



UNIVERSITY OF MINNESOTA  
TWIN CITIES

Department of Chemistry  
Kolthoff and Smith Halls  
207 Pleasant Street S.E.  
Minneapolis, Minnesota 55455

No. 7

MINNESOTA CHEMISTS NEWLETTER

February 1978

Dear Alumni and Friends:

During 1977, the Department of Chemistry has witnessed at least as much progress as it did in 1976. We believe that we are well on our way to establishing our Department firmly among the top ten chemistry departments in this country. We feel that the next few years will see this goal accomplished.

As part of our continued program of resurgence, we have attracted Professors Peter Carr, John Evans, and William Farneth to our staff during 1977. The addition of Professors Carr and Evans constituted a start of our plans to regain the distinction which our Department once held in the area of analytical chemistry. Professor Farneth's addition is part of our continued strengthening of organic chemistry.

As a result of the changes which are occurring, we have noted an improvement in the general well-being of the Department. In the last three years, graduate enrollment has almost doubled, industrial grant-in-aids have doubled, federal funding has increased 80% and very importantly, learned publications have increased more than 50%. Many of these accomplishments are a reflection of the vigor and spirit with which the faculty are responding to our desire for distinction. Through the combined efforts of our faculty, we have been able to significantly improve our instrumentation during the last year. For instance, we have added facilities for chemical ionization mass spectrometry, Auger, ESCA and SIMS spectrometry, and Fourier transform infrared spectroscopy this year. Major changes are occurring in Smith Laboratory. Approximately one-fourth of the fourth floor of Smith is currently being renovated. More importantly, we feel that there is an excellent probability that we will receive major renovation funds from the state legislature this year. In response to the University administration's request for \$324,000 for this renovation, the legislative appropriations committees have recently recommended \$2.4 million to start this project. Obviously, we are very pleased with this development, which only could have been achieved through the active influence of many of the Department's friends. It has been estimated that the total cost of renovating Smith will be \$8.9 million. The recommendation now before the legislature will get us nicely started on this major project.

As indicated above, 1977 has been a year of much good fortune for the Department of Chemistry. We feel that our progress has transformed this Department into one which is able to provide an excellent education to students at both the undergraduate and graduate level. We hope that our alumni and friends will bring to the attention of those who might be prospective graduate students or postdoctorals the vigorous evolution which we are undergoing.

With best wishes for a productive and prosperous year, I am

Sincerely yours,

Paul G. Gassman

NORVILLE C. PERVIER

February 26, 1891 - October 16, 1977

Norville C. Pervier, Professor Emeritus of Chemistry, passed away October 16, 1977 after almost six decades of residence in Minnesota with thirty-nine years of service to the Department of Chemistry. Professor Pervier retired on June 15, 1959. He was a graduate of Iowa State College in 1917 receiving a Master of Science Degree in Physiological Chemistry from the same institution the following year. Some prior tertiary training was obtained at the Armour Institute, now known as the Illinois Institute of Technology. He spent a short period with the Rockefeller Institute of Advanced Physiology and Diagnostic Bacteriology with a short tenure at Yale University. In his early years he also served industry with the Standard Oil Co. His doctorate was obtained at the University of Minnesota in 1922 in the area of Physiological Chemistry. He was appointed to the staff of the School of Chemistry, as it was then called, with a promotion to Associate Professor the following year.

Professor Pervier carried in the Chemistry Program a most unique obligation since he was trained as a Physiological Chemist. He created and carried on a course for the Mortuary Science Program which served as a standard for programs in other states. In addition to the course, he taught a multitude of other courses in the Introductory Program.

Professor Pervier carried an important and indeed a heavy committee load especially in the area of student work and advanced standing. He served as a consultant to such industries and L. H. Kellogg Chemical and, as well, the State Board of Health. In addition to his specialties of the Introductory General-Inorganic area and Biochemistry, he on occasion taught in the Organic specialty area. A quote from the Chief of that specialty area is significant. "He conducted the work in a first-rate manner, his course was modern and up-to-date; it was a pleasure to be associated with him."

## FACULTY CHANGES

Peter W. Carr joined the faculty as an associate professor. Dr. Carr was previously at the University of Georgia at Athens. He received his B.S. degree from the Polytechnic Institute of Brooklyn in 1965 and his Ph.D. from Pennsylvania State University in 1969. His research interests deal with using enzymes immobilized by covalent and hydrophobic bonding for the rapid determination of sugars, amino acids, lipids and proteins. He and his group are also developing analytical and clinical applications for affinity chromatography which is based on the extreme specificity exhibited by biochemical interactions.

David Dixon joined the faculty as an assistant professor. He received his Ph.D. in 1975 from Harvard and spent last year as a Junior Fellow, Society of Fellows at Harvard University. During the Junior Fellowship he was also a visiting Associate at California Institute of Technology. The types of reactive processes Dr. Dixon is interested in studying range from the highly exoergic reactions of metal atoms with oxidants to reactions of organic molecules.

John F. Evans joined the department as an assistant professor in analytical chemistry. Dr. Evans received his Ph.D. in 1977 from the University of Delaware and spent last year as a Visiting Research Associate at the Ohio State University, Columbus. His research interests are directed toward the application of chemical ionization techniques to the mass analysis of sputtered organic materials so that (1) greater sensitivity to the detection of surface material may be realized by charge exchange or proton transfer reactions between the sputtered neutrals and a reactive plasma generated above the surface of interest, and (2) the ions formed from these types of reactions will have low internal energy and less propensity for unimolecular decomposition.

William E. Farneth joined the faculty as an assistant professor in organic chemistry in July. Dr. Farneth obtained his B.A. in Chemistry from Cornell University in 1971 and his Ph.D. from Stanford University in 1975. At Stanford University, Dr. Farneth's thesis advisor was Professor John I. Brauman. From 1975 to the present Dr. Farneth held a postdoctoral appointment at Columbia University. He is engaged in research that may be broadly categorized as physical-organic chemistry. In particular, he is interested in studying the detailed mechanisms of organic reactions and isolating the influences of the activating and deactivating steps on the course of these reactions. This involves studying organic reactions under non-conventional conditions.

## VISITING PROFESSORS

Professor Stanko Borcic of the faculty of Pharmacy and Biochemistry, University of Zagreb, Zagreb, Yugoslavia was a visiting professor during winter quarter 1976-1977. Professor Borcic was born in Shanghai, China, on March 1, 1931, where his father was a medical official of the League of Nations. He received the Dipl. Ing. Chem. in 1953 and the Doctorate in 1957 from the Eidgenössische Technische Hochschule in Zürich. His doctoral thesis was under the direction of Professor Prelog. He was a member of the Institute "Ruder Boskovic" in Zagreb from 1953 to 1967. Since 1967 he has held his present position, Professor of Chemistry, at the Faculty of Pharmacy and Biochemistry, University of Zagreb. Professor Borcic was a postdoctoral fellow at CalTech, with J. D. Roberts. In 1970-1971 he was a Visiting Professor at the University of Oregon. In the summer of 1971 Professor Borcic was a Visiting Professor at Minnesota and taught summer classes in Organic Chemistry.

Professor Friedrich Schlögl from the University of Aachen, Germany was a visiting professor in the Department during spring quarter. Professor Schlögl was born in Erfurt, Germany, and received his early education in German schools in Czechoslovakia. He studied mathematical physics at the German University of Prague and at the University of Göttingen, where he received his doctorate in 1947. He has been a lecturer in theoretical physics at the Universities of Regensburg and Cologne. Since 1960 he has been professor and Director of the Institute for Theoretical Physics at the Rheinisch-Westfälische Technische Hochschule in Aachen. From 1960-1970 he was also Dean of the Mathematical Scientific Faculty Societies, and since 1972 has been chairman of the Section for Thermodynamics and Statistical Mechanics of the German Physical Society. He has made many important contributions in this field, particularly to the understanding of irreversible phenomena.

## FACULTY PROMOTION

John E. Ellis was promoted to associate professor by the Board of Regents in 1977. He received his B.Sc. in 1966 from the University of Southern California at Los Angeles and his Ph.D. in 1971 from the Massachusetts Institute of Technology. He joined the faculty in 1971 as an assistant professor. Dr. Ellis' research interests include investigating areas of fundamental importance in organometallic chemistry. These include studies of syntheses, reactivity patterns, electrochemistry and spectral properties of "superreduced" transition-metallate organometallics; photochemistry of organotransition-metallates; reductions of coordinated  $\pi$ -acceptor ligands; metal atom vapor syntheses of anionic metal complexes; organoactinide chemistry; and parallels in the chemistry of non-metal and transition metal electronically equivalent groups.

## AWARDS

Professor Robert C. Brasted was elected as a Fellow of the American Association for the Advancement of Science. The citation includes the following: "One who has produced a body of work on behalf of the advancement of science that is scientifically distinguished or socially highly significant, or both." The individual citation carries the following: "Robert C. Brasted, for innovative and administrative techniques in the instruction of large classes of students in undergraduate programs and for cooperative efforts in international education".

Professor Bryce Crawford received the 1977 Pittsburgh Spectroscopy Award, given by the Spectroscopy Society of Pittsburgh. Dr. Crawford was the 22nd recipient of the award presented annually since 1957 by the Society to individuals who have made outstanding contributions to the field of spectroscopy. He was also nominated a Honorary member of the Society for Applied Spectroscopy. He received an Honorary Membership Scroll on November 10, 1977 at the FACSS meeting in Detroit. Professor Crawford was also elected to the Fellowship of the American Academy of Arts and Sciences on May 11, 1977. Other active members of this Academy from the Minnesota faculty include: Carl Auerbach, Law; John Borchert, Geography; Walter Heller, Economics; Leo Hurwicz, Economics; and Paul Meehl, Psychology.

In April, 1977, Professor Albert Moscowitz was elected a Foreign Member of the Royal Danish Academy of Sciences and Letters. Currently, there are only six American chemists who are Foreign Members in the mathematical-physical group of the Royal Danish Academy.

At the Sigma Xi banquet held on May 18, 1977, at the St. Paul Student Center, Steven R. Wann and Gregg A. Vandesteeg (Ph.D. March, 1977) were initiated into Associate Membership. Steven Wann was awarded the George T. Walker Prize for excellence in undergraduate research.

## LEAVES

Professor Albert Moscowitz spent part of the fall quarter 1977 as an invited visiting professor at the University of Copenhagen's H. C. Ørsted Institute, Laboratory IV. In addition to giving various lectures, one of his principal functions was to act as one of the two "Official Opponents" at the Danish doctoral thesis defense of Dr. Aage E. Hansen.

Professor Rufus Lumry was on leave from the Department October 12, 1977 to January 15, 1978 to do research at the Scripps Institution of Oceanography at the Chemistry Department of the University of La Jolla, California.

## LEAVES

Professor Robert M. Hexter is on sabbatical leave during the year 1977-1978, which he is spending here in Minneapolis, devoting himself to research on Raman and secondary ion mass spectroscopy of metal surfaces. The research is supported by the Office of Naval Research, The Army Research Office (Durham) and the Graduate School, University of Minnesota. Working in collaboration with Carl Neuberger, Grant Albrecht, John Evans and Peter Kaufmann, this research has most recently concentrated on the apparent enhancement of the Raman spectrum of molecules and polyatomic ions, such as pyridine and  $CN^-$ , when they are adsorbed on an electrochemically roughened surface. New selection rules for these spectra have been found, and a new theory of the enhancement has been proposed. In this theory, the wavelength of the exciting light plays an important role, and this is currently being tested using a dye laser.

Professor Rufus Lumry travelled to the following during his sabbatical leave, October 12 through December 31, 1977: to the Scripps Institution of Oceanography, University of California - San Diego, La Jolla, California, which was his base facility for his sabbatical, carrying out library work, laboratory work and writing. From La Jolla he travelled to Claremont and Los Angeles, California for consultation with Professor Henry Frank at Pomona College and Professor Paul Boyer at UCLA regarding grant-supported research; two papers have been written as a result of this collaboration. During the period of October 12 through December 31 he also made several trips to Varian Associates in Palo Alto, California, to discuss the manufacture of a Continuous Dilution Cuvette which was designed by Zachary Yim, one of Professor Lumry's graduate students, for his Ph.D. research.

# LANDO SUMMER FELLOWSHIPS

The Lando (the late Maximillian N. Lando was a University of Minnesota chemistry graduate, B.S. 1902, who left a large endowment to the University) Summer Research Fellowship Program sponsored by the Department of Chemistry, was conducted again this summer. The program was for outstanding undergraduate students who have completed three years of undergraduate study in chemistry or related fields. Students were selected in a national competition. Twelve students were selected from 102 applications and participated in advanced research projects under faculty supervision in the Department of Chemistry. The twelve students who participated in the summer of 1977 were:

<u>NAME</u>	<u>SCHOOL</u>	<u>RESEARCH GROUP HEAD</u>
Gregory Blasi	Kansas Newman College Wichita, KS	Crawford
Christine Bulawa	Augustana College Rock Island, NY	Gray
Reed Drews	Yale College New Haven, CT	L. Miller
Charles Horowitz	Harvey Mudd College Claremont, CA	Truhlar
Martin Hulce	Butler University Indianapolis, IN	Gassman
Daniel Hunt	Frostburg State College Frostburg, MD	Wertz
Bryan Jick	UCLA Los Angeles, CA	Pignolet
Deborah Kaseman	North Dakota State U Fargo, ND	Borch
Erik Larson	University of Nebraska Lincoln, NE	Gassman
William Lytton	Harvard University Cambridge, MA	Hexter
Mitchio Okumura	Yale College New Haven, CT	Gentry
Mary Beth Schwehr	North Dakota State U Fargo, ND	Moscowitz

NATIONAL SCIENCE FOUNDATION - UNDERGRADUATE RESEARCH PROGRAM  
FOR SUMMER 1977

The Department was awarded \$21,500 to conduct a summer research program for undergraduates. The program was directed and organized by Professor John E. Ellis. The fifteen participants who were at Minnesota for ten weeks were:

<u>NAME</u>	<u>SCHOOL</u>	<u>RESEARCH GROUP HEAD</u>
David Eckmann	University of Minnesota Morris, MN	Siegel
John Feikema	University of Minnesota Minneapolis, MN	Gentry
Kim Halweg	University of Minnesota Minneapolis, MN	Gassman
Nancy Johnson	Concordia College Moorhead, MN	Reynolds
Kevin Murray	Yale University New Haven, CT	Lumry
Charles Parnell	Southwest State University Marshall, MN	Ellis
Joseph Pfotenhauer	St. Norbert College DePere, WI	Bryant
Mark Severson	Augsburg College Minneapolis, MN	Siegel
Henry Spangler	St. Olaf College Northfield, MN	Hoye
Robert Straub	Marian College Fond du Lac, WI	Gray
Michael Tempesta	University of Minnesota Minneapolis, MN	Noland
Ming K. Tse	Lawrence University Appleton, WI	Hoye
Mary Waller	Mount Holyoke College South Hadley, MA	Conroy
Eve Zebisch	University of Minnesota Minneapolis, MN	Pignolet
Dale Zurawski	University of New Mexico Albuquerque, NM	Truhlar



## POST-DOCTORAL ASSOCIATES

In the following table are listed the persons who held post-doctoral appointments in the Department.

<u>NAME</u>	<u>INSTITUTION</u>	<u>GRAD YEAR</u>	<u>COLLABORATING PROFESSOR</u>
Albrecht, M. Grant	London U	1975	Hexter
Bradic, Zdravko	U of Zagreb	1974	Lumry
Chantooni, Miran	U of Minnesota	1961	Kolthoff
Childs, Michael	U of S California	1976	Gassman
Ellis, Peter	U of Illinois	1977	Gassman
Evans, April	U of Minnesota	1975	Gassman
Garrett, Bruce	U of CA - Berkeley	1977	Truhlar
Jhon, Myung	U of Chicago	1974	Dahler
Knox, Donald	Notre Dame	1976	Lumry
Leung, Hiu Kwong	U of Nebraska	1977	Gassman
Mossman, Allen	UCLA	1976	Gassman
Onda, Kunizo	U of Tokyo	1973	Truhlar
Pasternak, Mordechai	Tel Aviv U	1975	Miller, L.
Raj, Tilak	U of Illinois	1976	Bryant
Raynolds, Peter	Ohio State U	1977	Gassman
Seamans, Lloyd	U of Minnesota	1974	Moscowitz
Starkey, Frank	Brown U	1973	Gassman
Szabo, Andras	U of Tubingen	1969	Miller, L.
Tezuka, Meguru	Tokyo U	1975	Miller, L.
Tohyama, Kohji	Osaka U	1976	Miller, W.
Van De Mark, Michael	Texas A & M	1976	Miller, L.
Yamaguchi, R.	Kyoto U	1975	Gassman

## PLACEMENT OF POST-DOCTORAL STUDENTS IN 1977

<u>NAME</u>	<u>POSITION TAKEN</u>
Chang, John C. C. (Gassman)	3M Company
Hahnfeld, Jerry (Gassman)	Dow
Maier, Helmut (Gassman)	returned to Germany
Balchunis, Robert (Gassman)	3M Company
Sugawara, R. (Gassman)	Okazaki, Japan*
Parton, Richard (Gassman)	Eastman Kodak
Kihara, Sorin (Kolthoff)	returned to Japan
Sawamoto, Hiromiti (Kolthoff)	returned to Japan
Bennett, Charles (Bryant)	Hamline U, temporary professor
Hsi, Edward (Bryant)	Union Carbide
Nielsen, Svend (Dahler)	returned to Denmark
Adiarde, Arthur (Lumry)	Minnesota Energy Agency
Haddad, Louis (Lumry)	General Mills
Gregory, Thomas (Lipsky)	IBM, Rochester
Modler, Robert (Kreevoy)	Kraft, Chicago
Swanson, Douglas (Crawford)	IBM, Rochester
Werness, Peter (Lumry)	Department of Nephrology Mayo Clinic, Rochester

\*National Institute for Molecular Science

Grants to faculty members during calendar year 1977 from sources outside the University totaled \$1,928,775 and were received by the following professor:

<u>NAME</u>	<u>PROJECT TITLE</u>	<u>GRANTING INSTITUTION</u>	<u>AMOUNT</u>
Victor Bloomfield	Physical Chemistry of Bacterial Viruses	NIH	\$85,000
Richard Borch	Platelet Aggregation Inhibition of Altered Synthesis	American Heart Assoc.	58,740
	Synthesis of Platelet Aggregation Inhibitors	Minnesota Heart Assoc.	7,935
Robert Brasted	Production of Materials to Assist Foreign Students	International Activities	7,500
Robert Bryant	Solvent and Small Solute in Tissues and Proteins	USPHS	34,292
	Metal Ions in Proteins	USPHS	23,243
Peter Carr	New Developments in Thermochemical Analysis	NSF	33,000
Lawrence Conroy	Characterization of Aquatic Components	NSF-RANN	206,700
John Dahler	Kinetic Theory of Polyatomic Fluids	NSF	42,700
	Theory of High-Energy Ion Atom and Atom-Atom Collisions	NSF	33,000
David Dixon	Sloan Foundation Fellowship	Sloan Fnd.	14,800
	Molecular Beam Chemistry	PRF	10,000
John Ellis	Synthesis and Chemistry of Highly Reduced Organometallics	NSF	28,000
	Carbonyl Di- and Trianions	ACS-PRF	8,000

<u>NAME</u>	<u>PROJECT TITLE</u>	<u>GRANTING INSTITUTION</u>	<u>AMOUNT</u>
Paul Gassman	Purchase of FTIR	NSF	\$55,000
	Chemistry of Bent Bonds	NSF	57,100
W. Ronald Gentry	Chemical Dynamics of Bimolecular Reactive Collisions	NSF	26,000
	Reactions of Ions with Atomic and Molecular Free Radicals	ERDA	34,000
	Energy Transfer in Molecular Collisions	NSF	32,000
Gary Gray	Tumor Regression Mediated by Myco- bacterial Components	American Cancer Soc.	25,566
	Antitumor-Active Components of BCG Cell Walls	NIH	48,070
Robert Hexter	Fluorescence Probes of Metal Surface Adsorbed Molecule Reactions	DAAG	37,000
	Surface Chemistry Studies Using Fluor- escence Probes	NAVY	40,000
	Critical Point Analysis in Molecular Crystals by the use of Modulation Spectro- scopy	ACS-PRF	24,000
Thomas Hoyer	Synthetic Organic Photochemistry-Intra- molecular Reactions for the Formation of Medium Sized Rings	Research Corp.	9,000
	Extension and Appli- cation of the Intra- molecular ENE and Retroene Reactions	ACS-PRF	9,000
	Total Synthesis of cyco-(Streptolytyl- streptolutyl)	American Cancer Soc.	2,800

<u>NAME</u>	<u>PROJECT TITLE</u>	<u>GRANTING INSTITUTION</u>	<u>AMOUNT</u>
Maurice Kreevoy	The Relations Between Rate, Structure and Solvent, Proton and Hydride Transfer	NSF	\$36,000
	DMSO-Water as a Medium for BH <sub>4</sub> Reductions	Ventron Corp.	3,000
	Reactions of BH <sub>4</sub> in Acidic Protic and Aprotic Solutions	ACS-PRF	12,000
	Catalysis of Reduction with BH <sub>4</sub>	Ventron Corp.	4,000
Edward Leete	Research on Biogenesis of Morphine	PHS	70,333
	Metabolism of Natural Products of Medicinal Interest	NIH	52,833
Sanford Lipsky	The Contribution of Excited States to the Radiation Chemistry of Organic Systems	USERDA	75,000
Rufus Lumry	Molecular Details of Direct Water Participation in Protein Membrane and Whole Cell Function	American Cancer Soc.	42,910
	Systems Approach to Protein Function	NSF	36,000
	Role of Water in Function of Hemoglobin and Myoglobin	NIH	53,805
	Conformational Basis of Enzymic Catalysis	NIH	38,926
C. Alden Mead	Principle of Increasing PRF Mixing Characters	PRF	16,000
Larry Miller	Electrochemical Medicinal Synthesis	PHS	54,106
	Organic Plasma Chemistry	NSF	71,268
	Organic Electrochemistry	NSF	114,000
	Anodic Substitution	PRF	12,000

<u>NAME</u>	<u>PROJECT TITLE</u>	<u>GRANTING INSTITUTION</u>	<u>AMOUNT</u>
Wilmer Miller	Cholesteric Biopolymer Liquid Crystals	PHS	\$56,916
	Conformation of Polymer Adsorbed at Solid- Liquid Interface	PRF	12,000
Albert Moscowitz	Magnetic Circular Dichroisms of Forbidden Transition in Organic Molecules	NSF	25,916
	Hemoglobin and Red Cell Systems in Hemo- globinopathies	NIH	20,000
John Overend	Infrared Spectroscopy of Adsorbates on Clean Solid Surfaces	NSF	25,916
Louis Pignolet	Photochemical, Redox, Magnetic and Kinetic Properties of Transition Metal Complexes with Sulfur Containing Legands	NSF	27,400
Brock Siegel	Mechanical Studies of Models for the Action of Prolyl Hydroxylase	Research Corp.	8,000
	Kinetic and Mechanism of non-Exzomatic 2-Keto Acid Dependant Aliphatic Hydroxylation	ACS-PRF	9,000
Donald Truhlar	Scattering Theory and Calculations for Chem- ical Reactions and Electron Impact Pro- cesses	NSF	21,000
John Wertz	Electronic Properties of the Alkaline Earth Oxides	NSF	38,000

## INDUSTRIAL GRANTS TO THE DEPARTMENT

The following industrial organizations have made grants to the Department for fellowships and unrestricted use. Faculty and students greatly appreciate this support, for without it many deserving and talented students would not be able to complete successfully their research programs. Individual faculty members who received unrestricted industrial grants are noted in parentheses.

Allied Chemical	\$3,000
Diamond Shamrock (Britton)	3,000
Dow Chemical Company	5,000
E. I. du Pont de Nemours and Company	26,000
Ciba-Geigy (Gassman)	5,000
General Electric Company (Gassman)	7,500
General Electric Company (L. Miller)	7,500
General Mills	1,000
Hercules	4,000
Lubrizol	1,000
Minnesota Mining and Manufacturing	7,000
Pillsbury Company (Bryant)	3,600
Pillsbury Company (Overend)	5,000
Proctor and Gamble	6,000
Robins (Gassman)	400
Union Carbide	3,000
Uniroyal	3,000
Ventron (Kreevoy)	3,000

## OTHER SUPPORT

During 1977, the Department of Chemistry was very fortunate in that it received excellent support from its' alumni and from the McKnight Foundation, which provided \$170,000. These McKnight funds were used to help attract new faculty members by providing funds for the establishment of their research operations. In addition, the McKnight funds were used to improve the general level of instrumentation within the Department.

In terms of individual giving, we were very pleased to receive a gift of \$3,000 from Robert and Mame Heinze (class of 1916) and an employer matching gift of \$9,000 from the Exxon Foundation. These funds were provided as an initial "challenge gift" towards the establishment of an Alumni Endowed Chair of Chemistry. As most of you realize, the Department of Chemistry at the University of Minnesota is one of the few major departments of chemistry in the United States which have no "chaired" professorships. We have strong hopes that the next few years will witness the establishment of one or more endowed chairs. Clearly, help in this area will have to come primarily from our alumni. It should be noted that unless donated funds are sent to the Minnesota Foundation and specified for the use of the Chemistry Department or for the Alumni Endowed Chair in Chemistry, the donations would go into the University's general fund. This is true both for individual donations and for matching gifts from employers. Both must be designated gifts. We hope that we will see strong response to the "challenge gift" which we have received.

## UNIVERSITY SPONSORED RESEARCH GRANTS TO THE FACULTY

Graduate School grants to faculty members during calendar year 1977 totaled \$108,190 and were distributed as follows:

<u>NAME</u>	<u>PROJECT</u>	<u>AMOUNT</u>
Dixon, David	Ion Cyclotron Resonance Studies of Ion Molecule Reactions	\$6,500
Dodson, Raymond Leete, Edward Miller, Larry	Infrared Analysis of Organic Compounds	2,000
Evans, John	Funds to set up laboratory	9,615
Farneth, William	Funds to set up laboratory	10,000
Gassman, Paul	Purchase of Auger, ESCA, SIMS Spectrometer	50,000
Hexter, Robert	Fluorescence Probes of Metal Surface-Adsorbed Molecule Interactions	8,000
Hoye, Thomas	Total Synthesis of Aplysistatin	7,000
Lipsky, Sanford	Emission Spectroscopy	6,000
Siegel, Brock	Mechanistic Studies of Chemical Models for the Action of Prolyl Hydroxylase	6,800
Truhlar, Donald	Collision Theory of Chemical Reactions, Energy Transfer Processes, and Electron Impact Spectroscopy	2,275

## FACULTY ACCOMPLISHMENTS

During 1977, our faculty was extremely active. Their accomplishments have been widely recognized by invitation to provide lectures at symposia, National American Chemical Society Meetings, and numerous universities. The faculty has also distinguished itself in terms of attracting federal funding and in the area of the publication of scholarly findings. The following pages provide a sampling of some of these achievements.

VICTOR BLOOMFIELD

- February 15-18      Biophysical Society meeting, New Orleans, Louisiana; presented paper "Light Scattering and Electrophoresis Study on TA Phage Tail Fiber Attachment"
- May 27              Biochemistry Department, University of Minnesota, Duluth, Minnesota; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- August 25          Department of Biochemistry, Baylor College of Medicine, Houston, Texas; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- September 13      Physical Chemistry and Molecular Biology, University of Wisconsin, Madison; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- September 15      Cell and Molecular Biology Seminar, Colorado State University, Fort Collins; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- September 16      Department of Chemistry, University of New Mexico, Albuquerque; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- October 20          Division of Cell and Molecular Biology, State University of New York, Buffalo; seminar "Dynamic Light Scattering in Biophysical Chemistry"
- November 14-16    Department of Biochemistry, Columbia University, New York; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"
- November 30        Department of Biochemistry, University of Chicago, Chicago, Illinois; invited seminar "Dynamic Light Scattering Applications in Biophysical Chemistry"

ROBERT C. BRASTED

- March 20            Japan; Visiting Scholar Award, Japanese Society for  
June                  The Promotion of Science, University of Tokyo
- March 21            Hawaii Section, American Chemical Society, invited seminar, "Techniques and Technologies in Chemical Education"
- April 2-4            Japanese Chemical Society Meeting, Osaka, Japan, address to the Division of Chemical Education on the occasion of the special award to Professor Bunichi Tamaushi
- April 21            Hongo Campus of the University of Tokyo; invited seminar "Cyclic Sulfur Imides, Preparation and Structural Chemistry"



April 25	Komaba Campus of the University of Tokyo; invited seminar "Instructional Techniques in Teaching Large Groups of Students"
April 26	Wasada Campus of the University of Tokyo; invited seminar "Instructional Techniques in Teaching Large Groups of Students"
April 28	Komaba Campus of the University of Tokyo; invited seminar "Anamalous Behavior of Optically Resolvable Complexes"
April 28	Hongo Campus of the University of Tokyo; invited seminar "Anamalous Behavior of Optically Resolvable Complexes"
May 2	Japanese Chemical Society, Tokyo; invited seminar "Comparitive Systems of Education"
May 6	Nagoya University, Department of Chemistry; invited seminars "Environmental and Ecological Problems from the Instructors Point of View" and "Expanded Ring Metal Complexes"
May 10	Miyagi University, Sendai, Japan; invited seminar "Experiences and Experiments in Chemical Education, Demonstrations in Teaching"
May 20	Kyushu University, Department of Chemistry; invited seminar "Continuing Education - Responsibility of Universities"
May 21	Hiroshima University, Department of Chemistry; invited seminar "Research in Complexes" and Sulfur-Nitrogen Chemistry"
May 25	Kinki University, Nagase, Japan; invited seminar "Anamalous Rotations of Metal Complexes"
May 27	Kanazawa University, Department of Chemistry; invited seminar "Cyclic Sulfur Imides"
May 28	Hokuriku University, Department of Chemistry; invited seminar "Techniques and Technology of Teaching Large Sections"
June 10-12	Novosibersk, Akademgorodok, USSR, visited Academician Boroskov in the Institute of Catalysis; Homogenesis and Catalysis Group Seminar "Some Aspects of $N_2-O_2$ Fixation Using Metal Complexes"
October 20-22	National Science Teachers Association at the Joint International Conference (NSTA-STAM), Winnipeg, Manitoba; invited seminar "Two Hundred Years of Revolutions in Chemical Education - How Much Smoke and How Much Fire?"

ROBERT G. BRYANT

- January 9 Pillsbury Company; invited seminar "Water-Protein Interactions"
- February 14-18 21st Annual Biophysical Society Meeting, New Orleans, Louisiana; presented paper "NMR Relaxation in Protein Crystals and Frozen Solutions"
- October 22 University of California, Davis; invited seminar "NMR Relaxation of Water at the Water-Protein Interface"
- April 24 Colorado State University, Fort Collins; invited seminar "NMR Relaxation at the Water-Protein Interface"
- September 21 Bloomington Elementary School; High Achievers Program invited lecture "Basic Scientific Research"
- October 3-7 Manhattan College; invited seminar "NMR Applications in Biophysical Chemistry" and University of Virginia, invited seminar "NMR Relaxation at the Water Protein Interface:
- October 18 University of Wisconsin, Madison; invited seminar "NMR Relaxation at the Water-Protein Interface"

LAWRENCE E. CONROY

- March 21-25 American Chemical Society National Meeting, New Orleans, Louisiana; invited paper "The Orientation Program for Teaching Assistants in General Chemistry at the University of Minnesota, Minneapolis"

BRYCE L. CRAWFORD

- January 21-23 Governing Board of the National Research Council and Council of the National Academy of Sciences, Washington, DC; participant
- February 28 Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Cleveland, Ohio; received Pittsburgh Spectroscopy Award
- March 4-6 Council of the National Academy of Sciences and the Governing Board of the National Research Council, Washington, DC; participant
- March 16-23 Board of Directors and the Spring National Meeting of the American Chemical Society, New Orleans, Louisiana; participant
- April 18 Department of Chemistry, Gustavus Adolphus College, St. Peter, Minnesota; invited seminar "Infrared Intensities are Harder than Frequencies but More Fun"

June 23-26 Meetings of the Council of the National Academy of Sciences and the Governing Board of the National Research Council, Washington, DC; participant

July 8-9 Retreat session, American Chemical Society Board of Directors, Bloomington, Minnesota; participant

August 5-10 Meetings of the Council of the National Academy of Sciences and the Governing Board of the National Research Council; participant

August 25 - September 1 Board of Directors and the Fall National Meeting of the American Chemical Society, Chicago, Illinois; participant

September 17-18 Governing Board Meetings of the National Research Council, Washington, DC; participant

September 22-23 Presented the 1977 ACS Award for Outstanding Performance by a Local Section to the Central Wisconsin Section, Stevens Point, Wisconsin; invited talk "The Scientific Journal"

October 19 Department of Chemistry, University of Delaware, Newark, Delaware; invited talk "IR Intensities and Band Shapes; Delaware Section, American Chemical Society, Villanova University, invited talk "The Scientific Journal"

October 28-30 Meetings of the Governing Board of the National Research Council and the Council of the National Academy of Sciences, Washington, DC; participant

#### JOHN S. DAHLER

May 26-29 10th Midwest Theoretical Conference at Argonne National Laboratory, Argonne, Illinois; presented two papers "A Kinetic Theory of Correlation Function in Dense Fluids" and "Influence of Electronic Correlation on the Electron Impact Excitation of the Doubly-Excited  $^3P_g$  and  $1,^3D_u$  States of Helium"

June 29-July 2 Second International Symposium on Continuum Models of Discrete Systems; Montreal, Canada; presented paper "Transport and Relaxation in Polyatomic and Chemically Reactive Fluids"

July 18 ICPEAC Meeting, Paris, France; presented three papers "A Comparison of Model-Potential Calculations for Resonance Line Excitation in Quasi-one-electron Systems: Li, Na,  $Be^+$ ,  $Mg^+$ -He, Ne Collisions"; "Impact-parameter Theory for Quasi-one-electron Systems" and "Associative Ionization in N-O Collisions in Classical Theory"

November 9      University of Toronto, Department of Chemistry,  
invited seminar "Transport and Relaxation in  
Chemically Reactive Fluids"

JOHN E. ELLIS

February 24      Department of Chemistry, University of Chicago;  
invited lecture, "Superreduced Organometallics"

March 20-27      National American Chemical Society Meeting, New  
Orleans; paper "Superreduced Metal Carbonyls"

May 19            3M Company, Central Research Laboratories, St.  
Paul, Minnesota; invited lecture "Superreduced  
Organometallics"

JOHN F. EVANS

October 27       Midwest Universities Analytical Chemistry Conference,  
Lincoln, Nebraska; paper "Introduction of Functional  
Groups onto Conductive Carbons Using Reactive Plasmas"

PAUL G. GASSMAN

February 8       Scherling Corporation, Bloomfield, New Jersey;  
invited talk "Azasulfonium Salts - Useful Inter-  
mediates in Aromatic Substitution and the Synthe-  
sis of Heterocyclics"

February 9       Lederle Laboratories, Pearl River, New Jersey;  
invited talk "New Routes to Old Heterocyclics"

March 8           Department of Chemistry, University of Tennessee,  
Knoxville, Tennessee; invited seminar "Transition  
Metal Promoted Rearrangements of Hydrocarbons"

March 14          PPG Industries, Research Laboratories, Barberton,  
Ohio; invited talk "Transition Metal Complex Pro-  
moted Rearrangement of Hydrocarbons" and "Azasulfon-  
ium Salts - Useful Intermediates in Organic Synthesis"

April 4           3M Company, Central Research Laboratories, St. Paul,  
Minnesota; invited lecture "Transition Metal Complex  
Promoted Rearrangements of Hydrocarbons"

April 7-9          Department of Chemistry, University of Utah, Salt  
Lake City, Utah; invited seminars "Transition  
Metal Complex Promoted Rearrangements of Hydro-  
carbons" and "[2,3]-Sigmatropic Rearrangements of  
Ylids Derived from Azasulfonium Salts"

April 19           Department of Chemical Engineering, University of  
Minnesota, Minneapolis; invited seminar "Transition Metal  
Complex Promoted Rearrangements of Hydrocarbons"

April 22	Department of Chemistry, University of North Dakota, Grand Forks, North Dakota; invited seminar "Transition Metal Complex Promoted Rearrangements of Hydrocarbons"
May 11	Charles Pfizer, Inc., Groton, Connecticut; invited talk "Azasulfonium Salts - Useful Intermediates in the Synthesis of Heterocyclics"
May 29- June 2	Joint American Chemical Society-Chemical Institute of Canada Meeting, Montreal, Canada; plenary lecture "The Role of Metal-Carbene Complexes in Olefin Metathesis", Symposium on Organometallic Chemistry
June 27	Research Laboratories, Eli Lilly, Ltd., Research Center, Windlesham, England; invited seminar "Azasulfonium Salts - Useful Intermediates in the Synthesis of Heterocyclics"
June 28	Department of Chemistry, Imperial College of Science and Technology, London, England; invited seminar "Azasulfonium Salts - Useful Intermediates in the Synthesis of Heterocyclics"
June 30	The Chemical Society, Organic Reaction Mechanisms Group Meeting, Cardiff, Wales; plenary lecture, "[2,3]-Sigmatropic Rearrangements of Ylids Derived from Azasulfonium Salts. A Mechanistically Interesting and Synthetically Useful Reaction"
July 23	Gordon Research Conference on Organic Reactions and Processes, New Hampton, New Hampshire; invited seminar "Transition Metal Complex Promoted Rearrangement of Organic Compounds, New Concepts in Olefin Metathesis"
August 29	179th National Meeting of the American Chemical Society, Chicago, Illinois; invited seminar "[2,3]-Sigmatropic Rearrangements of Ylids Derived from Azasulfonium Salts" Symposium on the Chemistry of S-N compounds
September 15- 16	Phi Lambda Upsilon Award Lecture, Department of Chemistry, University of Nebraska, Lincoln; invited lecture "Chemistry and Alchemy. The Study of Transition Metal Promoted Rearrangements of Hydrocarbons", and "Azasulfonium Salts. Useful Intermediates in the Synthesis of Heterocyclics"
September 23	Department of Chemistry, Carleton College, Northfield, Minnesota; invited seminar "Transition Metal Complex Promoted Rearrangements of Hydrocarbons"
September 28	Department of Chemistry, University of California - Berkeley; invited seminar "Transition Metal Complex Promoted Rearrangements of Hydrocarbons"

GARY R. GRAY

- February 20-25 1977 ICN-UCLA Symposium on Cell Surface Carbohydrates and Biological Recognition, Keystone, Colorado; presented poster "Proteins Containing Reductively Aminated Disaccharides. Chemical and Immunochemical Characterization"
- April 19 Mayo Clinic, Rochester, Minnesota; invited seminar "Mycobacterial Components in Cancer Immunotherapy"
- June 26-July 1 1977 Gordon Research Conference on Chemistry of Carbohydrates, Boston, Massachusetts; presented paper "A General Synthesis of 2-Deoxyaldoses"
- November 3 Minnesota Mining and Manufacturing, invited seminar "Chemistry of Antitumor-Active Immunogens"

THOMAS R. HOYE

- October 27 Department of Chemistry, University of Northern Iowa, Cedar Rapids, Iowa; invited seminar "Studies Directed Toward a Total Synthesis of Aplysistatin, an Antineoplastic, Marine Natural Product"

I. M. KOLTHOFF

- May 15-16 Joint Japanese-American Seminar, San Francisco, California; invited lecture "Catalytic Currents of Albumin at the Hanging Mercury Drop Electrode (HMDE). Aging Effects at the HMDE"

MAURICE M. KREEVOY

- February 10 University College of Swansea, Wales; invited seminar, "Recent Advances in Borohydride Chemistry"
- February 24 University of Essex, Colchester. Essex. England, invited seminar "The Dynamics of Proton Transfer in Solution"
- March Series of lectures on "Kinetic Methods for the Determination of Mechanism and Transition State Structure", University of Lausanne, sponsored by the Convention Intercantonale Romande
- April 10-May 10 University of Zagreb, Zagreb, Yugoslavia; Distinguished Professor; sponsored by the Yugoslav-American Commission for Educational Exchanges (Fullbright Commission)
- May 23 Chemistry Institute of the University of Bergen, Bergen, Norway; invited seminar "The Upper Limit to Rates of Proton Transfer Reactions"

- May 25 University of Durham, Durham, England; invited seminar, "The Upper Limit to Rates of Proton Transfer Reactions"
- May 26 Dyson-Perrins Laboratory of Organic Chemistry, Oxford, England; invited lecture "Recent Advances in Chemistry with Borohydride Ions"
- May 31 University of Freiburg, Germany; invited lecture "The Spectra, Isotopic Fractionation Factors, and Structure of Hydrogen Bonded Complexes"
- June 1 King's College, London, England; invited lecture "Structures and Isotopic Fractionation Factors of Complexes, AHA"
- October 30 - November 3 University of Indiana, Bloomington, Indiana; invited seminar, "Isotopic Fractionation Factors and Structures of Hydrogen-Bonded Complexes"
- November 7 Southwest State University, Marshall, Minnesota; invited seminar "The Use of Isotopes in Chemistry, Physics and Biology"
- November 8 Buena Vista College, Storm Lake, Iowa; invited seminar "The Use of Isotopes in Chemistry, Physics and Biology"

#### EDWARD LEETE

- March 19-26 American Chemical Society Meeting in New Orleans, Louisiana; two invited papers "Metabolism of the Tobacco Alkaloids" and "Biosynthesis of Dioscorine"
- April 14 Department of Chemistry, University of Northern Iowa, Cedar Falls; invited lecture "Biosynthesis of Natural Products"
- September 16 Department of Chemistry, University of Wisconsin, Eau Claire, Wisconsin; invited lecture "Biosynthesis of Natural Products Using  $^{13}\text{C}$ -NMR"
- September 22 Symposium on the Chemistry of Psychoactive Drugs, University of Birmingham, Alabama; invited paper "Studies on the Biosynthesis of Psychoactive Drugs Using  $^{13}\text{C}$  Labelled Compounds"
- October 4-8 31st Tobacco Chemists Research Conference, Greensboro, North Carolina; invited lecture "Aberrant Biosynthesis of 5-fluoroanabasine from 5-fluoronicotinic Acid in Nicotiana glauca"

#### C. ALDEN MEAD

- May 26-28 Midwest Theoretical Chemistry Conference, Argonne, Illinois; poster presentation "The Principle of Increasing Mixing Character"

LARRY L. MILLER

- January 11 University of Washington, Seattle, Washington; invited seminar "Organic Electrochemistry"
- January 12 University of Oregon, Eugene, Oregon, 1st Annual Snow Symposium; talk "Electrical Organic Chemistry"
- March 30-31 California Institute of Technology, Pasadena, California; invited seminar "Organic Electrochemistry"
- May 19 3M Company, St. Paul, Minnesota; invited seminar "Organic Electrochemistry"
- May 22-29 EUCHEM Organic Electrochemistry Meeting, Glasgow, Scotland; invited talk "Chemically Modified Electrodes"
- October 12-13 Central Regional American Chemical Society Meeting, Charleston, West Virginia; invited paper "Organic Electrode Surfaces"
- November 2 University of Rochester, Rochester, New York; invited seminar "Organic Electrochemistry"
- November 4 Hope College, Holland, Michigan; invited seminar "Organic Electrochemistry"

WILMER G. MILLER

- January 4 Department of Chemistry, Carleton College; invited seminar "Studies on Stiff Chain-Polymers"
- March 22 American Chemical Society National Meeting, New Orleans, Louisiana; invited talk given at the Symposium on Rigid-Chain Polymers "Kinetic Studies on the Formation of the Anisotropic Phase in Stiff Chain Polymers"
- June 2 Joint CIC-ACS Meeting, Montreal, Quebec; invited seminar "Enthalpy Relaxation in Polystyrene in the Presence of Non-solvents"
- July 7 McDonnell Douglas Corporation, invited seminar "The Use of Nitroxides in Synthetic Polymers"
- August 31 American Chemical Society Meeting, Chicago, Illinois; invited seminar, Symposium on Ordered Fluids and Liquid Crystals "Some Modifications of the Flory Lattice Model for Rigid Chain Polymers"
- September 7 IUPAC Meeting, Tokyo, Japan; invited seminars "Conformation of Polymer Adsorbed on Interfaces" and "Effect of Solvents on Nitroxide Motion in Polystyrene and Poly(methyl Methacrylate)"



- September 13 Nagoya University, Department of Chemistry, Nagoya, Japan; invited seminar "Thermodynamic Studies on Stiff Chain Polymers"
- September 15 Japan Polymer Society, Symposium - Kyoto; invited talk, "Studies on the Population of Conformers in Helical Forming Polyamino Acids"
- December 7 IBM Watson Laboratories, New York; invited seminar, "The Use of Nitroxides in Synthetic Polymers"

ALBERT J. MOSCOWITZ

- February 23 American Chemical Society Student Affiliate at Grinnell College; invited talk "Optical Activity and Molecular Structure"
- December 1-31 Official opponent for Dr. of Philosophy thesis of Dr. G. E. Hansen at the University of Copenhagen, Denmark.

WAYLAND E. NOLAND

- October 17 Biology Colloquium, University of Minnesota; invited seminar "Chemicals and Food: A Story about Additives"

JOHN OVEREND

- June 5-9 11th Great Lakes Regional Meeting of the American Chemical Society, Stevens Point, Wisconsin; invited papers "Isotope Separation by Laser Excitation of Octahedral Molecules", "Infrared Spectroscopy of Adsorbates in Low-Area Surfaces" and "Anharmonic Effects in Vibrational Circular Dichroism"
- June 13-17 Molecular Spectroscopy Symposium, Columbus, Ohio; invited papers "Intensities of Binary Overtone and Combination Bands in the Infrared", "Anharmonic Effects in Vibrational Circular Dichroism" and "Infrared Spectroscopy of Adsorbates on Low-Area Surfaces"
- June 19-  
August 15 Visiting Senior Scientist at Leeds University, England, working on thermal conductivity of gases
- September 1-  
10 NATO school at Belgrade, Italy; invited papers "The Experimental Determination of Gas-Phase Infrared Intensities", "Dipole Strengths of Multiquantum Transitions. I. Basic Theory and Application to the Intensities of Binary Transitions in the Absence of Vibrational Degeneracy" and "Dipole Strengths of Multiquantum Transitions. II. Intensities of Binary Transitions in the Case of Degenerate Vibrations and the Extension of Theory to Tertiary Transitions"

LOUIS H. PIGNOLET

- January 18      American Chemical Society Meeting, Duluth, Minnesota; invited seminar "Photo Chemistry of Coordination Compounds"
- March 20-25    National Meeting of the American Chemical Society, New Orleans, Louisiana; invited seminars "Photochemical and Structural Properties of Some Dithiocarbamate Complexes of Ruthenium and Osmium" and "Photochemical Study of Some Iron and Ruthenium Complexes with Sulfur Containing Ligands"
- May 10          General Mills Chemicals, Inc., Minneapolis, Minnesota; invited talk "Bonding in Transition Metal Complexes"
- June 6-8        Eleventh Great Lakes Regional Meeting of the American Chemical Society, Stevens Point, Wisconsin; invited seminars "The Photochemistry of Dithiocarbamates and Dithiolenes of Iron", "The Photochemistry of Ruthenium Dithiocarbamates", "Redox Properties of Some Dithiocarbamate Complexes of Ruthenium" and "The Synthesis and Chemistry of Dithiocarbamate Complexes of Osmium"
- December 13    American Chemical Society Meeting, Minneapolis, Minnesota; invited seminar "Photochemistry of Coordination Complexes and Solar Energy Conversion"

STEPHEN PRAGER

- March 19-23    National American Chemical Society Meeting; New Orleans, Louisiana; invited talk, "Statistical Mechanisms of Microemulsions"
- October 20      Department of Chemistry, Washington University, St. Louis, Missouri; invited seminar "Statistical Mechanisms of Microemulsions"

WARREN L. REYNOLDS

- June 6-8        Eleventh Great Lakes Regional American Chemical Society Meeting, Stevens Point, Wisconsin; presented paper "Demetallation of  $\alpha, \beta, \gamma, \delta$ -Tetra(p-sulfophenyl)-porphineiron(III) in Sulfuric Acid-Ethanol-Water Media"
- August 28-      American Chemical Society Meeting, Chicago, Illinois presented paper "De-Metallation of  $\alpha, \beta, \gamma, \delta$ -Tetra(p-sulfophenyl-porphineiron(III) in Sulfuric Acid-Ethanol-Water Media"
- October 31      Department of Chemistry, Gustavus Adolphus College, St. Peter, Minnesota; invited seminar "Intermediates in Substitution Reactions of Pentaamminecobalt(III) Complexes"

HAROLD S. SWOFFORD, JR.

June 7-8            11th Annual Great Lakes Regional Meeting of the American Chemical Society, University of Wisconsin, Stevens Point: invited papers "Electrochemistry of Cobalamines", "Electrochemistry of Cobinamides" and "Voltammetry of Biologically Important Sulfur-Containing and Sulfur-Free Compounds at the Hanging Mercury Drop Electrode (HMDE)"

DONALD G. TRUHLAR

April 14            Department of Chemistry, Carnegie-Mellon University, Pittsburgh, Pennsylvania; Physical Chemistry seminar, "Molecular Trajectory Studies of the Influence of Potential Energy Surface Features on the Attributes of Chemical Reactions and Energy Transfer Processes"

April 21            Department of Chemistry, Kansas State University, Manhattan, Kansas; Departmental seminar "Collision-Induced Dissociation of Diatomic Molecules"

April 27            Guelph-Waterloo Centre for Graduate Work in Chemistry; University of Waterloo, Ontario, Canada' invited seminar "Collision-Induced Dissociation and Energy Transfer in Ar-H<sub>2</sub> Collisions at Shock-tube Temperatures"

May 29-  
June 2            Chemical Institute of Canada-American Chemical Society Joint Conference in Montreal; contributed paper "Reactive and Nonreactive Rate Constants for Modelling the Thermally Induced Steady-State Dissociation of N<sub>2</sub> in a Bath of Argon"

June 24-  
July 11            Los Alamos Scientific Laboratory, Los Alamos, New Mexico; participated in research on collision-Induced dissociation of small molecules in the gas phase

September 7        Department of Chemistry, Illinois Institute of Technology; Chemistry Department Colloquium seminar; "Collision Theory and Nonequilibrium Effects in Thermal Reaction Systems: The Dissociation of Hydrogen Molecules in the Gas Phase"

November 21-  
                 23            University of Southern California, University of California at Los Angeles, and California Institute of Technology; presented Tri-Joint seminar in Chemical Physics "The Competition Between Energy Transfer and Dissociation in the Gas-Phase Reaction Ar + H<sub>2</sub> → Ar + H + H"

ARCHIE S. WILSON

February 9      Department of Chemistry, Grinnell College, Grinnell, Iowa; invited seminar "Plutonium, Friend or Foe"

HAROLD WITTCOFF

February 25      Northwestern Section of the American Association of Cereal Chemists, Minneapolis, Minnesota; invited seminar "The Food Industry -- An Overview"

March 3          Western Coatings Society, 13th Biennial Symposium and Show, Los Angeles, California; invited seminar, "The Polyamide-Epoxy Vehicle: Mechanism of Film Formation of Wet Surfaces"

March 15        University of Northern Arizona, Flagstaff and Arizona State University, Tempe; invited seminars related to industrial chemical topics and microbiology

April 14        Industry/Education Interface Meeting sponsored by the Industrial Research Institute, Corning, New York, invited participant

April 23        Undergraduate Research Symposium in Chemistry; Carleton College, Northfield, Minnesota; invited lecture "Industrial Chemistry and our Future"

June 20-24      Presented short course at the University of Minnesota, "How to Teach Industrial Chemistry"

September 15    American Chemical Society Meeting, Iowa State University, Ames, Iowa; invited talk "Industrial Chemistry"

October 11      Society of Research Administrators, San Antonio, Texas; invited talk "Technological Sovereignty"

October 25      AAAS Sponsored Chautauqua Program, presented short courses on the teaching of industrial chemistry at Miami University of Ohio, Oxford; Christian Brothers College, Memphis, Tennessee; and the University of Iowa, Iowa City

## FACULTY PUBLICATIONS

"Biosynthesis of Alkaloids", E. Leete, Biosynthesis, Volume 5 (Specialist Periodical Report), The Chemical Society, London, Editor John D. Bu'Lock, 1977, Chapter 6, pp. 136-239.

"Analytical Aspects of Immobilized Enzyme Columns", R. S. Schifreen, D. A. Hanna, L. D. Bowers, and P. W. Carr, Anal. Chem., 49, 1929 (1977).

"Biosynthesis of Dioscorine: Incorporation of Nicotinic Acid into the Isoquinuclidine Moiety", E. Leete, Phytochemistry, 16, 1705-1709 (1977).

"The ortho-Alkylation of Anilines via [2,3]-Sigmatropic Rearrangement of Azasulfonium Ylids. A New Process for the Introduction of Alkyl Groups", P. G. Gassman and R. L. Parton, Tetrahedron Lett., 2055 (1977).

"A Vanadium Carbonyl Trihydride", J. Ellis, R. Faltynek and S. Hentges, J. Amer. Chem. Soc., 99, 626 (1977).

"Highly Reduced Organometallic Anions. 1. Syntheses and Properties of Tetracarbonylmetalate(3-) Anions of Manganese and Rhenium", J. Ellis, R. Faltynek, J. Amer. Chem. Soc., 99, 1801, (1977).

"The Relationship of Polarization in Metal Carbene Complexes to the Degenerate Metathesis of Terminal Olefins", P. Gassman, and T. H. Johnson, J. Amer. Chem. Soc., 99, 622 (1977).

"A Comparison of the Heterolytic vs. Homolytic Cleavage of the N-Cl Bond", P. G. Gassman, K. Uneyama, and J. Hahnfeld, J. Amer. Chem. Soc., 99, 647 (1977).

"ortho-Alkylation of Anilines: Indoles from Anilines: Ethyl 2-Methyl-indole-5-carboxylate", P. G. Gassman and T. J. van Bergen, Organic Syntheses, 56, 72 (1977).

"A General Procedure for the Base-Promoted Hydrolysis of Esters at Ambient Temperatures", P. G. Gassman and W. N. Schenk, J. Org. Chem., 42, 918 (1977).

"Substituent Effects on the Carbon-13 Spectra of Oxindoles," P. G. Gassman, D. P. Gilbert and T. -Y. Luh, J. Org. Chem., 42, 1340 (1977).

"A General Method for the Synthesis of Isatins", P. G. Gassman, B. W. Cue, Jr., and T. -Y. Luh, J. Org. Chem., 42, 1344 (1977).

"Application of the Baylis-Gombas Pseudopotential to Inelastic Atomic Collisions", K. J. Wahlstrand, R. W. Numrich, J. S. Dahler, S. E. Nielsen, Atom. Molec. Phys., Vol. 10, No. 9 (1977).

"Excitation Cross Sections and Polarization of Impact Radiation in Li/Na-He/Ne High-energy Collisions: A Comparison of Model Potential Calculations", J. Manique, S. E. Nielsen, J. S. Dahler, Atom. Molec. Phys., Vol 10, No. 9, (1977).

"Lectin Purification on Affinity Columns Containing Reductively Aminated Disaccharides", R. J. Baues and G. R. Gray, J. Biol. Chem., 252, 57-60 (1977).

"Acetylated Methylmannose Polysaccharide of Streptomyces griseus" L. S. Harris and G. R. Gray, J. Biol. Chem., 252, 2470-2477 (1977).

"Synthesis of Labelled 2-Deoxyaldoses. Hydroxyl Group Participation in the Reduction of Intermediate Ketene Dithioacetals by Lithium Aluminum Hydride", M. Y. H. Wong and G. R. Gray, Tetrahedron Letters, 1617-1620 (1977).

"Proteins Containing Reductively Aminated Disaccharides. Synthesis and Chemical Characterization", B. A. Schwartz and G. R. Gray, Arch. Biochem. Biophys., 181, 542-549 (1977).

"The Methanol-Trimethoxyborane Azeotrope as a Solvent for Acid-Catalyzed Reactions. Methyl Esterification", M. M. Kreevoy and S. S. Kantner, Croatica Chem. Acta, 49:1, 41-46 (1977).

"The Apparent Oxidation of Triphenylmethane by Triflic Acid", S. S. Kantner and M. M. Kreevoy, J. Org. Chem., 42 865 (1977).

"The Hydrolysis Mechanism of  $\text{BH}_4^-$  in Moist Acetonitrile" R. F. Modler and M. M. Kreevoy, J. Amer. Chem. Soc., 99, 2271 (1977).

"The Methanol-Trimethoxyborane Azeotrope as a Solvent," M. M. Kreevoy and S. S. Kantner, Croatica Chem. Acta., 49:1, 31-39 (1977).

"Quantum Mechanical and Crossed-Beam Study of Vibrational Excitation of  $\text{N}_2$  by Electron Impact at 30-75 eV" D. G. Truhlar, M. A. Brandt, S. K. Srivastava, S. Trajmar, and A. Chutjian, J. Chem. Phys., 66, 655-633 (1977).

"Monte Carlo Trajectory Study of  $\text{Ar} + \text{H}_2$  Collisions. II. Vibrational and Rotational Enhancement of Cross Section for Dissociation" N. C. Blais and D. G. Truhlar, J. Chem. Phys., 66 772-778 (1977).

" $\text{H} + \text{H}_2$ : Potential Energy Surfaces and Elastic and Inelastic Scattering", D. G. Truhlar and R. E. Wyatt, Ad. Chem. Phys., 36, 141-204 (1977).

"Electron Scattering", D. G. Truhlar, chapter in Modern Theoretical Chemistry, Volume 8, "Semiempirical Methods of Electronic Structure Calculation, Part B: Applications", edited by G. A. Segal (Plenum Press, New York, 1977) pp. 247-288.

"Synthesis and Characterization of a New Seven-Coordinate Ruthenium (IV) Complex. Crystal and Molecular Structure of Iodotris(N,N-dimethyldithiocarbamato)ruthenium(IV)-Iodine." B. M. Mattson and L. H. Pignolet, Inorg. Chem., 16, 488 (1977).

"Mass Spectrometry Data for Tris- and Bis(N,N-dialkyldithiocarbamato) Complexes of Chromium, Iron, Cobalt, Ruthenium, Rhodium and Thallium" K. W. Given, B. M. Mattson, G. L. Miessler, and L. H. Pignolet, J. Inorg. Nucl. Chem., 39, 1309 (1977).

"Photo Reaction Pathways of Ruthenium(III) Complexes. Ultraviolet Irradiation of Tris(N,N-dialkyldithiocarbamato)ruthenium(III)." K. W. Given, B. M. Mattson, M. F. McGuiggan, G. L. Miessler and L. H. Pignolet, J. Amer. Chem. Soc., 99, 4855 (1977).

"X-Ray Crystal Structure of Tetrakis(N,N-dimethyldithiocarbamato)- $\mu$ -nitrido- $\mu$ -(N,N-dimethyldithiocarbamato)diosmium(IV)." K. W. Given and L. H. Pignolet, Inorg. Chem., 16, 2982 (1977).

"Mixing Character and its Application to Irreversible Processes in Macroscopic Systems", C. A. Mead, J. Chem. Phys., 66, 459-467 (1977).

"Exactly Soluble Model for Crystal with Spatial Dispersion", C. A. Mead, Phys., Rev. B, 15, 519-532 (1977).

"The Influence of an Electric and Magnetic Field in Chemical Reactions", C. A. Mead, A. Moscovitz, H. Wynberg and F. Meuwese, Tetrahedron Letters, 12, 1063-1064 (1977).

"Monodisperse Sulfur sols from the Air-oxidation of Hydrogen Sulfide Solutions", G. Chiu and E. J. Meehan, J. Coll. Interface Sci., 62, 1 (1977).

"Light Scattering Studies on Colloidal Lead Sulfide", E. J. Meehan and D. J. Erdmann, J. Coll. Interface Sci., 62, 8 (1977).

"Principles of Nephelometric Titrations with Application to Dilute Solutions of Bromide", E. J. Meehan and S. Yamaguchi, Anal. Chem., 49, 2268 (1977).

"Reductive Sulfenylation. A General Method for the  $\alpha$ -Sulfenylation of Cyclic Ketones", P. G. Gassman, D. P. Gilbert and S. M. Cole, J. Org. Chem., 42, 3233 (1977).

"Sulfenylation of Amides", P. G. Gassman and R. J. Balchunis, J. Org. Chem., 42, 3236 (1977).

"The Use of [2,3] Sigmatropic Rearrangements for the Specific ortho-Substitution of Polycyclic Aromatic Amines. The Methylation of Naphthylamines and the Synthesis of 1H-Benz[g]indoles and 3H-Benz[e]indoles", P. G. Gassman and W. N. Schenk, J. Org. Chem., 42, 3240 (1977).

"The Conversion of Anilines into N-Methyl-2-quinolones via [2,3] Sigmatropic Rearrangements", P. G. Gassman and R. L. Parton, Chem. Commun., 694 (1977).

"Kinetic Resolution via the Transition Metal Complex Promoted Rearrangement of Strained Hydrocarbons", P. G. Gassman, T. Sugawara, and L. G. Tillotson, J. Org. Chem., 42, 3785 (1977).

"Chemistry of Metal Carbonyl Anions. 9. Syntheses and Properties of Alkylpentacarbonylmatalate Anions of Chromium and Tungsten", J. Ellis, G. Hagen, Inorg. Chem., 16, 1357 (1977).

"Derivatives of Tricarbonylmetallates(-III) of Cobalt, Rhodium and Iridium", J. Ellis, P. Barger, M. Winzenburg, J. Chem. Soc., Chemical Communications, 686 (1977).

"Analytical Chemistry in the USA in the First Quarter of this Century", I. M. Kolthoff, Anal. Chem., 49 481A (1977).

Foreword to "A History of Analytical Chemistry", by I. M. Kolthoff; H. A. Laitinen and G. W. Ewing, Ed., Division of Analytical Chemistry, ACS, 1977, pages IX-XIV.

"Acid-Base Reactions in Nonaqueous Solvents", I. M. Kolthoff, in "Essays on Analytical Chemistry", a volume in memory of Professor Anders Ringbom, Abo Akademi, Abo, Finland; Pergamon Press, Oxford, 1977, pages 1-22.

"Voltammetric Determination of Ultratraces of Albumin, Cysteine, and Cystine at the Hanging Mercury Drop Electrode", I. M. Kolthoff, and S. Kihara, Anal. Chem., 49:13, 2108 (1977).

"Kinetic and Equilibrium Acid-Base Behavior of Tertiary Amines in Anhydrous and Moist Dimethylsulfoxide", M. M. Kreevoy and Y. Wang, J. Phys. Chem., 81, 1924 (1977).

"Demetallation of  $\alpha, \beta, \gamma, \delta$ -Tetrakis( $\phi$ -sulfophenyl)porphiniron(III) in Sulfuric Acid-Ethanol-Water Media", W. L. Reynolds, J. Schufman, F. Chan, and R. C. Brasted, Jr., International J. Chem. Kin., 9, 777 (1977).

"Monte Carlo Trajectory Study of Ar + H<sub>2</sub> Collisions", N. C. Blais and D. G. Truhlar, in State-to-State Chemistry, ACS Symposium Series No. 56, edited by P. R. Brooks and E. F. Hayes (ACS, Washington, 1977) pp. 243-246.

"State-Resolved Rotational Excitation in HD + HD Collisions", W. R. Gentry and C. F. Giese, Phys. Rev. Lett., 39, 1259 (1977).

"Proteins Containing Reductively Aminated Disaccharides. Immunochemical Characterization", B. J. Kamicker, B. A. Schwartz, R. M. Olson, D. C. Drinkwitz, and G. R. Gray, Arch. Biochem. Biophys., 183, 393-398 (1977).

"A New Synthesis of the Pyrrolizidine Alkaloids Isoretioneanol and Trachalanthamidine", R. F. Borch and B. C. Ho, J. Org. Chem., 42, 1225 (1977).

"Synthesis of 8-epi-Dendrobine", R. F. Borch, A. J. Evans, and J. J. Wade, J. Amer. Chem. Soc., 99, 1612 (1977).

"Structures and Isotopic Fractionation Factors of Complexes AHA<sup>-1</sup>", M. M. Kreevoy, T-M. Liang, and K-C. Chang, J. Amer. Chem. Soc., 99, 5207 (1977).

"The Measurement of Optical Constants in the Infrared by Attenuated Total Reflection", B. Crawford, T. G. Goplen and D. Swanson, Chapter 2 in Advances in Infrared and Raman Spectroscopy, Vol. 4, edited by Clark and Hester.



"The Cleavage of  $C_5H_5HgBr$  by Aqueous Solutions Containing  $H^+$  and  $Br^-$ ", E. E. Ibrahim and M. M. Kreevoy, J. Phys., Chem., 81, 2143 (1977).

"Quantum Vibrational Transition Probabilities from Real Classical Trajectories: Symmetric Diatom-Diatom Collisions", R. T. Skodje, W. R. Gentry and C. F. Giese, J. Chem. Phys., 66 160 (1977).

"The Dynamics of the Reaction  $D_2^+ + N \rightarrow ND^+ + D$ ", D. J. McClure, C. H. Douglass and W. R. Gentry, J. Chem. Phys., 66 2079 (1977).

"Long-Range Interactions of Ions with Atoms Having Partially-Filled P Subshells", W. R. Gentry and C. F. Giese, J. Chem. Phys., 67, 2355 (1977).

"The Dynamics of the Reaction  $D_2^+ + O(^3P) \rightarrow OD^+ + D$ , and the Influence of the Atomic Quadrupole Moment on the Cross Section at Very Low Kinetic Energies", D. J. McClure, C. H. Douglass, and W. R. Gentry, J. Chem. Phys., 67 2362 (1977).

"The Dynamics of the Reaction  $H_2^+ + H_2 \rightarrow H_3^+ + H$ , with Isotopic Variations", C. H. Douglass, D. J. McClure and W. R. Gentry, J. Chem. Phys., 67, 4931 (1977).

"On the Possibility that Electronically Excited Products May Be Formed in the Reaction  $H_2^+ + H_2 \rightarrow H_3^+ + H$ ", W. R. Gentry and G. Ringer, J. Chem. Phys., 67, 5398 (1977).

"Resolved Single-Quantum Rotational Excitation in  $HD + He$  Collisions: First Results from a Unique Pulsed Molecular Beam Apparatus", W. R. Gentry and C. F. Giese, J. Chem. Phys., 67, 5389 (1977).

"Acid-Base Equilibria of Some Acids in Propylene Carbonate", K. Izutsu, I. M. Kolthoff, T. Fujinaga, M. Hattori, and M. K. Chantooni, Anal. Chem., 49, 503 (1977).

"Velocity Correlation Functions for Harmonic Oscillator Chains", M. S. Jhon and J. S. Dahler, Chem. Phys. Lett., 50, 330-332 (1977).

"On the Choice of Phase in Classical Trajectory Theories II." J. S. Dahler, S. E. Nielsen and R. W. Numrich, J. Phys. B, Atom. Phys., 10 L257-L260 (1977).

"Excitation Cross Sections and Polarization of Impact Radiation in  $Be^+-Mg^+-He-Ne$  High-Energy Collisions: A Comparison of Model Potential Calculations", S. E. Nielsen and J. S. Dahler, Phys. Rev. A, 16 563-576 (1977).

" $H + H_2$ : Potential Energy Surfaces and Elastic and Inelastic Scattering", D. G. Truhlar and R. E. Wyatt, Adv. Chem. Phys., 36 141-204 (1977).

"Quantum Mechanical and Crossed-Beam Study of Vibrational Excitation of  $N_2$  by Electron Impact at 30-75 eV", D. G. Truhlar, M. A. Brandt S. K. Srivastava, S. Trajmar, and A. Chutjian, J. Chem. Phys., 66 655-663 (1977).

"Monte Carlo Trajectory Study of Ar + H<sub>2</sub> Collisions. II. Vibrational and Rotational Enhancement of Cross Sections for Dissociation", N. C. Blais and D. G. Truhlar, J. Chem. Phys., 66 772-778 (1977).

"The Importance of Isotope-Dependent Transmission Coefficients in Calculating Low-Temperature Isotope Effects," D. G. Truhlar, A. Kuppermann, and J. Dwyer, Mol. Phys., 33 683-688 (1977).

"Legendre Moment Method for Calculating Differential Scattering Cross Sections from Classical Trajectories with Monte Carlo Initial Conditions", D. G. Truhlar and N. C. Blais, J. Chem. Phys., 67 1532-1539 (1977).

"Monte Carlo Trajectories: Alignment of HBr Rotational Angular Momentum as a Function of Scattering Angle for the Reaction H + Br<sub>2</sub> → HBr + Br", N. C. Blais and D. G. Truhlar, J. Chem. Phys., 67 1540-1546 (1977).

"Monte Carlo Trajectory Study of Ar + H<sub>2</sub> Collisions. Translation to Vibration Energy Transfer from Different Initial States", N. C. Blais and D. G. Truhlar, in State-to-State Chemistry, edited by P. R. Brooks and E. F. Hayes (American Chemical Society, Washington, 1977). pp. 243-246.

"Direct Calculation of the Equilibrium Value of the Energy of Activation for Dissociation of H<sub>2</sub> by Ar and Evidence for the Important Contribution of Collisional Dissociation from Low Vibrational Quantum Numbers at Shock-Tube Temperatures", D. G. Truhlar and N. C. Blais, J. Amer. Chem. Soc., 99 8108-8109 (1977).

"Infrared Intensities: A Model for the Quantitative Prediction of the Vibrational Strengths of SF<sub>6</sub> and UF<sub>6</sub>", W. B. Person and J. Overend, J. Chem. Phys., 66 1442 (1977).

"The Relative Dipole Strengths of the 00°1 → 10°0 and 00°1 → 02°0 Laser Transitions in CS<sub>2</sub> and CO<sub>2</sub>", J. Overend, Spectrochim Acta 33A 311 (1977).

"A 2 m Cell for Infrared Spectroscopy in Liquid-Argon Solution", A. C. Jeannotte II and J. Overend, Spectrochim. Acta, 33A, 849 (1977).

"Intensities of Binary Overtone and Combination Bands in the IR Spectrum of NF<sub>3</sub>" W. G. Golden, A. C. Jeannotte II, C. C. Blackburn and J. Overend, Spectrochim. Acta, 33A 901 (1977).

"Anharmonic Splittings and Vibrational Energy Levels of Octahedral Molecules: Application to the nv<sub>3</sub> Manifold of <sup>32</sup>SF<sub>6</sub>", C. C. Jensen, W. B. Person, B. J. Krohn, and J. Overend, Opt. Comm., 20 275 (1977).

"Anharmonic Effects in Vibrational Circular Dichroism" T. R. Falukner, C. Marcott, A. Moscovitz, and J. Overend, J. Amer. Chem. Soc., 99 8160 (1977).

"Potential Energy Surface for Bond Exchange among Three Hydrogen Molecules" D. A. Dixon, R. M. Stevens and D. R. Herschbach, Faraday Discuss. Chem. Soc., 62 110 (1977).

"Ab Initio Study of the Electronic Structure of  $\text{Li}_2^-$ ", D. A. Dixon, J. L. Gole and K. D. Jordan, J. Chem. Phys., 66 567 (1977).

"Theoretical Studies of Inversion Barriers in Pyramidal Molecules" D. S. Marynick and D. A. Dixon, Faraday Discuss. Chem. Soc., 62 47 (1977).

"Energy Transfer Processes Involving van der Waals Bonds", D. A. Dixon and D. Herschbach, Ber. Bunsenges. Phys. Chem., 81, 145 (1977).

"Inelastic Energy Transfer in Chlorine Dimers" D. A. Dixon and D. R. Herschbach, Faraday Discuss. Chem. Soc., 62 309 (1977).

"Lifetime for Predissociation of Vibrationally Excited van der Waals Molecules" D. A. Dixon, D. R. Herschbach and W. Klemperer, Faraday Discuss. Chem. Soc., 62 341 (1977).

"Six-Centre Reaction Systems:  $\text{H}_6$ ,  $\text{H}_2\text{Li}_4$  and  $\text{Cl}_6$ " D. A. Dixon and D. R. Herschbach, Faraday Discuss. Chem. Soc., 62 162 (1977).

"The Bond Energy-Bond Order Method" D. A. Dixon and D. R. Herschbach, Faraday Discuss. Chem. Soc., 62 166 (1977).

"Limitations of Molecular Orbital Correlations for Reaction" D. A. Dixon and D. R. Herschbach, Faraday Discuss. Chem. Soc., 62 343 (1977).

"Localized Molecular Orbitals for Polyatomic Molecules VII. The Closo Boron Hydrides  $\text{B}_n\text{H}_n^{2-}$  and Carboranes  $\text{C}_2\text{B}_{n-2}\text{H}_n$ " D. A. Dixon, D. A. Kleier, J. H. Hall, T. A. Halgren and W. N. Lipscomb, J. Amer. Chem. Soc., 99 6226 (1977).

"Electron Affinity of the Methyl Radical: Structures of  $\text{CH}_3$  and  $\text{CH}_3^-$ " D. S. Marynick and D. A. Dixon, Proc. Natl. Acad. Sci., USA, 74 410 (1977).

"The Inversion Barriers of  $\text{AsH}_3$  and  $\text{SeH}_3^+$ " D. A. Dixon and D. S. Marynick, J. Amer. Chem. Soc., 99 6101 (1977).

"Orthogonal Collocation: A Mathematical Technique for the Simple, Fast Numerical Solution of Electroanalytical Diffusion Problem" L. F. Whiting and P. W. Carr, J. Electroanal. and Interfacial Chem., 81 1 (1977).

"Fourier Analysis of the Transient Response of Potentiometric Enzyme Electrodes" P. W. Carr, Anal. Chem., 49 799 (1977).

"Fundamental Aspects of Immobilized Enzyme Reactors" Application to a Thermochemical Analyzer Based on Theory" R. S. Schifreen, L. D. Bowers, D. A. Hanna and P. W. Carr, Anal. Chem., 49 1929 (1977).

- "Electron Scattering", D. G. Truhlar, chapter in Modern Theoretical Chemistry, Vol. 8, "Semiempirical Methods of Electronic Structure Calculations, Part 8: Applications", (G. A. Segal, ed.), Plenum Press, New York (1977), pp. 247-288.
- "Solid State Chemistry of Organic Polyvalent Iodine Compounds. X. Sequential, Competitive, and Reversible Topotactic Transformations" J. Zanos Gougoutas, J. Amer. Chem. Soc., 99 127 (1977).
- "The Crystal Structure of 3-Iodo-2-Naphthoic Acid", J. Z. Gougoutas and B. Toeplitz, Cryst. Struct. Comm., 6, 331 (1977).
- "Novel Synthesis and X-Ray Crystal Structure Analysis of the 1,2,4-Thiadiazolo [4,5- $\alpha$ ]benzimidazole Ring System", R. D. Haugwitz, B. Toeplitz, and J. Z. Gougoutas, Chem. Comm., 736 (1977).
- "The Crystal Structure of o-Iodobenzoic Acid", J. Z. Gougoutas, Cryst. Struct. Comm., 6 703 (1977).
- "Nuclear Magnetic Resonance Study of Water Adsorbed on Milled Northern White Cedar", E. Hossfeld and R. G. Bryant, J. Colloid Interface Sci., 62 389 (1977).
- "NMR Relaxation Studies of Carbonic Anhydrase Derivatives in Frozen Solutions" E. Hsi and R. G. Bryant, J. Phys., Chem., 81 462 (1977).
- "NMR Relaxation in Cross-Linked Lysozyme Crystals: An Isotope Dilution Experiment" E. Hsi and R. G. Bryant, Archives of Biochemistry and Biophysics, 183 588 (1977).
- "Electron Transport in Methane Gas" H. T. Davis and P. Kleban, Phys. Rev. Lett., 39 456 (1977).
- "Percolation Theory of Residual Phases in Porous Media", H. T. Davis, R. Larson and L. E. Scriven, Nature, 268 409 (1977).
- "Water Loss Rates and Temperature Profiles of Dry Cooked Bovine Muscle" H. T. Davis, E. W. Godsalve, E. A. Davis and J. Gordon, J. Food Sci., 42 1038 (1977).
- "The Crystal Structure of Silver Dicyanide,  $\text{Ag}(\text{CN})_2$ ", D. Britton and Y. M. Chow, Acta Cryst., B33, 697-699 (1977).
- "The Crystal Structure of 4-Bromobenzonitrile", D. Britton, J. Konnert, and S. Lam, Cryst. Struct. Comm., 6 45-48 (1977).
- "The Crystal Structure of Terephthelonitrile", C. van Rij and D. Britton, Acta Cryst., B33 1301-1303 (1977).
- "Synthesis and Structure of Fluorotricyano methane" D. Britton, S. Farooq and R. Keese, Helv. Chim. Acta, 60 1393-1397 (1977).
- "The Crystal Structure of 2,4,6-Tribromobenzonitrile,  $\text{C}_7\text{H}_2\text{Br}_3\text{N}$ ", V. B. Carter, D. Britton and W. B. Gleason, Cryst. Struct. Comm., 6 543-548 (1977).

"Vibrational Circular Dichroism in HCB<sub>2</sub>ClF and DCB<sub>2</sub>ClF; Calculation of the Rotational Strengths Associated with the Fundamentals and the Binary Overtones and Combinations", C. Marcott, T. R. Faulkner, A. Moscovitz, and J. Overend, J. Amer. Chem. Soc., 99 8169 (1977).

"Total Synthesis of Illudinine, Illudalic Acid, and Illudacetalic Acid," R. B. Woodward and T. R. Hoye, J.A.C.S., 99 8007 (1977).

"The Effect of Good Solvents on Molecular Motion of Nitroxide Free Radicals in Covalently Labeled Polystyrene and Poly(methyl methacrylates)", W. G. Miller and Z. Veksli, Macromolecules, 10 686 (1977).

"The Effect of Solvents on Molecular Motion of Nitroxide Free Radicals Doped in Polystyrene Poly(methyl methacrylates)" W. G. Miller and Z. Veksli, Macromolecules, 10 1234 (1977).

"Biosynthesis of Gramine in *Phalaris arundinacea*", E. Leete and M. L. Minich, Phytochemistry, 16 149 (1977).

"Biosynthesis of the Isoquinuclidine Moiety of Dioscorine. Incorporation of [5,6-<sup>13</sup>C<sub>2</sub>]Nicotinic Acid Established by means of <sup>13</sup>C-NMR", E. Leete, J. Amer. Chem. Soc., 99, 648 (1977).

"The Incorporation of [5,6-<sup>13</sup>C<sub>2</sub>]Nicotinic Acid into the Tobacco Alkaloids Established by the Use of <sup>13</sup>C Nuclear Magnetic Resonance" E. Leete, Bioorganic Chemistry, 6 273 (1977).

Biosynthesis and Metabolism of the Tobacco Alkaloids in "A Symposium on the Chemistry of Tobacco", E. Leete, ACS Special Publication (1977).

"Correlation of Electrochemical Reactivity and Photoelectron Spectra of Aromatic Ketones" T. Koenig, R. Wielesek, L. L. Miller, and Y.-H. So, J. Amer. Chem. Soc., 99, 7061 (1977).

"Organic Electrosynthesis", L. L. Miller, E. Kariv, and J. R. Behling, Ann. Rept. in Med. Chem., 12 309 (1977).

"Asymmetric Cathodic Reduction of Acetylpyridines", J. Kopilov, E. Kariv and L. L. Miller, J. Amer. Chem. Soc., 99 3450 (1977).

"Kinetics of Anisole Plasmolysis" M. Tezuka and L. L. Miller, J. Amer. Chem. Soc., 99 17 (1977).

"The Preparation and Characterization of a Sodium Tungsten Bronze" L. E. Conroy, J. Chem. Ed., 54 45 (1977).

"Preparation and Crystal Structure of  $\beta$ -Ta<sub>2</sub>N" L. E. Conroy and A. N. Christensen, J. Solid State Chem., 20 205 (1977).

"Biomass Conversion" The Minnesota Alternative Energy Research and Development Policy Formulation Project, L. E. Conroy and R. A. Peterson, Minnesota Energy Agency, St. Paul (1977).

- "Vibrational Circular Dichroism in HCB<sub>r</sub>C<sub>2</sub>F and DCB<sub>r</sub>C<sub>2</sub>L; Calculation of the Rotational Strengths Associated with the Fundamentals and the Binary Overtones and Combinations", C. Marcott, T. R. Faulkner, A. Mowcowitz, and J. Overend, J. Amer. Chem. Soc. 99, 8169 (1977).
- "The Influence of an Electric and Magnetic Field in Chemical Reactions," C. A. Mead, A. Moscovitz, H. Wynberg, and F. Meuwese, Tetrahedron Lett. 12, 1063 (1977).
- "Photochemical and Thermal Transformations of Phytochrome", M. J. Burke and A. Moscovitz, in Chemistry and Physiology of Bile Pigments, P. D. Berk and N. I. Berlin, eds., U. S. Dept. of Health, Education and Welfare, Washington, D.C., 1977.
- "Syntheses and Properties of Alkylpentacarbonylmetalate Anions of Chromium and Tungsten", J. E. Ellis and G. P. Hagen, Inorg. Chem., 16, 1357 (1977).
- "Synthesis of Radiolabeled T-2 Toxin", S. Fenton, Wallace, Pathre, Ag. and Food Chem., 25 4, 836 (1977).
- "Long-Range Interactions of Ions with Atoms in P States", W. R. Gentry and C. F. Giese, Proceedings of the X ICPEAC, Vol. 2, p. 740 (Comissariat a L' Energie Atomique, Paris, 1977).
- "Low-Energy Charge Transfer Collisions of He<sup>+</sup> with N<sub>2</sub>", H. Udseth, C. F. Giese and W. R. Gentry, Proceedings of the X ICPEAC, Vol. 12, p. 1040 (Comissariat a L' Energie Atomique, Paris, 1977).
- "A Merged Beam Study of the Associative Ionization Reaction N + O → NO<sup>+</sup> + e", W. R. Gentry and G. Ringer, Proceedings of the X ICPEAC, Vol. 12, p. 1146 (Comissariat a L' Energie Atomique, Paris, 1977).
- "Proteins Containing Recutively Aminated Disaccharides. Chemical and Immunochemical Characterization", G. R. Gray, B. A. Schwartz and B. J. Kamicker, in "Cell Surface Carbohydrates and Biological Recognition", ed. V. Marschesi, V. Ginsburg, P. Robbins and C. F. Fox, Alan Liss, New York, 1977.
- "Mechanism of the Reaction of Diazomethane with Weak Acids", M. Kreevoy and S. Thomas, J. Org. Chem., 42, 3979 (1977).
- "Kinetic Studies on the Formation of the Anisotropic Phase in Stiff Chain Polymers", W. G. Miller, Polym. Prep. 18, 173 (1977).
- "Statistical Mechanics of Microemulsions", Y. Talmon and S. Prager, Nature 267, 333 (1977).
- "Linkage Between the Binding Sites for Zinc and Oxygen on Sperm Wale Myoglobin", J. M. Rifkind, M. H. Keyes and R. Lumry, Biochem., 16, 5564 (1977).

"Indoles from Anilines: Ethyl 2-Methyl-indole-5-carboxylate", P. G. Gassman and T. J. van Bergen, *Org. Syn.*, 56 72 (1977).

"The ortho-Alkylation of Anilides via the [2,3]-Sigmatropic Rearrangement of Ylids Derived from N-Acyl-N-aryl-azasulfonium Salts", P. G. Gassman and R. J. Balchunis, *Tetrahedron Lett.*, 2235 (1977).

"Measurement of Diffusion Coefficient and Electrophoretic Mobility with a Quasielastic Light Scattering-band Electrophoresis Apparatus", T. K. Lim, G. J. Baran and V. A. Bloomfield, *Biopolymers*, 16 1473-1488 (1977).

"Hydrodynamic Properties of Macromolecular Complexes. I. Translation", J. G. de la Torre and V. A. Bloomfield, *Biopolymers*, 16 1747-1763 (1977).

"Hydrodynamic Properties of Macromolecular Complexes. II. Rotation", J. G. de la Torre and V. A. Bloomfield, *Biopolymers*, 16 1765-1778 (1977).

"Hydrodynamic Properties of Macromolecular Complexes. III. Bacterial Viruses", J. G. de la Torre and V. A. Bloomfield, *Biopolymers*, 16 1779-1793 (1977).

"Hydrodynamic Theory of Swimming of Flagellated Microorganisms", J. G. de la Torre and V. A. Bloomfield, *Biophysical Journal*, 20 49-67 (1977).

"Structure of the Prothrombin and Blood Clotting Factor X-membrane Complexes", T. K. Lom, V. A. Bloomfield, and G. L. Nelstuen, *Biochem.*, 16 4177-4181 (1977).

"Hydrodynamics in Biophysical Chemistry", V. A. Bloomfield, *Ann. Rev. Phys. Chem.*, 28 233-259 (1977).

"Magnetic Circular Dichroism Studies XLVI. Structure and the Magnetic Circular Dichroism of Trans-2-decalones and Bicyclo-[2.2.2]octan-2-ones", K. Morrill, R. E. Linder, E. M. Bruckmann, G. Barth, E. Bunnenberg, C. Djerassi, L. Seamans and A. Moscovitz, *Tetrahedron* 33, 907 (1977).

"On Structural-Vibrational Effects in Magnetic Circular Dichroism Spectra", L. Seamans, A. Moscovitz, R. E. Linder, K. Morrill, J. S. Dixon, G. Barth, E. Bunnenberg, and C. Djerassi, *J. Amer. Chem. Soc.* 99, 724 (1977).

"An Expiscation of Structural-Vibrational Effects in Magnetic Circular Dichroism Spectra of Saturated Ketones", R. E. Linder, K. Morrill, J. S. Dixon, G. Barth, E. Bunnenberg, C. Djerassi, *J. Amer. Chem. Soc.* 99, 727 (1977).

•

"Theoretical Studies of Enzyme Cohnstien Reaction by Differential Scanning Calorimetry", L. F. Whiting and P. W. Carr in Analytical Calorimetry by R. S. Porter and J. F. Johnson (editors), vol. 4, Plenum Press 1977, p. 67.

"On the Location of the Lowest Triplet Excitation in Ammonia", K. E. Johnson and S. Lipsky, J. Chem. Phys., 66 4719 (1977).

"The Fluorescence of N,N,N',N'-tetramethyl-p-phenylenediamine (TMPD) in Non-polar Organic Liquids for Excitation Energies Below and Above the Photoionization Threshold" K. C. Wu and S. Lipsky, J. Chem. Phys., 66 5614 (1977).

"New Drift-Tube Source for Use in Chemical Ionization Mass Spectrometry", P. C. Price, H. S. Swofford, Jr., S. E. Buttrill, Jr., Alan. Chem., 49 1497 (1977).

"Distortions in Substituted Benzene Rings," D. Britton, Acta Cryst. B33, 3727-3729 (1977).

"p-Fluorobenzonitrile," D. Britton and W. B. Gleason, Acta Cryst. B33, 3926-3928 (1977).

"Radio Frequency Oxygen Plasma Treatment of Pyrolytic Graphite Electrode Surfaces", J. F. Evans and T. Kuwana, J. Electroanal. Chem., Anal. Chem., 49 1632 (1977).

"Electrocatalysis of Solution Species Using Modified Electrodes", J. F. Evans, T. Kuwana, M. T. Henne, and G. P. Royer, Anal. Electroanal. Chem., 80 409 (1977).

"Molecular Vibrations in Crystals", J. C. Decius and R. M. Hexter, McGraw Hill (1977).

"Synthesis of Cycloheptaamylose 2-,3-,6-Phosphoric Acids, and a Comparative Study of Their Effectiveness as General Acid or General Base Catalysts with Bound Substrates", B. Siegel, A. Pinter, and R. Breslow, J. Amer. Chem. Soc., 99, 2309 (1977).

"Reactions of Cation Radicals of EE Systems. V. Acid-Base Equilibria in Nucleophilic Reactions of Pyridine and Water with Thianthrene Cation Radical" J. F. Evans and H. N. Blount, J. Org. Chem., 42 976 (1977).

"Reaction of Cation Radicals of EE Systems. VI. The Pyridination of 10-Phenylphenothiazine; Heteroatom Effects on Rates and Mechanisms of Pyridinations", J. F. Evans, J. R. Lenhard and H. N. Blount, J. Org. Chem., 42 983 (1977).

#### GRADUATES - 1977

On the following pages are listed the names, theses, advisers and positions of those students who graduated in 1977 with an M.S. or Ph.D. degree.



DEGREE	NAME	DATE REC'D	THESIS TITLE	ADVISOR	POSITION
M.S.	Bahls, Donna M.	6/77	Turbidimetric Studies of Virus Structure and Solution Ordering	Bloomfield	Water Quality Analyst Sanitary Engineering Labs, Inc. (Serco) 2982 North Cleveland Ave. Roseville, MN 55113
Ph.D.	Chang, Kuo-Her	8/77	Topotactic Reactions of 2-Iododibenzoyl Peroxide Derivatives.	Gougoutas	Honeywell
Ph.D.	Combs, Jr., Walter	6/77	The Measurement and Prediction of Irradiances Available for Photosynthesis by Phytoplankton on Lakes	Moscowitz	Postdoctoral Position Dept. of Mineral and Civil Engineering University of Minnesota
M.S.	Darling, James C.	8/77	Plan B - No Thesis	Noland	Graduate Student Department of Chemistry University of Minnesota
M.S.	Eubank, William	6/77	Multiplicative Noise in Flame Emission Spectrometry	Mossotti	
M.S.	Fennell, Robert W.	3/77	Studies in Metal Carbonyl Carbon Disulfide Chemistry	Ellis	Production Chemist Durkee Atwood Co. 215 - 7th St. NE Minneapolis, MN 55413
Ph.D.	Frawley, Nile N.	12/77	The Analytical Chemistry of Potassium Cyanate With Particular Emphasis on Its Determination in Biological Materials.	Swofford	Research Chemist Dow Chemical Midland, MI 48640
M.S.	Hagen, David	8/77	Plan B - No Thesis	W. Miller	Graduate Student Dept. of Mechanical Engineering 124 Space Science University of Minnesota

DEGREE	NAME	DATE REC'D	THESIS TITLE	ADVISOR	POSITION
M.S.	Horvath, Nicholas	8/77	Plan B - No Thesis	Noland	Assistant Scientist Dept. of Agriculture Engineering 303 Agricultural Engineering University of Minnesota St. Paul, MN 55108
M.S.	Igarashi, Kintaro	12/77	The Reaction of Beta-Haloacetophenone With Thiourea Dioxide	Dodson	Chemical Researcher Mitsui - Toatsu Chemicals, Inc. Japan
M.S.	Jeong, Kyu-Man	3/77	Plan B - No Thesis	Mossotti	
Ph.D.	Johnson, Kenneth E.	12/77	Low Energy Zero and Ninety Degree Electron Impact Spectra of Some Simple Saturated and Unsaturated Hydrocarbons	Lipsky	Postdoctoral Position University of Chicago James Franck Institute South Ellis Ave. Chicago, IL 60637
Ph.D.	Johnson, Thomas H.	12/77	A Study of Olefin Metathesis Catalysts	Gassman	Assistant Professor Chemistry Department Kansas State University Manhattan, Kansas 66506
Ph.D.	Jopke, Walter H.	6/77	Decay Processes of Trapped Hole Centers in Magnesium Oxide	Wertz	Design Engineer (Electronics) Dav-Tron 400 Penn Ave. S. Minneapolis, MN 55405
Ph.D.	Kolpin, Charles F.	8/77	Electrochemical Behavior of Adsorbed Heme at a Mercury Electrode Surface in Aqueous Ethanol Solutions	Swofford	Postdoctoral Position Department of Hematology Medical School University of Minnesota
Ph.D.	Martinsen, David	3/77	Studies of the Exchange Reaction Between D <sub>2</sub> O and Substituted Benzenes and of the Clustering Reaction Between H <sub>2</sub> O and Substituted Phenols <sup>2</sup> in Chemical Ionization Mass Spectrometry	Buttrill	Fein-Marquart Assoc., Inc. 3930 Knowles Ave. Kensington, MD 20795

DEGREE	NAME	DATE REC'D	THESIS TITLE	ADVISOR	POSITION
Ph.S.	Mattson, Bruce M.	12/77	The Oxidation, Reduction, and Photochemistry of Ruthenium Dithiocarbamate Complexes	Pignolet	Assistant Professor Chemistry Department Creighton University 2500 California Street Omaha, Nebraska 68178
M.S.	Prose, Craig	8/77	Plan B - No Thesis	Noland	Research Chemist Sonneborn Division of Contech, Inc. 7711 Computer Ave. Minneapolis, MN 55435
M.S.	Ranbom, Karen	12/77	The Metabolism of Anatabine in the Nicotiana Species	Leete	Research Chemist Hoechst-Rovssel Pharmaceuticals, Inc. North Somerville, NJ
Ph.D.	Schaffausen, John	8/77	Synthesis and Solvolysis of 3-Aza and 3-Oxatricyclo [3.2.1.0 <sup>2,4</sup> ] oct-8-yl Derivatives	Gassman	Post Doctoral Position Chemistry Department Univ. of Wisconsin at Madison 1415 Johnson Drive Madison, Wisconsin 53706
Ph.D.	Schenk, William	12/77	Part I. A Study of the Chemistry of Azasulfonium Salts. Part II. Base Promoted Hydrolysis of Hindered Esters	Gassman	Chemist BF Goodrich Brecksville, Ohio
M.S.	Silvestrini, Thomas	3/77	Investigation of the Aberrant Synthesis of 1-Methyl-2-(3-Pyridyl)-Azacycloheptane in Nicotiana Tabacum	Leete	Research Chemist Atlantic Richfield Harvey, IL
Ph.D.	Stoesz, James	6/77	A Thermodynamic Characterization of the Refolding Transition of $\alpha$ -Chymotrypsin	Lumry	Postdoctoral Position Graduate Dept. of Biochemistry Brandeis University 415 South St. Waltham, MA 02154
M.S.	Suh, Suk Youn	6/77	Permeation Through Thin Membrane	Prager	Graduate Student Department of Chemistry University of Michigan Ann Arbor, Michigan 48104

DEGREE	NAME	DATE REC'D	THESIS TITLE	ADVISOR	POSITION
M.S.	Thomas, Stephen J.	3/77	Acidolysis of Diazomethane	Kreevoy	Chemist PPG Industries Coatings and Resins Research Center 151 Colfax St. Springdale, PA 15144
Ph.D.	Vandesteeg, Gregg	3/77	Synthesis and Reactions of Substituted-4H-1, 4-Thiazine 1, 1-Dioxides and 1,2,3,4-Tetrahydro- pyrimidines	Noland	Research Chemist 3M Center, 201-2W St. Paul, MN 55101
Ph.D.	Wang, Yueh	3/77	Kinetic Study of Proton Exchange Reaction of Tribenzylamines in Dimethylsulfoxide Solutions	Kreevoy	Research Associate Department of Biochemistry Medical School University of Minnesota 227 Millard Hall
Ph.D.	Weber, Paul L.	12/77	Acidic Arabinomannan Polysaccharide of Mycobacterium smegmatis	Gray	Department of Biochemistry Purdue University W. Lafayette, Indiana 47907
Ph.D.	Wu, Kam Chu	8/77	The Fluorescence of Some Organic Molecules in Non-Polar Organic Liquids Excited in the Region of Their Photoionization Thresholds	Lipsky	Radiation Laboratory U of Notre Dame Notre Dame, Indiana