phys. Soc., 92, 1046 (1967)

"Structure of Ion-pairs Derived from Dihydroanthracenes II. Nuclear Magnetic Resonance Studies"
D. Nicholls and M. Szwarc
Proc. Roy. Soc. (London) Ser. A, 301, 231 (1967)

"Chemical Applications of Oxygen-17 Nuclear and Electron Spin Resonance"
B. L. Silver and Z. Luz
Quart. Rev. (London) 21, 458 (1967)

"The Conformation of Non-Aromatic Ring Compounds. Part 38. The Chlorination of 1,4-thioxane in Carbon Tetrachloride and the NMR Analysis of 1,4-thioxane, 1,4-thioxene and Some Chloro-substituted Thioxanes"
N. de Wolf, P. W. Henniger and E. Havinga
Rec. Trav. Chim. 86, 1227 (1967)

Comp | "Analysis of the NMR Spectrum by the Small-Scale Digital Computer"
O. Yamamoto and K. Hayamizu
Rep. Gov. Chem. Ind. Res. Inst. Tokyo 62, 388 (1967)

"The Relative Signs of the Long Range Spin-Spin Coupling Constants in Formic Acid Esters"
K. Hayamizu and O. Yamamoto
Rep. Gov. Chem. Ind. Res. Inst. Tokyo 62, 380 (1967)

"Polymerization of 1-Methylcyclopropene"
M. Yamabe
Rep. Res. Lab., Asahi Glass Co., Ltd. 17, 109 (1967)

"Broadband Nuclear Resonance Dispersion Detector"
R. J. Blume and D. T. Edmonds
Rev. Sci. Instr. 38, 1716 (1967)

IN | "Zwiazki Aryloborowe. XIV. Widma NMR Produktow Kondensacji Aminodioli Z Aldehydami I Kwasem Fenylboronowym"
L. Stefanik, B. Serafin i A. Jonczyk
Roczniki Chemii 41, 1741 (1967)

"Autoxidation of Compounds Occurring in Nature (I). Autoxidation of Esters of β -Sitosterol"
P. K. Paasonen
Suomen Kemistilehti 40, 277 (1967)

"Über die Stereoisomeren 2-Chlor-2-Cyano-Norbornene-(5)."
J. Paasivirta und R. Kuusisto
Suomen Kemistilehti 40, 291 (1967)

"The Chemistry of Small Ring Compounds IX. The Base Catalysed Reactions of Cyclopropanecarbaldehyde and Cyclobutanecarbaldehyde"
F. P. B. van der Maeden, H. Steinberg and Th. J. de Boer
Tetrahedron Letters 4521 (1967)

"The Kinetic Investigation of Trans-Aldo-Cis-Enol Transformation of Alkyl 2-Formyl-2-Phenylacetates"
S. T. Yoffe, P. V. Petrovskii, E. I. Fedin, K. V. Vatsuro, P. S. Burenko and M. I. Kabachnik
Tetrahedron Letters 4525 (1967)

"The Structure of the Protonated Azo-link in 2,2'-Azo-Isobutane"
E. Haselbach and E. Heilbronner
Tetrahedron Letters 4531 (1967)

"Nucleophilic Substitutions of α -Chloroketones 1-Phenyl-mercapto- and 1-Phenylsulfonyl-3-Chloropropanones"
V. Rosnati, G. Pagani and F. Sannicolo
Tetrahedron Letters 4545 (1967)

"Alkaloids aus *Vinca Herbacea* W. K. XI. Norfluorocurarine"
B. Pyuskyulev, I. Ognyanov, P. Panov
Tetrahedron Letters 4559 (1967)

"The Structure and Synthesis of Corymbosin, a Flavone from *Webera Corymbosa* Willd"
B. S. Joshi and D. F. Rane
Tetrahedron Letters 4579 (1967)

"Cytosine-thymine Addition Product from DNA Irradiated with Ultraviolet Light"
S. Y. Wang and A. J. Varghese
Biochem. Biophys. Res. Commun. 29, 543 (1967)

"Additions of Dichloromethylvinylsilane and of Unsaturated Organic Compounds to Pentamethyldisiloxane and to 3H-Heptamethyltrisiloxane"
K. A. Andrianov, V. I. Sidorov, and L. M. Khananashvili
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 307 (1967)

"Some New Forms of the Arbuzov Rearrangement. Communication 20. cis-trans Isomerism of 3-Phosphonocrotonic Triester"
V. A. Kukhtin, Yu. Yu. Samitov, and K. M. Kirillova
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 337 (1967)

"Cyclization of Isoprenoid Compounds Communication 17. Effect of the Character of the Substitution at the Terminal Double Bond on the Stereospecificity of the Initiation of the Cyclization Reaction"
I. G. Mursakulov, V. A. Semenovskii, and V. A. Smi
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 362 (1967)

"Isomerization of 1-Acetyl-4-Tert-Butylcyclohexanediols-1,2"
A. A. Akhrem and V. N. Dobrynnin
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 378 (1967)

"Thermal Aralkylation of Perchlorocyclopentadiene with Toluene"
R. Kh. Freidlina, A. B. Belyavskii, and F. K. Vellichko
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 381 (1967)

"Thermal Isomerization of 1-Methylcyclopentadiene"
V. A. Mironov, T. M. Fadeeva, A. U. Stepaniants, and A. A. Akhrem
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 418 (1967)

"Tetracyclopentadienyldizirconium"
E. M. Brainina and G. G. Dvoryantseva
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 427 (1967)

"Interaction of Penta- and Decafluorobenzophenones with Hydrazine and Its Derivatives"
T. N. Gerasimova, T. N. Vasilevskaya, V. A. Barkhash, and N. N. Vorozhtsov Jr.
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 438 (1967)

"Rearrangements of Six-Membered Organocyclosiloxanes into Eight-Membered and Higher Organocyclosiloxanes"
K. A. Andrianov, A. A. Zhdanov, B. D. Lavrukhin, M. M. Levitskii, E. I. Fedin, and S. E. Yakushikina
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 462 (1967)

"Synthesis and Structure of 1-oxo-1-chlorophospholenes"
B. A. Arbuzov, O. A. Vizel', Yu. Yu. Samitov, and Yu. F. Tarenko
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 648 (1967)

"Fluoroalkylation of Vinylidene Chloride"
L. S. German and I. L. Knunyants
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 651 (1967)

"Condensation of Formaldehyde with Olefins in Anhydrous Hydrogen Fluoride"
L. S. German and I. L. Knunyants
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 653 (1967)

"R action of Trialkylethylynsilanes with Mercaptans and Thioacetic Acid"
N. V. Komarov, O. G. Yarosh, and G. A. Kalabin
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 668 (1967)

"N-Ethyleneimino trimethylstannane"
R. G. Kostyanovskii and A. K. Prokof'ev
Bull. Acad. Sci. USSR, Div. Chem. Sci. (English Transl.) 469 (1967)

"Studies of the Solvent Effects on the Chemical Shifts in NMR Spectroscopy. IV. Methoxyl Proton Signals of Methoxybenzenes in the Benzene Solutions"
T. Matsuo, T. Yoshida and O. Higuchi
Bull. Chem. Soc. Japan 40, 2526 (1967)

"Cobalt(IV) Amminecomplexes with 5-Nitrosalicylato Ligands. I."
Y. Yamamoto, (the late) K. Ito, H. Yoneda, and M. Mori
Bull. Chem. Soc. Japan 40, 2580 (1967)

"Studies of Heteroaromaticity. IV. The Thermal 1, 3-Dipolar Cycloaddition of Fur- and 5-Nitro-2-furhydroxamoyl Chlorides with Olefinic and Acetylenic Compounds"
T. Sasaki and T. Yoshioka
Bull. Chem. Soc. Japan 40, 2604 (1967)

"Studies of Heteroaromaticity. VIII. Reactivity of Some Nitrile Oxides Conjugated with a Double Bond"
T. Sasaki and T. Yoshioka
Bull. Chem. Soc. Japan 40, 2608 (1967)

"Nuclear Magnetic Resonance Spectrum of Phytoene"
G. Suzue, K. Tsukada and S. Tanaka
Bull. Chem. Soc. Japan 40, 2688 (1967)

"Reaction of Oxime p-Toluenesulfonates and Mercaptans"
A. Kaneda, M. Nagatsuka and R. Sudo
Bull. Chem. Soc. Japan 40, 2705 (1967)

"Macrocyclic Dilactone. I. The Synthesis of 7-Hydroxyoctanoic Acid Dilactone"
N. Sugiyama, T. Gasha and C. Kashima
Bull. Chem. Soc. Japan 40, 2713 (1967)

"N.M.R. Experiments of Ketals. XI. Shifts of Acyclic and Cyclic Ketals"
M. Anteunis, F. Borremans, J. Gelan, L. Heyndrickx and W. Vandenbroucke
Bull. Soc. Chim. Belges 76, 533 (1967)

"The PMR-spectra of 2-Halo-3,3,5,5-Tetramethyl-Cyclohexanone. Long Range Couplings not Following "M" Patterns"
M. Anteunis, N. Schamp, and H. De Pooter
Bull. Soc. Chim. Belges 76, 541 (1967)

"Long Range Phenomena. V. Stereo-Specific Long Range Coupling J, Involving *tert.* Methyl Groups"
M. Anteunis, W. Vandenbroucke, and N. Schamp
Bull. Soc. Chim. Belges 76, 552 (1967)

"Détermination par Résonance Magnétique Nucléaire de la Position des Atomes d'Hydrogène dans la Kröhnkite"
P. J. Van Tigelen
Bull. Soc. Chim. Belges 75, 620 (1966)

"Stéréochimie. XVIII. Réarrangements benzilique et semi-benzilique, III. Diméthyl-4,4-(5 α)-cholestanedione-2,3"
J. Levisalles et I. Tkatchenko
Bull. Soc. Chim. France 3125 (1967)

"Stéréochimie. XIX. Réarrangements benzilique et semi-benzilique, III. (5 α) cholestanedione-2,3"
J. Levisalles et I. Tkatchenko
Bull. Soc. Chim. France 3131 (1967)

"Stéréochimie XX: Réarrangements benzilique et semi-benzilique. IV. Cétols stéroïdes"
S. Hunck, J. Levisalles et I. Tkatchenko
Bull. Soc. Chim. France 3140 (1967)

"Études sur les matières végétales volatiles CCIII. Présence de n-undécatriènes-1,3,5 dans l'huile essentielle de la gomme-résine de galbanum"
Y.-R. Naves
Bull. Soc. Chim. France 3152 (1967)

"Hydrobromides and Stable Trichloroethylene Complexes of 2-Methyl-4-Amino-5-Bromomethylpyrimidine"
A. M. Yurkevich, G. V. Parkhomenko, E. I. Finkel'shtein, L. V. Khrustenko, and L. M. Smulovich
J. Gen. Chem. (USSR) English Transl.) 37, 601 (1967)

"Fluorine-Containing Polyhalogenated Phenols"
G. P. Taturop, L. N. Pushkina, N. I. Gubkina, V. F. Kollegov, and S. V. Sokolov
J. Gen. Chem. (USSR) (English Transl.) 37, 632 (1967)

"Reactions of Diethyl Chlorophosphine with Derivatives of Dimethylacrylic Acid and Mesityl Oxide"
S. Kh. Nurdinov, V. S. Tsivunin, T. V. Zykova, and G. Kh. Kamai
J. Gen. Chem. (USSR) (English Transl.) 37, 648 (1967)

"Reaction of Anhydrides of Dialkylphosphorous and Acetic Acids with Mono- and Dichloroacetaldehydes"
A. N. Pudovik, T. Kh. Gazizov, Yu. Yu. Samitov, and T. V. Zykova
J. Gen. Chem. (USSR) (English Transl.) 37, 662 (1967)

KMR-Untersuchungen Über die Bindung des Wassers in festen Kaliumpolyboraten"
K. Wegener
J. Inorg. Nucl. Chem. 29, 1847 (1967)

"Redistribution Equilibria of Methylsilane Derivatives"
K. Moedritzer and J. R. Van Wazer
J. Inorg. Nucl. Chem. 29, 1851 (1967)

"Wide-line NMR Study of Silicon-Nitrogen Compounds"
H. Levy, II
J. Inorg. Nucl. Chem. 29, 1859 (1967)

"The Interaction of 2-Mercapto-Benzothiazole with Certain Platinum Group Element Derivatives"
R. F. Wilson and P. Merchant, Jr.
J. Inorg. Nucl. Chem. 29, 1993 (1967)

"Reaction of Hexachlorodisilane with Bases and Alkyl Halides"
H. J. Emeleus and M. Tufail
J. Inorg. Nucl. Chem. 29, 2081 (1967)

"The NMR Spectra of the n-Alkyl Fluorides"
D. L. Hooper, N. Sheppard and C. M. Woodman
J. Mol. Spectr. 24, 277 (1967)

"Evidence for Proton Magnetic Resonance Deshielding over the Whole Amide Plane"
T. H. Siddall, III and W. E. Stewart
J. Mol. Spectr. 24, 290 (1967)

"High-Resolution Proton Magnetic Resonance Spectra of Fluoranthene, Benzo [k] fluoranthene and Benzo [ghi] Fluoranthene"
K. D. Bartle, D. W. Jones and J. E. Pearson
J. Mol. Spectr. 24, 330 (1967)

"Spectroscopic Studies of Hydrogen Bonding. Part I. Trifluoroethanol"
K. F. Purcell and S. T. Wilson
J. Mol. Spectr. 24, 468 (1967)

"High-Resolution Proton Magnetic Resonance Spectra of Fluorene and Its Derivatives. Part I. Fluorene"
K. D. Bartle and D. W. Jones
J. Mol. Struct. 1, 131 (1967)

"Bridged Polycyclic Compounds. XLVIII. The Proton Magnetic Resonance Spectra and Mass Spectra of Some Disubstituted Benzonorbornenes and Monosubstituted Benzonorbornadienes"
S. J. Cristol and G. W. Nacitigall
J. Org. Chem. 32, 3738 (1967)

"*cis*- and *trans*-1,4-Cyclohexadiene Dioxide"
T. W. Craig, G. R. Harvey and G. A. Berchtold
J. Org. Chem. 32, 3743 (1967)

"Studies Relating to the Synthesis of Cyclodecenes from Bicyclo[5.3.1]undecanediol Derivatives"
J. A. Marshall, C. J. V. Scanio, and W. J. Ibarg
J. Org. Chem. 32, 3750 (1967)

"Stereospecific Synthesis of 1,4-Dienes. II"
G. Hata and D. Aoki
J. Org. Chem. 32, 3754 (1967)

"Some Reactions of 12α-Hydroxymethylabiet-7,8-enoic Acid"
D. K. Black and G. W. Hedrick
J. Org. Chem. 32, 3758 (1967)

"The Condensation of Paraformaldehyde with Abietic Acid and Some of Its Derivatives"
D. K. Black and G. W. Hedrick
J. Org. Chem. 32, 3763 (1967)

"Studies in the Ganglioside Series. I. Synthesis of 4-O-(2-Acetamido-2-deoxy-β-D-glucopyranosyl)-D-galactopyranose"
D. Shapiro, A. J. Acher, and E. S. Rachaman
J. Org. Chem. 32, 3767 (1967)

"The Formation of Dimers from Flavylium Salts"
G. A. Reynaols, J. A. Van Allan and T. H. Regan
J. Org. Chem. 32, 3772 (1967)

"Nucleosides. XLIII. 3'-Amino-3'-deoxyhexopyranosyl Nucleosides. V. Studies on the Preparation of Aminoacyl Derivatives of Amino Sugar Nucleosides"
H. A. Friedman, K. A. Watanabe and J. J. Fox
J. Org. Chem. 32, 3775 (1967)

"Bromination of the 3,6-Endoxo-⁴-Tetrahydrophthalic Anhydride System. Stereochemistry and Mechanism of the Reaction"
J. Mantecón, L. Cortés, E. Payo and A. Salazar
J. Org. Chem. 32, 3796 (1967)

"Quinazolines and 1,4-Benzodiazepines. XXXVII. Synthesis and Rearrangements of a Substituted 5-Phenyl-1H-1,4-benzodiazepine"
R. I. Fryer, J. V. Earley and L. H. Sternbach
J. Org. Chem. 32, 3798 (1967)

"Azepinoidoles. II. 1,2,3,4,5,6-Hexahydroazepino[3,2-b]indole and 1,2,3,4,5,6-Hexahydroazepino[4,3-b]indole"
J. B. Hester, Jr.
J. Org. Chem. 32, 3804 (1967)

"Synthesis and Reactions of Certain 3-Formyl- and 3-Cyanooxindoles"
R. C. Elderfield and H. H. Rembges
J. Org. Chem. 32, 3809 (1967)

"Mobile Keto Allyl Systems. IV. Reaction of Amines with α-(Bromomethyl)chalcone and Allylic Rearrangements with β-Ketoallylamines"
N. H. Cromwell and R. P. Rebman
J. Org. Chem. 32, 3830 (1967)

"Free-Radical Addition of Organic Disulfides to Acetylenes"
E. I. Heiba and R. M. Dessau
J. Org. Chem. 32, 3837 (1967)

"Organic Fluoronitrogens. VII. Tris(difluoramino)fluoromethane and Related Compounds"
R. J. Koshar, D. R. Husted and C. D. Wright
J. Org. Chem. 32, 3859 (1967)

"Medium Dependence of the Proton Chemical Shift and H-H, H-F, F-F Coupling Constants in 1,1-difluoroethylene"
C. J. Macdonald and T. Schaefer
Can. J. Chem. 45, 3157 (1967)

"Light-induced Addition of Acetylene to Saturated Compounds"
R. Srinivasan and K. H. Carlough
Can. J. Chem. 45, 3209 (1967)

"A New Approach to the Synthesis of Higher 3-Deoxy-glyculosonic Acids"
N. K. Kochetkov, B. A. Dmitriev, and L. V. Backinowsky
Carbohydr. Res. 5, 399 (1967)

"Nature of the Structural Change During the Mutarotation of Sugar Osazones"
L. Mester, E. Moczar, G. Vass, and A. Schimpl
Carbohydr. Res. 5, 406 (1967)

"The Reduction of Azides with Sodium Borohydride: A Convenient Synthesis of Methyl 2-Acetamido-4,6-O-Benzylidene-2-Deoxy- α -D-Allopyranoside"
Y. Ali and A. C. Richardson
Carbohydr. Res. 5, 441 (1967)

"Nitrogen-containing Carbohydrate Derivatives. Part XVIII. Methyl 4,6-O-benzylidene-3-deoxy-3-methylazo- α -D-glucoside"
E. O. Bishop, R. D. Guthrie, and J. E. Lewis
Carbohydr. Res. 5, 477 (1967)

"Synthese eines C-methyl-verzweigten Inosamins"
F. W. Lichtenhaller and H. K. Yahya
Carbohydr. Res. 5, 485 (1967)

"Cyansäureester, XV. Alkylierung und Acylierung nucleophiler Verbindungen durch Alkylcyanate"
D. Martin, A. Weise, H.-J. Niclas und S. Rackow
Chem. Ber. 100, 3756 (1967)

"Biogenetic-type Synthesis of (+)- α -Chamigrene"
S. Kanno, T. Kato, and Y. Kitahara
Chem. Commun. 1257 (1967)

"1-Trimethylsilyl-2,2,4,4-tetramethylcyclodisilazane"
R. P. Bush, N. C. Lloyd, and C. A. Pearce
Chem. Commun. 1269 (1967)

"A Novel Metallation Reaction of N-Lithio-t-butylamino-trimethylsilane"
R. P. Bush, N. C. Lloyd and C. A. Pearce
Chem. Commun. 1270 (1967)

"Oxazolo[3,2-c]- and Thiazolo[3,2-c]-[1,2,3]-benzotriazinium Salts"
A. W. Murray and K. Vaughan
Chem. Commun. 1272 (1967)

"Restricted Rotation in Methylated Derivatives of Adenosine and Cytidine"
D. M. G. Martin and C. B. Reese
Chem. Commun. 1275 (1967)

"Nuclear Magnetic Resonance Studies of Lithium Exchange between Organolithium Compounds and Lithium Halides in Ether Solutions"
R. Waack, M. A. Doran and E. B. Baker
Chem. Commun. 1291 (1967)

"Octahydrotriborotetracarbonyl Metallates of Chromium, Molybdenum, and Tungsten"
F. Klanberg and L. J. Guggenberger
Chem. Commun. 1293 (1967)

"Rotational Isomerism in a Vinylogous Amide"
R. J. Parry
Chem. Commun. 1294 (1967)

"The Products of the Reactions of Isohydrocoriamyrtin and Isocoriamyrtin with Phenylhydrazine Analogues"
T. Okuda, T. Yoshida, and K. Konishi
Chem. Commun. 1297 (1967)

"Structure Chimique de l'Aglycone du Mycoside G de *Mycobacterium Marinum*"
P. Sarda and M. Gastambide-Odier
Chem. Phys. Lipids 1, 134 (1967)

"Synthesis and Characterization of the Complete Series of Methylene-Interrupted *cis,cis*-Octadecadienoic Acids"
W. W. Christie and R. T. Holman
Chem. Phys. Lipids 1, 407 (1967)

"Physical Studies of Phospholipids. VI. Thermotropic and Lyotropic Mesomorphism of Some 1,2-Diacyl-phosphatidylcholines. (Lecithins)"
D. Chapman, R. M. Williams and B. D. Ladbrooke
Chem. Phys. Lipids 1, 445 (1967)

"Analysis of Aromatic Petroleum Fractions by Means of Absorption Mode Carbon-13 N.M.R. Spectroscopy"
S. A. Knight
Chem. Ind. (London) 1920 (1967)

"Sintesi e caratterizzazione dell' 1-nitroso-cicloesene"
P. Ciattoni, and L. Rivolta
Chim. Ind. (Milan) 49, 1186 (1967)

"Alcynols diastéréoisomères acycliques. Étude en R. M. N. d'oxydes de phosphine alléniques"
D. Dron, M.-L. Capmau et W. Chodkiewicz
Compt. Rend., Ser. C, 265, 673 (1967)

"Sur les diformylpyridine N-oxydes"
G. Quéguiner, M. Alas et P. Pastour
Compt. Rend., Ser. C, 265, 824 (1967)

"Méthode de synthèse de cyclanols β -acétyleniques"
É. Casadevall, J.-C. Jallageas, L. Mion, M. Mion et P. Moreau
Compt. Rend., Ser. C, 265, 839 (1967)

"Interactions intramoléculaires. Isomères de rotation des phénol-2 éthanes substitués : $C_6H_5-CH_2-CH_2-X$ ($X=F, Cl, Br, I, OH, OTs$)"
H. Bodot, A. Leray et M. Pujol
Compt. Rend., Ser. C, 265, 842 (1967)

"Étude par résonance magnétique nucléaire d'effets intermoléculaires entre thiols aliphatiques et composés azotés. Phénomènes d'échanges"
M.-M. Marciaq-Rousselot et N. Bellavita
Compt. Rend., Ser. C, 265, 853 (1967)

"Action de l' α -cyano-cinnamamide sur les énamines"
H. Person et A. Poucaud
Compt. Rend., Ser. C, 265, 1007 (1967)

"Influence de l'halogénéure de benzyle sur la C-benzylation des phloracétophénones"
J. Chopin et J.-P. Piréau
Compt. Rend., Ser. C, 265, 1172 (1967)

"Propargylation des dicétones"
M. Miocque et J.-P. Duclos
Compt. Rend., Ser. C, 265, 1178 (1967)

- "Reactions of 1,1-Diaryl-2-halogenoethylenes with Sodium Ethoxide. Part V. Reactivity of pp'-Dinitro-derivatives"
 P. Beltrame, P. L. Beltrame, O. Sighinolfi and M. Simonetta
J. Chem. Soc., B., Phys. Org. 1103 (1968)
- "Nucleophilic Substitution by Thiolate Ions in Some 1,1-Diaryl-2-Halogenoethylenes"
 P. Beltrame, D. Pites, and M. Simonetta
J. Chem. Soc., B, Phys. Org. 1108 (1968)
- |** "1^H and 19^F Nuclear Magnetic Resonance Spectra of Some Cyclopropane Derivatives"
 J. Lee, C. Parkinson, P. J. Robinson and J. G. Speight
J. Chem. Soc., B, Phys. Org. 1125 (1968)
- "Aryloxy-radicals. Part VII. The Electron Spin Resonance Spectra of the Secondary Radicals formed during the Heterogeneous Oxidation of Some Substituted Phenols"
 W. G. B. Huysmans and W. A. Waters
J. Chem. Soc., B, Phys. Org. 1163 (1968)
- "11,11,12,12-Tetracyano-1,4-naphthaquinodimethane: A New Electron Acceptor"
 S. Chatterjee
J. Chem. Soc., B, Phys. Org. 1170 (1968).
- "The Determination of Configuration of Certain Quaternary Salts derived from N-Benzyl Piperidines by Nuclear Magnetic Resonance Spectroscopy"
 D. R. Brown, J. McKenna and J. M. McKenna
J. Chem. Soc., B, Phys. Org. 1195 (1968)
- "Nuclear Magnetic Resonance Study of the Conformational Isomerisation of Tetrahydropyran"
 G. Gatti, A. L. Segre and C. Morandi
J. Chem. Soc., B, Phys. Org. 1203 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part VI. The Nitration of Pyridines in the 3-Position as Free Bases and as Conjugate Acids"
 C. D. Johnson, A. R. Katritzky, B. J. Ridgewell, and M. Viney
J. Chem. Soc., B, Phys. Org. 1204 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part VII. The Nitration of Pyridines in the α -Position and Rules for the Nitration of Substituted Pyridines"
 C. D. Johnson, A. R. Katritzky and M. Viney
J. Chem. Soc., B, Phys. Org. 1211 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part VIII. The α -, β -, and γ -Nitration of Pyridine 1-Oxides"
J. Chem. Soc., B, Phys. Org. 1213 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part IX. General Form of Rate Profiles for Acid-catalysed Hydrogen Exchange as Illustrated by Substituted Aminopyridines"
 G. P. Bean, C. D. Johnson, A. R. Katritzky, B. J. Ridgewell and A. M. White
J. Chem. Soc., B, Phys. Org. 1219 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part X. Acid-catalysed Hydrogen Exchange at the α -, β -, and γ -positions of Substituted Pyridine 1-Oxides"
 G. P. Bean, P. J. Brignell, C. D. Johnson, A. R. Katritzky, B. J. Ridgewell, H. O. Tarhan and A. M. White
J. Chem. Soc., B, Phys. Org. 1222 (1968)
- "The Mechanism of the Electrophilic Substitution of Heteroaromatic Compounds. Part XI. Acid-catalyzed Hydrogen Exchange of α - and γ -Pyridones and γ -Quinolone"
 P. Bellingham, C. D. Johnson and A. R. Katritzky
J. Chem. Soc., B, Phys. Org. 1226 (1968)
- "Proton Resonance Spectra of Heterocycles. Part IV. Quinoxaline and Monosubstituted Quinoxalines"
 P. J. Brignell, A. R. Katritzky and R. E. Reavill
J. Chem. Soc., B, Phys. Org. 1241 (1968)
- "Proton Resonance Spectra of Heterocycles. Part V. 4(1H)-Cinnolone and Substituted 4-Cinnolones"
 A. R. Katritzky, E. Lunt, B. Ternai and G. J. T. Tiddy
J. Chem. Soc., B, Phys. Org. 1243 (1968)
- "Applications of Proton Resonance Spectroscopy to Structural Problems. Part XXVII. Phenanthrene Chemistry Part V. Configuration and Conformation of Some 9,9'-10,10'-Tetrahydro-9,9'-biphenanthryls"
 D. Cohen and I. T. Millar, H. Heaney, P. R. Constantine, A. R. Katritzky, B. M. Semple and M. J. Sewell
J. Chem. Soc., B, Phys. Org. 1248 (1968)
- "Applications of Proton Resonance Spectroscopy of Structural Problems. Part XXVIII. Orientation of 1-Substituted 4- and 5-Nitroimidazoles"
 J. S. G. Cox and C. Fitzmaurice, A. R. Katritzky and G. J. T. Tiddy
J. Chem. Soc., B, Phys. Org. 1251 (1968)
- "Structures and Pesticidal Activities of Derivatives of Dinitro-phenols. Part IV. Preparation of Cerain 2-(α -Branched Alkyl)-4,6-dinitro- and 4-(α -Branched Alkyl)-2,6-dinitro-phenols"
 M. Pianka and J. D. Edwards
J. Chem. Soc., C, Org. 2281 (1967)
- "Structures and Pesticidal Activities of Derivatives of Dinitrophenols. Part V. Reactions of Certain Dinitro-aryl Thiocarbamates with Potassium Hydroxide in Methanol and with Various Nucleophiles"
 M. Pianka and J. D. Edwards
J. Chem. Soc., C, Org. 2290 (1967)
- "Solvent Effects in the Nuclear Magnetic Resonance Spectra of Steroidal Ketones"
 E. Glotter and D. Lavie
J. Chem. Soc., C, Org. 2298 (1967)
- "7,12-Dihydropleiadene-7,12-dione; Preparation and Reaction with Grignard Reagents"
 D. C. C. Smith and D. E. Steere
J. Chem. Soc., C, Org. 2305 (1967)
- "Oxidation of Alkoxyphenols. Part XI. Further Observations on the Influence of an o-Methoxy-group"
 F. R. Hewgill and B. S. Middleton
J. Chem. Soc., C, Org. 2316 (1967)
- "Studies in Furan Chemistry. Part V. The Diels-Alder Adducts of 2,2'-Bifuryl and Dimethyl Acetylene-dicarboxylate"
 R. Grigg, P. Roffey and M. V. Sargent
J. Chem. Soc., C, Org. 2327 (1967)
- "The Synthesis of Some 1,3-Benzodioxans and a Revised Structure for Averufin"
 P. Roffey and M. V. Sargent, and (in part) J. A. Knight
J. Chem. Soc., C, Org. 2328 (1967)
- "A Re-examination of the Synthesis of Perfluoro- γ -butyrolactone"
 R. E. Banks and K. Mullen
J. Chem. Soc., C, Org. 2333 (1967)
- "Diazepines. Part VI. Condensation Products from Benzoylacetone and Ethylenediamine"
 A. M. Gorringe, D. Lloyd, and D. R. Marshall
J. Chem. Soc., C, Org. 2340 (1967)
- "Synthesis and Stereochemistry of 1,4-Diazabicyclo[4.3.0]nonane-2,5,9-triones"
 M. R. Harnden
J. Chem. Soc., C, Org. 2341 (1967)
- "Some Reactions of 3-Acetamido-2-nitrobenzo[b]thiophene and its 5-Chloro- and 5-Bromo- derivatives"
 M. S. El Shanta, R. M. Scrowston and M. V. Twigg
J. Chem. Soc., C, Org. 2364 (1967)
- "Quinoline Alkaloids. Part IX. A Partial Asymmetric Synthesis of Orixine"
 R. M. Bowman and M. F. Grundon
J. Chem. Soc., C, Org. 2368 (1967)
- "Amino-acids and Peptides. Part XXVI. The Use of 1-Piperidyl Esters in Peptide Synthesis: Further Studies"
 J. H. Jones, B. Liberek and G. T. Young
J. Chem. Soc., C, Org. 2371 (1967)

"Résonance magnétique de phosphonates. IV. Exemples de non-équivalence magnétique dans quelques esters phosphoniques diastéréoisomères encombrés"
J. G. Riess
Bull. Soc. Chim. France 3661 (1967)

"Sur le mécanisme du réarrangement pinacolique. I. La déshydratation des bis (*o*-, *m*-, et *p*-hydroxyphényl)-3,4 dihydroxy-3,4 hexanes"
R. Devis et P. Depovere
Bull. Soc. Chim. France 3185 (1967)

"Emploi des époxydes-4,5 pour l'introduction stéréosélective d'un substituant en position 4 des stéroïdes. IX. Réaction de l'acétoxy-3β époxy-4β,5 cholestane avec l'iode de méthyl-magnésium"
S. Julia, J.-P. Lavaux, R. Lorne et J.-C. Riz
Bull. Soc. Chim. France 3218 (1967)

"Interactions intramoléculaires. II. Isomères de rotation d'une série d' α -chlorocéttones acycliques progressivement substitués (synthèses et spectres d'absorption infrarouge du carbonyle)"
A. Caristan et H. Bodot
Bull. Soc. Chim. France 3227 (1967)

"Étude du mécanisme de la réduction duplicative de composés carbonylés α -insaturés en présence de métallos. Application à la synthèse d' α -glycols secondaires tertiaires-bi-éthyléniques"
J. Wiemann, M. R. Monot, G. Dana et J. Chuche
Bull. Soc. Chim. France 3293 (1967)

"Étude par RMN des diméthyl-2,2 dioxolannes-1,3. Application à la séparation et à la caractérisation des α -glycols érythro et thréo"
J. Chuche, G. Dana et M.-R. Monot
Bull. Soc. Chim. France 3300 (1967)

"Étude conformationnelle par RMN des α -glycols érythro et thréo. Application à la stéréochimie de la réduction des composés carbonylés α - β insaturés"
Bull. Soc. Chim. France 3308 (1967)

"Réactions des β -céto-esters avec PbO et Pb(OCH₂C₆H₅)₂: Étude en phase solide et en solution des composés paramagnétiques formés"
S. Tyrlik et R. Marx
Bull. Soc. Chim. France 3316 (1967)

"Addition photochimique d'amines aux esters α , β -non saturés"
M. Pfau et R. Dulou
Bull. Soc. Chim. France 3336 (1967)

"Action des organomagnésiens sur les acétals éthyléniques (3^e mémoire). Comportement de l'acétal diéthylique du pentadiène-1,3 al et de quelques acétals cycliques"
R. Quelet et J. d'Angelo
Bull. Soc. Chim. France 3390 (1967)

"Synthèse des β -glucosides de cyclartényle et de lanostéryle"
M.-F. Lhomme et G. Ourisson
Bull. Soc. Chim. France 3428 (1967)

"Configuration en C-20 du diptérocarpol"
J.-F. Biellmann
Bull. Soc. Chim. France 3459 (1967)

"Réduction duplicative des β -dicétones: I. Réduction duplicative de l'acétylacétone"
P.-F. Casals et J. Wiemann
Bull. Soc. Chim. France 3478 (1967)

"Effet de cycle sur la cinétique d'équilibration des cyano-1 hydroxy-1 cyclanes et sur la stabilité conformationnelle des acides cyclénol-1 carboxyliques-1 correspondants"
R. Braidy
Bull. Soc. Chim. France 3489 (1967)

"RMN. Un exemple de couplage à longue distance ^{4}J entre protons axiaux"
B. Lacoume
Bull. Soc. Chim. France 3496 (1967)

"Alcaloïdes stéroïdiques. LXIII. Préparation de stéroïdes substitués en 18 et en 19 à partir de la conessine. Synthèse partielle de l'oxydo-6 β ,19-nor-18 cyano-13 β prégrâne-5 α dione 3,20"
X. Lusinchi et G. Roblot
Bull. Soc. Chim. France 3498 (1967)

"Recherches dans la série des azoles. XXVII. Synthèse et structure d'aryl-1 pyrazolidones-3 et -5 et de leurs acides conjugués"
P. Bouchet, J. Elguero et R. Jacquier
Bull. Soc. Chim. France 3502 (1967)

"Recherches dans la série des azoles. XXVIII. Synthèse et étude des sels de diméthyl-1,2 et diméthyl-1,1 pyrazolinium-2"
J.-L. Aubagnac, J. Elguero et R. Jacquier
Bull. Soc. Chim. France 3516 (1967)

"Addition 1-4 en série furannique. I. Condensation du bromure de benzylmagnésium sur les cétones α -furanniques"
E. Berreby, J.-P. Morizur et J. Wiemann
Bull. Soc. Chim. France 3529 (1967)

"Influence de la température sur les spectres RMR de Composés aminophosphorés: cas de la diméthylaminophénol-chloro-phosphine"
M. P. Simonnin, J. J. Basselier, et C. Charrier
Bull. Soc. Chim. France 3544 (1967)

"Les Réactions du carbonyle avec les aminophosphines. Réaction des Cétones"
R. Burgada
Bull. Soc. Chim. France 3548 (1967)

"Sur une voie d'accès aux spiro-[2,3] hexanols-4 substitués"
M. Bertrand et R. Mauin
Bull. Soc. Chim. France 3549 (1967)

"Sur une synthèse des cyclopropylidénecycloalcanes"
J.-P. Vincent, A. Bezague et M. Bertrand
Bull. Soc. Chim. France 3550 (1967)

"Nouvelles données relatives à l'obtention d'enoxy silanes"
R. Bourhis et E. Frainnet
Bull. Soc. Chim. France 3552 (1967)

"La cyclisation thermique de cétones -acétyléniques"
F. Rouessac, P. Le Perche, J.-L. Bouket et J.-M. Conia
Bull. Soc. Chim. France 3554 (1967)

"Époxy nitriles V: Préparation de bromodicétones puis de cyanoépoxycétones"
J. Cantacuzène et D. Ricard
Bull. Soc. Chim. France 3555 (1967)

"Désulfuration stéréospécifique de dithiolannes dispiranniques et bis (aryl-2 benzothiazine-3,1 ylidène)-4: *l'* cis et *trans*"
M. Etel, L. Legrand et N. Lozac'h
Bull. Soc. Chim. France 3556 (1967)

"Aqueous Nonelectrolyte Solutions. Part V. Water-Ethylene Oxide Ice Freezing Points, Molar Volumes, and Proton Magnetic Resonance Chemical Shifts"
D. N. Glew, H. D. Mak, and N. S. Rath
Can. J. Chem. 45, 3059 (1967)

"Correlations of Substituent Effects on Proton and Fluorine Chemical Shifts with Inverse Ionization Potentials"
T. Schaefer, F. Hruska, and H. M. Hutton
Can. J. Chem. 45, 3143 (1967)

"Correlations of Proton Coupling Constants in Mono- and Di-substituted Ethylenes with the Inverse of Substituent Electronegativities. A Reconsideration of Previous Correlations"
T. Schaefer and H. M. Hutton
Can. J. Chem. 45, 3153 (1967)

"2,3-Bis(perfluoromethyl)bicyclo[2.2.2]octa-2,5,7-trienes and Their Photorearrangement Reactions"
R. S. H. Liu
J. Am. Chem. Soc. 90, 215 (1968)

"Chemical Shifts for Bicyclic Fluorides"
G. L. Anderson and L. M. Stock
J. Am. Chem. Soc. 90, 212 (1968)

F "Substituent Effects on Fluorine-19 Chemical Shifts in Saturated Systems"
M. J. S. Dewar and T. G. Squires
J. Am. Chem. Soc. 90, 210 (1968)

"The Stereoselective Rearrangements of Conformationally Mobile Epoxides"
C. J. Cheer and C. R. Johnson
J. Am. Chem. Soc. 90, 178 (1968)

"Nuclear Magnetic Resonance Studies of Proton Exchange Rate, Nitrogen Inversion Rate, and Relative "Size" of Methyl Groups and -NH₂ in N,N-Dimethylpiperazine Hydrochlorides"
J. L. Sudmeier and G. Occupati
J. Am. Chem. Soc. 90, 154 (1968)

F "The Nuclear Magnetic Resonance Spectra of Fluorobenzenes. II. The Effect of Substituents on the meta and para Fluorine-Fluorine Coupling Constants"
R. J. Abraham, D. B. MacDonald, and E. S. Pepper
J. Am. Chem. Soc. 90, 147 (1968)

"The Effect of Substituents on Proton-Proton Coupling Constants in N-Substituted Pyridines and on the cis Coupling Constants in the Vinyl Group of 2-Substituted 1,3-Butadienes"
S. Castellano and R. Kostelnik
J. Am. Chem. Soc. 90, 141 (1968)

"Purine Nucleosides. XVIII. The Direct Utilization of Unsaturated Sugars in Nucleoside Syntheses. The Conformation and Structure of Certain 9-(2-Deoxyribopyranosyl) purines Prepared from D-Arabinose"
E. E. Leutzinger, W. A. Bowles, R. K. Robins, and L. B. Townsend
J. Am. Chem. Soc. 90, 127 (1968)

"Attempts to Generate Diphenylcyclopropenylidene. III. Hydride Abstraction-Decarboxylation of 1,2-Diphenylcyclopropenecarboxylic Acid"
S. D. McGregor and W. M. Jones
J. Am. Chem. Soc. 90, 123 (1968)

"The Synthesis of α -Difluoraminocarbinols and Some Derivatives"
J. P. Freeman, W. H. Graham, and C. O. Parker
J. Am. Chem. Soc. 90, 121 (1968)

"The Synthesis and Bisdecarboxylation of Oxygenated Bicyclo[2.2.X]alkanedicarboxylic Anhydrides"
C. M. Cimarusti and J. Wolinsky
J. Am. Chem. Soc. 90, 113 (1968)

"The Synthesis and Study of Pseudo-Aromatic Compounds. VI. The Synthesis of 6,7-Dihydrocyclohepta[d,e]naphthalene and a Conformational Analysis of 1,2-Benzohexaphulvene"
D. J. Bertelli, J. T. Gerig, and J. M. Herbelin
J. Am. Chem. Soc. 90, 107 (1968)

"Organic Syntheses by Means of Noble Metal Compounds. XXXV. Novel Decarbonylation Reactions of Aldehydes and Acyl Halides Using Rhodium Complexes"
K. Ohno and J. Tsuji
J. Am. Chem. Soc. 90, 99 (1968)

"Boron Compounds. XIII. C-Methyl-B-pentaethyl-2-carba-hexaborane(9)"
M. A. Grassberger, E. G. Hoffmann, G. Schomburg, and R. Köster
J. Am. Chem. Soc. 90, 56 (1968)

"Preferential Exchange of Bromines and Bridging Oxygens between Dimethylgermanium and Dimethylsilicon Moieties"
J. R. Van Wazer and K. Moedritzer
J. Am. Chem. Soc. 90, 47 (1968)

"Mechanism of Reduction of Dihydrofolate to Tetrahydrofolate. Studies with 7-Methyldihydrofolate as a Model Compound"
S. F. Zakrzewski and A. Sansone
J. Biol. Chem. 242, 5661 (1967)

"Phospholipids of Clostridium butyricum. III. Further Studies on the Origin of the Aldehyde Chains of Plasmalogens"
P. O. Hogen and H. Goldfine
J. Biol. Chem. 242, 5700 (1967)

"High Resolution NMR in Polymers"
W. P. Slichter
J. Chem. Educ. 45, 10 (1968)

"Magnetic Resonance Studies of Ion Solvation. The Hydration of the Cobaltous Ion"
A. M. Chmelnick and D. Fiat
J. Chem. Phys. 47, 3986 (1967)

Rel "Spin-Lattice Relaxation in Dilute Gases. I. Proton Relaxation in HCl, HBr, and HI"
E. Tward and R. L. Armstrong
J. Chem. Phys. 47, 4068 (1967)

"Proton Relaxation Times and Translational Diffusion in Ferroelectric Potassium Ferrocyanide Trihydrate"
D. E. O'Reilly and T. Tsang
J. Chem. Phys. 47, 4072 (1967)

"Magnetic Resonance Study of Molecular Motion in Cubic $(\text{NH}_4)_2\text{SiF}_6$ "
R. Blinc and G. Lahajnar
J. Chem. Phys. 47, 4146 (1967)

"¹⁷O NMR Shifts in H_2^{17}O Liquid and Vapor"
A. E. Florin and M. Álei, Jr.
J. Chem. Phys. 47, 4268 (1967)

"Magnetic Resonance of Hydrogen and Sodium Nuclei in Sodium Bicarbonate"
J. W. McGrath
J. Chem. Phys. 47, 4276 (1967)

"Thiophosphate. Isolation and Characterisation"
J. D. Murray, G. Nickless, and (the late) F. H. Pollard
J. Chem. Soc., A, Inorg. Phys. Theor. 1726 (1967)

"Reactions of Dialkynyl Compounds of Group IVB Elements with Metal Carbonyls"
S. D. Ibekwe and M. J. Newlands
J. Chem. Soc., A, Inorg. Phys. Theor. 1783 (1967)

"Transition Metal-Carbon Bonds. Part X. Reactions between Allylic Palladium Halides and Tertiary Phosphines, Triphenylarsine, Triphenylstibine, or Carbon Monoxide"
J. Powell and B. L. Shaw
J. Chem. Soc., A, Inorg. Phys. Theor. 1839 (1967)

"A Molecular Orbital Theory of Proton Spin-spin Coupling Constants"
W. T. Dixon
J. Chem. Soc., A, Inorg. Phys. Theor. 1879 (1967)

"Titanium Tetramercaptides and Dialkylaminotitanium(IV) Mercaptides"
D. C. Bradley and P. A. Hammersley
J. Chem. Soc., A, Inorg. Phys. Theor. 1894 (1967)

"Polarisation by Cation Formation: a Method for Influencing the Selectivity of Radical Chlorination"
J. Kollonitsch, G. A. Doldouras, and V. F. Verdi
J. Chem. Soc., B, Phys. Org. 1093 (1968)

"*I*-Substituted Estrone 3-Methyl Ethers"
E. W. Cantrall, R. B. Conrow, and S. Bernstein
J. Org. Chem. 32, 4078 (1967)

"*1,11*-Iminoestrones. II. Some Derivatives and Reactions"
E. W. Cantrall, R. B. Conrow, and S. Bernstein
J. Org. Chem. 32, 4081 (1967)

"The Stereochemistry of the Cleavage of a Steroid 4,4-Dimethyl-3,4-seco Lactone"
D. Rosenthal
J. Org. Chem. 32, 4084 (1967)

"17-Acetyl-13 β -etiojerv-16-en3 β -ol via Performic Acid Oxidation of the Sapogenin Side Chain"
W. F. Johns
J. Org. Chem. 32, 4086 (1967)

"Quinazolines. V. Synthesis and Proof of Structure of 1,3-Diamino-5,6-dihydrobenzo[f]quinazoline"
E. P. Burrows, A. Rosowsky, and E. J. Modest
J. Org. Chem. 32, 4090 (1967)

"Azepinoidoles. III. 3,4,5,6-Tetrahydro-1H-azepino[4,3,2-cd]indoles"
J. B. Hester, Jr.
J. Org. Chem. 32, 4095 (1967)

"4-Indol-3-yl-1-methylhexahydroazepines"
J. B. Hester, Jr.
J. Org. Chem. 32, 4098 (1967)

"The Formation and Structure of Certain Oxazolonium Compounds"
C. V. Greco, R. P. Gray, and V. G. Grossi
J. Org. Chem. 32, 4101 (1967)

"Synthesis and Properties of Fluorine-Containing Heterocyclic Compounds. IV. An N,N¹-Unsubstituted Imidazolidine"
M. M. Joullie, G. M. J. Slusarczuk, A. S. Dey, P. B. Venuto and R. H. Yocom
J. Org. Chem. 32, 4103 (1967)

"Synthesis of 2-Methyl-4H-pyran-4-one"
L. C. Dorman
J. Org. Chem. 32, 4105 (1967)

"Heterocyclic Compounds. VIII. The Reaction of Ethoxyacetylene with 2- and 4-Pyridone"
B. Weinstein and D. N. Brattesani
J. Org. Chem. 32, 4107 (1967)

"Hydrogenolysis by Hydrogen Transfer. Role of Palladium-Charcoal on Halogenated Benzo-Pyridine System"
U. P. Basu and B. Bhattacharya
J. Org. Chem. 32, 4108 (1967)

"Tetrasodium Carbonylidiphosphonate. Synthesis, Reactions, and Spectral Properties"
O. T. Quimby, J. B. Prentice and D. Allan Nicholson
J. Org. Chem. 32, 4111 (1967)

"Competitive Liquid Phase Photochlorination of Isobutane, Isobutyl Chloride, and t-Butyl Chloride"
E. M. Hodnett and P. S. Juneja
J. Org. Chem. 32, 4114 (1967)

"The Selective Oxidation of Sulfur-Containing Amino Acids by Diethyl Azodicarboxylate"
R. Axen, M. Chaykovsky and B. Witkop
J. Org. Chem. 32, 4117 (1967)

"Photochemical Rearrangement of a γ,δ -Cyclopropyl- α,β -Unsaturated Ketone"
P. J. Kropf and H. J. Krauss
J. Org. Chem. 32, 4118 (1967)

"The Polar Addition of Molecular Fluorine to Acetylenes"
R. F. Merritt
J. Org. Chem. 32, 4124 (1967)

"Some Reactions of Silanes and Sulfides with Strong Bases in Dimethyl Sulfoxide"
C. C. Price and J. R. Sowa
J. Org. Chem. 32, 4126 (1967)

"cis-trans Isomerism of Thioncarbamate Esters"
R. A. Bauman
J. Org. Chem. 32, 4129 (1967)

"The Reaction of 2-(N,N-Dimethylamino)-1,4-diphenyl-1,4-butanediol with Acid. A Novel Tetralone Formation"
S. A. Fine and R. L. Stern
J. Org. Chem. 32, 4132 (1967)

"The Reduction of Nitroalkenes to Nitroalkanes with Aqueous Sodium Borohydride"
A. I. Meyers and J. C. Sircar
J. Org. Chem. 32, 4134 (1967)

"Addition of Nitrosyl Chloride to Olefins. Synthesis of Some Chloro Ketones"
B. W. Ponder and D. R. Walker
J. Org. Chem. 32, 4136 (1967)

"Base-Catalyzed Disproportionation of 2-Cyano-1,3-cyclohexadiene"
D. P. Wyman and I. H. Song
J. Org. Chem. 32, 4139 (1967)

"A Convenient Synthesis of *cis,cis*-1,5-Cyclononadiene"
R. Vaidyanathaswamy and D. Devaprabhakara
J. Org. Chem. 32, 4143 (1967)

"The Clemmensen Reduction of Benzoylferrocene"
M. D. Rausch and D. L. Adams
J. Org. Chem. 32, 4144 (1967)

"Thermal Decomposition of p-Tosylhydrazones"
R. A. Henry and D. W. Moore
J. Org. Chem. 32, 4145 (1967)

"The Reaction of Di-n-butylcadmium with Derivatives of Ketal Acids"
R. A. LeMahieu
J. Org. Chem. 32, 4149 (1967)

"The Hydroboration and Subsequent Oxidation of Several Enamines"
I. J. Borowitz and G. J. Williams
J. Org. Chem. 32, 4157 (1967)

"A Useful Method for the Conversion of Alcohols into Iodides"
E. J. Corey and J. E. Anderson
J. Org. Chem. 32, 4160 (1967)

"Ring-Chain Tautomerism of Derivatives of α -Hydroxybenzylamine with Aldehydes and Ketones"
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