RADIATING FROM:
The Department of Chemistry
University of Massachusetts
Amherst, MA 01003

Which is lightly responsible for its absorbing contents.
On March 3 and 4, a meeting of Chemistry Chairpersons from throughout the Northeastern part of the United States was held at the University of Massachusetts in our Graduate Research Tower. After a long social hour (because of a snow storm which caused a number of people to be delayed or even cancel out) a short organizational section was held followed by a dinner which was held at the Top of The Campus. After dinner, the conference heard PROFESSOR ANNA HARRISON, who is currently President of the American Chemical Society, explain that Chemistry is truly in a transitory state, and that it is important that professors in Chemistry appreciate the changes which are occurring. This led into a discussion on chemical safety and the disposal of chemical waste materials. This allowed many Chairpersons to learn of Radiac, a company which appears to dispose of hazardous and other chemicals in environmentally acceptable ways. The concern of the Department Chairpersons for such matters is indicated by their continuing the discussion up until they were cut off at 11:00 p.m. The following morning the conference discussed faculty loads, faculty evaluation, budget problems and concerns, student considerations, and curricular items in addition to a few miscellaneous topics. The conference closed with a buffet luncheon and a self-guided tour of the Chemistry facilities. The conference appeared very enthusiastic about the conference and agreed that it should remain an annual affair, but the location for 1979 was not determined at the time. Apparently not all departments have persons like Ms. Margaret Palmer, who did all of the extensive mailing and related matters for the conference. Whereas 70 persons had pre-registered for the Conference, a snow storm which came through the Northeast on Friday limited the attendance to 33 persons. In some respects that was a blessing, inasmuch as the group was a nice size for serious discussions.

STATE OF THE DEPARTMENT

The Department Head is pleased to note that funding for the Chemistry Department from other than state sources appears to be on the increase. First of all, several of our alumni have contributed to the Chemistry Alumni Seminar Fund, which is being used to support honoraria and travel monies for distinguished chemists, who are asked to present seminars for the entire departmental community. Professor Bert Valley of Harvard and Professor Theodore Brown of Illinois were the 1977-78 speakers. We need appreciably more support for this to be a continuing operation. The contributions are routed through the Alumni Office as specially designated funds so that both the Department of Chemistry and the Alumni Fund get credit for the contributions. Research support by the Federal government has been on the increase for several individuals, and if we can get the state to realize that inflation hits us as hard as anyone else, things will be even better. Last May we had our Graduate Program Review by a distinguished team of visitors including an alumnus, PROFESSOR RUSSELL DRAGO, (Illinois), Professor James Durig (South Carolina), Professor James Hart (Michigan State), and Professor Louis Meites (Clarkson).
In general, the team commended our program for its strong points and recommended some relatively minor adjustments. This constructive criticism is being considered by the relevant departmental committees, and we hope that the effect will truly be a positive one.

Fresh insights for the Department of Chemistry are being provided through our two new faculty members, PROFESSORS BARBARA KALBACHER and MARIAN STANKOVICH, who are outstanding young chemists in the Inorganic and Analytical areas respectively. (See the separate items on these individuals.) Furthermore, PROFESSOR STUART ROSENFIELD is substituting for Professor Louis Carpino, who is on a leave of absence in Europe. Professor CARPINO spent the Fall semester in Poland and is currently in West Germany at Mainz. Further new insights are being obtained through visiting research faculty members; namely, PROFESSORS STEINAR HUSEBYE (a non-metal chemist from the University of Bergen) and ADRIENNE KOZLOWSKI (a coordination chemist from Central Connecticut State College).

Finally, I would like to indicate my feeling that it is truly a privilege to work with such a dedicated group of persons. Considering the pitifully small salary increases which have accrued since 1973, it is truly a miracle to have such a dedicated faculty, staff, and graduate student group.

RICHASON TESTIMONIAL

A testimonial banquet was held on Sept. 11, 1977 in honor of GEORGE R. RICHASON JR.'s retirement from the Department of Chemistry. About 200 of George's friends gathered in Worcester Dining Commons for an evening of fun and frivolity (and some serious moments as well). Dr. Oswald Tippo was Master of Ceremonies and Father Quigley offered the invocation. Speakers representing the Board of Trustees, the President and the Chancellor all noted George's contributions to the entire University. Senator John Olver (formerly of this department) and Representative James Collins brought greetings and citations from the Commonwealth of Massachusetts. The Athletic Department, represented by Dean Emeritus Warren McQuirk, presented George with the winning Maine game ball. Friends from the Turners Falls A.C. (George's home town), the Naval Reserve unit, Amherst Golf Club, and St. Brigid's Church recounted their many happy and often humorous good times with George and his wife Fran. A special Jim Trelease (he is the Springfield Newspapers sports cartoonist) caricature was presented to George. The Alumni Association gave him a University chair. Bill McEwen, on behalf of the Chemistry Department, gave George a Ron Archer designed, and Gordon Good constructed trophy honoring his thirty years of service to the department. The evening concluded with a gift of luggage from all their friends to George and Fran Richason. It was a great party.
VISIT BY A CHEMISTRY DELEGATION FROM THE PEOPLE’S REPUBLIC OF CHINA

The first Chemistry Delegation from the People’s Republic of China visited the U.S.A. last spring and the University of Massachusetts was one of their major stops. Seven scientists were here consisting of three each in polymer science and analytical chemistry and one liaison officer. They were accompanied by personnel from our National Academy of Sciences.

For three days they discussed recent advances in polymer sciences and in analytical chemistry with our staff members. The Chinese scientists also delivered two lectures, one on "The Effects of Twice-Drawing of PAN Fibers on the Structure and Properties of Its Carbon Fiber," and the other on "Pulse Polaro- graphy." The evening programs consisted of informal dinners with the U.S. - Chinese faculty and a formal banquet. There were free exchanges of views on society and lives in China today. The names of the visitors are as follows:

Subgroup B

Fields of Interest

Relationship between structure and properties of polymeric materials.

Polymer physics in fabrication of polymeric materials, rheology of polymeric systems, modification and control of polymeric material structure.

Structures and characteristics of polymers and polymeric materials.

HUANG Wei-yuan
Organic Chemist
Deputy Division Head
Shanghai Institute of Organic Chemistry
Academia Sinica

HSU Mao
Polymer Physicist
Division Head
Institute of Chemistry
Academia Sinica

CHOU En-lo
Polymer Physicist
Kirin Institute of Applied Chemistry
Academia Sinica

Subgroup C

Organic and inorganic analytical chemistry, trace analysis and instrumental analysis, analytical separations.

Structural analysis of organic compounds, continuous analysis and automation, especially computer application in analytical chemistry.

WANG Erh-kang
Inorganic Analyst
Kirin Institute of Applied Chemistry
Academia Sinica

HSIA Tsung-hsiang
Organic Analyst
Shanghai Institute of Organic Chemistry
Academia Sinica

CHANG Lo-feng
Organic Analyst
Dairen Institute of Chemical Physics
Academia Sinica

SU Feng-lin
Staff Member
Foreign Affairs Bureau
Scientific and Technical Association of the People’s Republic of China.
VISITING LECTURERS

THE FIVE COLLEGE LECTURES

April 28-30, 1977

were given by

Professor A. Ian Scott
Department of Chemistry
Yale University

(As of June 1, 1977, Professor Scott has assumed the position of Distinguished Professor of Chemistry at Texas A & M University)

The titles follow:

Biosynthesis of Vitamin B_{12}, Geessmann Laboratory, U Mass.

How Nature makes Porphyrins and Corrins, Science Center, Amherst College

In Search of the Porphyrin-Corrin Connection, McConnell Hall, Smith College

A Recapitulation of Vitamin B_{12}, Porphyrin and Corrin Chemistry, Cleveland Hall, Mount Holyoke College.

Many other visiting lecturers presented seminars. These are listed below:

Dr. Strasheim
National Physical Research Laboratory
Pretoria, South Africa

Analytical Chemistry at the National Physical Research Laboratory

Prof. Allen Kropf
Dept. of Chemistry
Amherst College
Amherst, Mass.

Visual Chemistry: Studies with Synthetic Analogs of Retinal

Prof. James Hendrickson
Dept. of Chemistry
Brandeis University
Waltham, Mass.

A New Approach to Synthesis Design

Dr. Jaroslav Vit
Reallco Chemical Co.
New Brunswick, N. J.

The Vitride Reducing Agent

Prof. Gayl Wiegand
Dept. of Chemistry
Idaho State University
Pocatello, Id.

Chemical Kinetic Systems for Geothermal Exploration

Prof. James E. Quick
Dept. of Chemistry
Northeastern University
Boston, Mass.

The Chemistry of \( \alpha \)-alkoxy-\( \alpha,\beta \)
Unsaturated Carbonyl Compounds
Chemical Modification of Polymers

Sodium Borohydride in Carboxylic Media - A Novel Synthetic Method

α-Phosphoryl Sulfoxides

Synthesis and Chemistry of 4H-Thiopyran-4-ones

Hydroxamic Acids - New Reactions of Old Substances

A Microscopic Picture of Molecular Liquids

Aqueous Solutions of Nonpolar Cases

Motion of Octahedra and Tetrahedra in Inorganic Crystals - Optical Second Harmonies Generation

The Structure of Crystal Surfaces and Adsorption.

The Production of New Molecules and Materials by Laser Photochemistry

Forensic Applications of Analytical Chemistry
The Determination of Factors Governing Atomization Efficiency in Atomic Spectrometry

Chemiluminescence and Bioluminescence in Biochemical Analysis

Conformational and Functional Properties of Carboxypeptidase A.

Stereochemistry and Transition Metal Photolysis

Using Light Scattering to Model Biological Cells

Interactions of Transition Metals with Nucleic Acids

Linear Chain Antiferro- and Ferromagnetic Interactions - High and Low Field Magnetic Phase Changes

Conformational Analysis by NMR: Insulin

The Stereoselective Synthesis of the Murolene Sesquiterpenes

Camphene and the Exo-Methyl Migration Problem.

Fosformycin - A New Phosphorus Containing Antibiotic
Prof. Steinar Husebye
Univ. of Bergen
Bergen, Norway

Prof. Michael J. Clarke
Boston College
Boston, Mass.

Dr. Barbara Kalbacker
Univ. of Washington
Seattle, Wash.

Mr. Lewis Kurtzman
District Manager
Organic Synthesis & Natural Products
Waters Associates
Milford, Mass.

Dr. Marian Stankovich
Univ. of Michigan
Ann Arbor, Mich.

Prof. Graham Palmer
Rice University
Houston, Texas

Prof. Adrienne Krause Kozlowski
Central Conn. State College
New Britain, Conn.

Dr. William Batschelet
Univ. of Washington
Seattle, Wash.

Prof. Leslie M. Loew
Dept. of Chemistry
SUNY, Binghamton, N. Y.

Prof. Geoffrey Davies
Northeastern Univ.
Boston, Mass.

Prof. John Fortmann
Wright State Univ.
Fairborn, Ohio

Structures of Tetravalent Tellurium Complexes
Interactions of Transition Metals with Nucleic Acids
Chemical and Theoretical Studies of Halodimolybdates and a Preliminary Look at the System of 2-Iron Ferredoxin
Preparative Scale Liquid Chromatography
The Electrochemistry of Cystine, Insulin and Albumin at the Hanging Mercury Drop Electrode
Electronic State of Heme in Cytochrome Oxidase
Electronic Spectra of Palladium Trimethylenediamine Complexes
Metal-Ligand Interactions in α-Diimine Complexes
Charge Shift Probes of Membrane Potential
The Use of Metal Ions for Selective Separations in High Performance Liquid Chromatography
Steric Hindrance in Internal Rearrangements of Metal β-Diketone Complexes
This annual symposium was held at the University of Massachusetts in June, 1977. The symposium title was "Enzymes in Analytical Chemistry" and consisted of 25 invited papers. This successful meeting attracted 150 attendees from throughout the United States and a number of overseas visitors. The local arrangements committee Chairman and Deputy Chairman were SIDNEY JIGGIA and PETER C. UDEN, with Mrs. Martha Robitaille efficiently acting as trouble shooter!

AWARDS

Richard W. Fessenden Memorial Scholarship

This award of $75.00 was presented to Mr. Viloya M. Schweiker for scholarship and citizenship in the Department of Chemistry. This award is made possible by donations from friends and former students of Dr. Fessenden, former Professor of Chemistry at this University.

Connecticut Valley Section of the American Chemical Society Student

This award, given to the outstanding senior chemistry major, was presented to Roy M. Stein, '77. (12-month membership in ACS and a journal subscription).

American Institute of Chemists Medal

This medal, given by the American Institute of Chemists, was presented to Mr. William F. Joyce, '77. This medal is given to a senior on the basis of character and high scholastic standing in Chemistry.

The Merck Index Award

This award, given by Merck and Company, Inc. was presented to Mr. Robert A. Cohen, '77. This award is given for scholastic achievement in Chemistry and service to the Chemistry Department.

SABBATICAL LEAVES

DAVID J. CURRAN
(Spring 1977)

Professor Curran used his sabbatical leave to fruitfully complete five papers which are currently in print or in press. One research proposal was written and submitted to the National Science Foundation. Several papers were presented at a Gordon Research Conference and a meeting of the American Chemical Society. The bulk of his time was spent at Massachusetts Institute of Technology, where he presented a research seminar, interacted with a number of chemists, used their extensive research collection, and participated in other meetings and seminars. Concurrently Dave maintained a close touch with his research group here in Amherst. Finally, he remained active in Departmental affairs even though he was on sabbatical leave. All in all, Professor Curran was able to bring himself back to the forefront of his field through his sabbatical leave.
BERNARD MILLER  
(Spring 1977)  
Professor Bernard Miller spent his sabbatical leave in residence at the University of Massachusetts. By spending his sabbatical leave on campus, Professor MILLER was able to investigate the synthesis of novel blocked aromatic molecules. Furthermore, Professor MILLER prepared six research proposals to federal and private granting agencies. He also completed his manuscript, "Organic Chemistry; The Basis of Life," which is scheduled to be published in 1978. In total, Professor MILLER was able to accomplish an appreciable amount of professional work in the semester at his disposal.

JOHN L. RAGLE  
(Academic year 1976-1977)  
Professor Ragle spent his sabbatical leave at the Technical University of Darmstadt in West Germany. At Darmstadt, Professor Ragle developed an experimental program in pulsed NMR (which is expected to result in two research publications) and double resonance NMR. Other professional activities at Darmstadt included both personal interactions and professional writing, including two research proposals, which have already been funded by the National Science Foundation. Furthermore, Professor RAGLE presented research seminars or colloquia at several other universities in Europe, where he also developed other professional contacts. Without a doubt, Professor RAGLE had a most fruitful sabbatical leave.

MARVIN D. RAUSCH  
(Spring 1977)  
Professor Rausch spent his sabbatical at the Technical University of Munich in Germany. Professor Rausch spent his time gaining new knowledge and skills in organometallic photochemistry and mass spectrometry. Furthermore, he lectured at a number of European Universities, where he continued to develop mutual research interests with other scientists. In addition, Professor RAUSCH prepared a sizeable number of research manuscripts and review articles. All in all, Professor RAUSCH was able to accomplish an appreciable amount of professional work during one semester of sabbatical leave.

PETER C. UDEN  
(Fall 1976)  
Professor Peter Uden spent his sabbatical at the University of Oxford in England. Professor Uden was able to do experimental work in his area of expertise (chromatography), write a number of manuscripts which was enhanced by the fabulous library facilities at Oxford. Furthermore, Professor Uden was able to present scientific lectures at a number of Universities and meetings in Europe. Overall, Professor Uden was able to improve his professional knowledge and stature through his sabbatical leave.

JOHN S. WOOD  
(Academic Year 1976-1977)  
Professor Wood spent his sabbatical leave at the University of Nijmegen in the Netherlands. As a Visiting Fellow, Professor Wood lectured in several research seminars and special topics courses, participated in an extensive research program, and also found time to do some writing. Professor Wood spent the bulk of his sabbatical on a detailed experimental program which could not be done at the University of Massachusetts because of the lower support level and lack of equipment for this work. His experimental program included some low temperature neutron diffraction work at Grenoble, France, and the presentation of work at other Dutch Universities. In summary, Professor Wood had a professionally stimulating and productive sabbatical year.
EVERETT TURNER

Everett Turner is using a sabbatical leave to polish up his skills in course development, with special emphasis on chemistry programs for non-science majors. During the fall semester he spent one week at a Sixth Form College in St. Austell, Cornwall, England and ten weeks at Germany’s Hannover Technical University. At Hannover, he worked with Professor Kühnel, an inorganic chemist who supervises the training of students preparing for gymnasium teaching, and, as a translator became very popular among the students. The latter make extensive use of the Journal of Chemical Education. During the spring semester, Everett plans to spend one month with Rod O’Connor at Texas A & M and then move on to the University of Arizona and Berkeley for a total of ten weeks. At the latter two schools, teaching is very much oriented to the theories of Praget.

NEW FACULTY

Barbara Kalbacher joined the inorganic division in September, 1977 as an assistant professor.

She received her AB in chemistry from the Catholic University of America in 1968. Subsequent to that, she studied the amino acid control of RNA synthesis under Michael Cashel in the Lab of Molecular Biology at the National Institute of Health in Bethesda, Md. After obtaining a MS degree at Cleveland State University, she pursued graduate work in physical-inorganic chemistry under the direction of Robert Bereman at SUNY at Buffalo. Her doctoral work, completed in 1974, centered on the synthesis and characterization, using mainly electron spin resonance spectroscopy, of transition element dithiolate complexes.

From 1974 to 1976, she worked with F. Albert Cotton at Texas A & M University on chemical and theoretical studies of metal-metal multiply bonded systems. At that time she became interested in applying the Xα Scattered Wave method to the theoretical study of transition element systems. She continued this work during a year spent with Joseph Norman at the University of Washington looking at model systems for iron-sulfur proteins using the Xα method.

Her current research interests include the synthesis and characterization of transition element-sulfur macrocycles and the study of transition element complexes using the Xα Scattered Wave method.

********

Marian T. Stankovich joined the analytical faculty in the fall of 1977 as assistant professor.

She received her BA in chemistry from the University of St. Thomas (1970) in Houston where she acquired a strong interest in electrochemistry.

She became interested in biochemical studies while working as a summer student at M. D. Anderson Hospital. She decided to stick with electrochemistry, however, she did graduate research in electrochemistry with Allen Bard at the University of Texas at Austin, achieving her Ph.D. in 1975. She then became a postdoc in Vincent Massey’s lab in the biochemistry department at the University of Michigan. She carried out biochemical studies of redox active enzymes and enzyme analogs. Her interests now are to apply modern electrochemical techniques to the study of flavoprotein reactions.
Attending U Mass Social Hour as reported by Peter Lillya

Arthur Smalley       PhD (McEwen)
Gordon Hardy         BS (now doing PhD at UCLA)
Kei-Wei (Kelvin) Shen PhD (McEwen)
Yvonne (Hua) Shen    PhD (McEwen)
George Adams         PhD (Stein)
Linda (Petrosky) Yates PhD (McEwen)
William Billings    PhD (McEwen)
Tucker Yee           PhD (McEwen)
Rena Yang Yee        PhD (Stein)
Kenneth Wynne        PhD (George)
George Forcia        PhD (Olver)
David Garnett        Postdoc (Lillya)
Wesley Bonds         PhD (Archers)
Glen Kjeldsen        PhD (McEwen)
Richard Field        B.S. in '63 (Now teaching at Univ. of Montana)
Pauul Fu             PhD (T. Robinson)
Joan Fu              PhD (Brandts)

Ron Archer, Marion Rhodes, Bob Holmes, Bob Rowell, Pete Lillya, Mike Strem (Strem Chemicals).

I also saw at meeting:

Robert Kovar         PhD (Rausch)
Robert Pribush       PhD (Archers)
Steven Carter         B.S (Siggia) (now grad student at U. of Arizona)
Bill McEwen           PhD (Rowell) (postdoc at Berkeley)
Helen (Currier) Gillham BS
Ray Farinato         PhD (Rowell) (postdoc at Berkeley)
John Swoboda         PhD (Holmes)
Russell MacDonald    PhD (McEwen) (postdoc with Carpino)

NOTE: Apologies from Dr. Lillya if he has omitted anyone.

**********************

SOPHOMORE SEMINAR

For several years the department has offered a sophomore seminar with the aim of showing our sophomores "What Chemists Do." Topics are extremely varied and the program has been well received. The following schedule for the spring of 1978 is quite representative:
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 31</td>
<td>Organizational Meeting</td>
</tr>
<tr>
<td>Feb. 14</td>
<td>Dr. MaryLou Delucia Univ. of Connecticut</td>
</tr>
<tr>
<td>Feb. 28</td>
<td>Prof. George Richason</td>
</tr>
<tr>
<td>March 7</td>
<td>Prof. Thomas Zajicek</td>
</tr>
<tr>
<td>March 14</td>
<td>Prof. Al Wynne</td>
</tr>
<tr>
<td>March 28</td>
<td>Prof. Robert Rowell</td>
</tr>
<tr>
<td>April 4</td>
<td>Open Discussion</td>
</tr>
<tr>
<td>April 11</td>
<td>Prof. Richard Stein</td>
</tr>
<tr>
<td>April 18</td>
<td>Prof. Ronald Archer</td>
</tr>
<tr>
<td>April 25</td>
<td>Mr. Thomas Styspeck Amherst Regional High School</td>
</tr>
<tr>
<td>May 2</td>
<td>Dr. Marcetta Dareusbourg Tuland University and Cornell University</td>
</tr>
<tr>
<td>May 15</td>
<td>Prof. Paul Cade</td>
</tr>
<tr>
<td></td>
<td>&quot;Protein Crystallography&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Graduate School—Why and How&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Who's been eating my pipes?&quot;, said Papa Bear, an excerpt from the fairy tale &quot;Water is my Best Enemy&quot; by Rusty N. Corroded</td>
</tr>
<tr>
<td></td>
<td>&quot;Anatomy of a Color Photograph&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Laser Scattering as a Probe to Study Chemical Systems&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Physical Studies of Solid Polymers&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Copper, Corrison and Contraception—The Cu-7 IUD&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;The Teaching of Chemistry In High School&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Academic Research of Immediate Industrial Application&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;Does Chemistry Have a Theoretical Basis?&quot;</td>
</tr>
</tbody>
</table>
GRADUATE DEGREES

DOCTOR OF PHILOSOPHY

May 1977

NAME

CLARK, Paul J.

FENN, Robert J.

FINLAY, Meredith C.

GRAF, Joyce F.

HACKETT, Helena M.

MEUNIER, Paul F.

NELSON, Albert B.

THESIS TITLE & DIRECTOR

Studies of Tetradentate Beta-Ketoamines in Divalent Transition Metal Analysis
Dr. Peter C. Uden

A Liquid Chromatographic Detector Employing Thin-layer Twin Electrode Steady-State Amperometry - Application to Catecholamine Analysis
Dr. Sidney Siggia

Synthesis and Characterization of Metal-Replaced Derivatives of Cytochrome C
Dr. James C. W. Chien

Photoisomerization of Etones and Dienones
Dr. C. Peter Lillya

Characterization of Oil Shale and Its Pyrolysis Products Using Vapor Phase Analytical Methodology
Dr. Sidney Siggia

Synthesis and Structure of Spirophosphoranes
Dr. Robert Holmes

The Preparation, Structure, and Reactions of Some 1,2,3-oxadiazoline-3-oxides
Dr. George W. Cannon

PRESENT LOCATION

American Can Co.
Neenah, Wisconsin

Olin Corporation
New Haven, CT

3M Company
St. Paul, Minnesota

American Cyanamid
Boundbrook, NJ

Ensign Bickford Co.
Simsbury, CT

Geology Department
Univ. of Massachusetts
Amherst, MA
<table>
<thead>
<tr>
<th>NAME</th>
<th>THESIS TITLE &amp; DIRECTOR</th>
<th>PRESENT LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERE, Jeffrey A.</td>
<td>I. The Photochemical Cyclopropylcarbinyl-Homoallyl Rearrangement of 2-Arylcyclopropylcarbinyl Esters II. Role of Modified Nucleosides in Transfer RNA: Effect of Chemical Modification of 4-Thiouridine on the Aminoacylation of Escherichia coli Phenylalanine tRNA.</td>
<td>U.S. Army Environmental Hygiene Agency Aberdeen Proving Ground, MD</td>
</tr>
<tr>
<td></td>
<td>Dr. Bernard Miller</td>
<td></td>
</tr>
<tr>
<td>BROWN, Richard K.</td>
<td>X-Ray Structural Analyses and Spectroscopic Investigation of Some Spirophosphoranes</td>
<td>Chemistry Division Argonne National Lab Argonne, Illinois</td>
</tr>
<tr>
<td></td>
<td>Drs. Robert Holmes and John Wood</td>
<td></td>
</tr>
<tr>
<td>CARPENTER, Alan P., Jr.</td>
<td>The Characterization of Carbonaceous Spent Shale and Shale Oil Derived From the TC30 II Retort of Green River Oil Shale</td>
<td>Proctor and Gamble Winton-Hill Tech. Ctr. Cincinnati, Ohio</td>
</tr>
<tr>
<td></td>
<td>Dr. Sidney Siggia</td>
<td></td>
</tr>
<tr>
<td>CHANDLER, John E.</td>
<td>Linear Poly benzyl Derivatives</td>
<td>American Cyanamid Stamford, CT</td>
</tr>
<tr>
<td></td>
<td>Dr. Robert Lenz (Chem. Engr.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. William E. McEwen</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>THESIS TITLE &amp; DIRECTOR</td>
<td>PRESENT LOCATION</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>ZOBOTA, John S.</td>
<td>Structural Studies of Phosphoranes Containing Amino, Ethylenic and Cyclic Substituents</td>
<td>Dr. Robert R. Holmes</td>
</tr>
<tr>
<td>TAUSTA, Joseph C.</td>
<td>Exploratory Photochemistry of Selected Bichromophoric Molecules</td>
<td>No. Co. Union H.S. Newport, Vermont</td>
</tr>
<tr>
<td>FOX, Ernest E.</td>
<td>No Thesis</td>
<td>Ph.D. candidate, UMass</td>
</tr>
<tr>
<td>MATTIA, Joseph</td>
<td>The Thermolysis and Photolysis of Diphenyltitanocene with Various Acetylenes</td>
<td>Polaroid Corporation Cambridge, MA</td>
</tr>
<tr>
<td>TETU, Therese P.</td>
<td>No Thesis</td>
<td>Ph.D. candidate, UMass.</td>
</tr>
<tr>
<td>VASCONCELLOS, Stephen</td>
<td>The Effectiveness of Surface-Active Agents in Stabilizing Coal-Oil Dispersions</td>
<td>Ph.D. candidate, UMass.</td>
</tr>
</tbody>
</table>
PROFESSOR RONALD ARCHER notes that his former Ph.D. student, DR. KENRICK LEWIS, who is currently with Union Carbidc at Tarrytown, New York, was an invited lecturer at the 1977 New England Association of Chemistry Teachers Conference. Dr. Lewis discussed the topic, "Copper, Corrosion and Contraception", a topic on which he and Professor Archer also discussed in Boston over television last May. Professor Archer has also discussed this topic at a number of colleges and universities. DR. CRAIG DONAHUE, who is currently at the University of California at Berkeley, made sufficient progress on a number of monomeric tungsten (IV) species that DR. WILLIAM BATSCELET, who obtained his Ph.D. at the University of Washington, has been able to synthesize some interesting coordination polymers of tungsten. Dr. Batschelet first tied together some seven coordinate tungsten(II) species initiated by DR. DAVID WHITCOMB, who is now with the 3M Corporation. MR. MARVIN ILLINGSWORTH has successfully synthesized some zirconium Schiff base polymers, which appear to be quite thermally stable, too. Professor Archer is also fortunate to have a visiting professor in his laboratory this year — DR. ADRIENNE KLAUSS KOZIOWSKI, who is a tenured professor at Central Connecticut State College. Also, MR. CHRIS HARDIMAN from Hampshire College, plus two undergraduates from UMass are involved with coordination chemistry projects and ligand syntheses for Dr. Archer. This research has been made possible through the support of the Army Research Office, the Materials Research Laboratory, and the Alden Research Foundation.

Former students with new positions include: DR. WONSUK KWAK is a research chemist for the Gillette Company in their central research laboratory in Maryland. The new positions of Drs. Lewis, Donahue, and Whitcomb have been noted above.

PROFESSOR JOHN RAGLE returned this fall from an interesting sabbatical at the Institute for Physical Chemistry of the Technical University in Darmstadt, Germany. Particularly valuable was the opportunity to meet German graduate students and to get to know the structure of graduate work at a German University.

NSF has recently supported two of Professor Ragle's proposals in the general area of solid-state and double-resonance NMR, and a very versatile pulsed NMR spectrometer has been funded from this source, as well as several years of post-doctoral support. Post-doctoral visitors from Germany and Wisconsin (USA) are expected to work in his group during the coming year.

1976 Ph.D. George L. Minott III is well pleased with his position at Owens-Corning in Ohio, and is doing very well for himself.

Papers were presented at an International NMR Symposium in Banff in spring 1977, and further work will be presented at the APS meeting this coming spring.
Professor RAMON M. BARNES reports the following activities:

1. Invited speaker, 8th Annual Symposium on the Analytical Chemistry of Pollutants, Geneva, Switzerland, April, 1978.


4. Editorial Board Member, Progress in Analytical Atomic Spectroscopy.


6. Editor and Publisher, ICP Information Newsletter, — University of Mass. Amherst. — see attached.

Professor JOHN E. ROBERTS continues an active interest in applying chemistry to archaeology and museum artifacts. A recent archaeological "dig" at nearby Historic Deerfield unearthed a wide variety of artifacts, one of which appeared to be the top of a medicinal vial with some red material clinging to it. Since this was found behind a house known to have been inhabited by a doctor, the nature of the red material was of interest. Microscopic testing proved it to be cinnabar (red mercuric sulfide) and calcium carbonate. While there may well have been many medicinal uses for this material in the 18th century, a major use seems to have been in the treatment of syphilis, one prescription calling for a daily dose until pronounced symptoms of mercury poisoning develop! Chemical archaeology is interesting and varied and Dr. ROBERTS anticipates spending a sabbatical leave in 1979 studying in this field.

Professor PETER LILLYA reports:

The things that excite us these days are organotransition metal chemistry, a long time interest, and amino acid polymers, a new interest. Working on the former are Jim Gleason and Tom McCarthy (undergrad). Anne (Lin) Su, Bob Srubas and Doug Brown are all working with the polymers. Anne and Doug's work is done jointly with Bill MacKnight in Polymer Science while Bob is working jointly with Mark Fisher in biochemistry. Joyce (Fleury) Graf received her Ph.D. degree in May 1977. She, Bob and their two boys are living in a new house in Des Plaines, Illinois. Bob is still with Varian and Joyce is looking. Anne Su will finish her Ph.D. this spring.

We enjoyed a visit by Don and Phyl Kuhn this fall and had lunch with them at a new restaurant on Pleasant St., across from the fire station, which has an open deck. Maybe Amherst is coming up in the culinary world. Don is at Hammer-mill Paper Co. in Erie, Pa.

All of us Lillyas left Amherst before Christmas, before the snow started piling up, and we are now living in California while I spend a sabbatical leave at Stanford. We stayed with Alt and Sue Kluge for five days while we looked for apartments. Art, who is at Syntex, has loaned me a bike which I use to commute to the campus.
The ICP Information Newsletter encourages the rapid and impartial dissemination of news related to the development and application of the inductively coupled plasma (ICP) discharge source for spectrochemical analysis. This informal Newsletter, published monthly, provides unique articles by recognized experts, status reports on recent developments, reviews of the ICP literature, and a forum for the exchange of comments and ideas on the design, application, and operations of ICP discharges.

Published and edited since June 1975 by the ICP Analytical Group at the University of Massachusetts, the ICP Information Newsletter reaches hundreds of subscribers in dozens of countries. This international Newsletter has been particularly popular with scientists throughout the world who have recently begun or are planning the use of ICP-AES. The Newsletter is the only authoritative single source of ICP data. It features:

1. ARTICLES and GUEST COLUMNS by ICP experts.
2. BIBLIOGRAPHIES of ICP literature.
3. SUMMARIES and ABSTRACTS of current ICP publications.
4. ABSTRACTS and REVIEWS of ICP conference presentations.
5. ICP laboratory TECHNIQUES and practical DEVELOPMENT reports.
6. ICP analysis METHODS from applications laboratories.
7. DESCRIPTIONS of commercial instruments and products.
8. Analysis REPORTS from industrial, academic, and government users.
9. QUESTION and ANSWER section.
10. ICP PATENT and NEW BOOKS reviews.

To begin your subscription, complete the following:

Please begin my subscription. I enclose ( ) prepayment, ( ) purchase order (P.O. No. ______). Send invoice ( ) for the following:

____ Volume 1 (June 1975-May 1976), 292 pages $45.
____ Volume 2 (June 1976-May 1977), 382 pages $50. $55 overseas
____ Volume 3 (June 1977-May 1978) to 5/31/78 $36. $46 overseas
____ Volume 4 (June 1978-May 1979) $39. $49 overseas

NAME ________________________________
ADDRESS ________________________________
_____________________________________
_____________________________________
ZIP ________

Make Payment and Return to:
ICP Information Newsletter
% Dr. R.M. Barnes
GRC Tower I, Chemistry
University of Massachusetts
Amherst, Massachusetts 01003

3/1/78
Professor ROBERT R. HOLMES received a new grant covering a three year period from N.I.H. on Phosphate Model for Ribonuclease Action. He and his students presented research talks at the spring ACS meeting in Anaheim, Cal., Northeastern University, and the Northeast Regional Meeting in Boston. He has begun collaborative research with Professor Heilwinkel, Heidelberg, Germany, and continues to do so with the phosphorus groups at Paul Sabatier University, Toulouse, France, and at Braunschweig University, West Germany.

POST-DOCTORAL ASSOCIATES

R. Day
Ph.D School
M.I.T.
Research & Director
Phosphorus Compounds
R. Holmes

A. Sau
Indian Institute of
Science, Bangalore, India

S. Husebye
Tulane University
(on sabbatical leave from
U. of Bergen, Norway)

Professor ROBERT ROWELL reports the following news items.

1. New Equipment. With the aid of a grant from the National Science Foundation, we have purchased a Nd:Glass Laser. The laser provides an intense pulse of energy which is vertically polarized and of 1.06 microns wavelength. The laser pulse is capable of inducing a polarizability in an isotropic colloidal particle and causing the particle to orient. The pulsed infrared laser is being used in conjunction with a second laser to study the shape and size of colloidal particles. The second laser operating in the visible region is used to monitor the relaxation of the particles following orientation. The work is a continuation of research carried out by Dr. Raymond S. Farinato (who is presently a post-doctoral in the Department of Chemistry at the Univ. of California at Berkeley), and it is currently being continued by John Parsons and James Ford.

2. Energy Related Research. In a new project which has been supported by the New England Power Service Company and the Electric Power Research Institute we are studying the stability of suspensions of coal in oil. A fundamental investigation is being carried out on the factors leading to the stability of finely ground coal suspended in oil which is to be used as a power plant fuel. The work has led to the development of some innovative laboratory apparatus and it is anticipated that patents will be filed. This is a new and stimulating area and is moving along at such a rapid pace that our research group is known as the "slurry in a hurry." This work is being primarily carried on by Richard Saia and Stephen Vasconcellos.

Professor JOHN WOOD reports:

"My one graduate student, Bill Rozell, left in September 1976 and is currently employed by Azo Plate, Murray Hill, N.J. - a division of American Hoechst. He has yet to finish his thesis.

"As regards my own activities - I spent last academic year (76-77) on sabbatical leave at the University of Nijmegen in The Netherlands, on a visiting
Fellowship in the Department of Molecular Spectroscopy. The research that I was involved in was principally concerned with ESR and ENDOR studies of a variety of transition metal complexes. Some aspects of this collaboration are being continued with the support of a NATO grant which enables me to spend two or three months per year in Nijmegen. I was there for all of January and will be returning for a large portion of the summer. In addition I have a joint project with Dr. M. S. Lehmann at Institut Laue-Langevin at Grenoble, France studying bonding density distributions in simple coordination compounds, and I spent part of March, 1977 in Grenoble doing reaction diffraction studies as part of the project."

Professor RICHARD STEIN was honored this year by being chosen for one of the Chancellor's Lectures on March 7, 1978. His topic was "Exploring the World of Large Molecules." He was also awarded an NSF grant to conduct a workshop in Washington, D. C. on "Applications of Small Angle Neutron Scattering to Polymers and Biological Systems." He plans to visit Kyoto University in Japan from December 1978 to January 1979 on a U. S. - Japan cooperating research project sponsored by NSF. During the year several post doctorate fellows have been associated with Dr. Stein's group:

William Mead
Queen Mary College
Univ. of London
Rheo-optical Studies of Acrylate Copolymers

David James
Loughborough University
England
Structure and Relaxation of Salt-containing Polymers

Yohji Shindo
Fuku University
Japan
Light Scattering Studies of Polymer Crystallization

Andrzej Wasiak
Polish Academy of Sciences
Studies of Stress Induced Crystallization

The latter was visiting for one month on an NSF sponsored U. S. - Poland cooperative research project.

Professor PETER C. UDEN and Professor SIDNEY SIGGIA received a two year extension of their NSF grant on the Characterization of Oil Shale and Shale Oil. They are co-editors of a new volume in the ACS Advances in Chemistry Series entitled "The Analytical Chemistry of Liquid Fuel Sources." Prof. UDEN directed a three day intensive short course "Chromatographic Identification and Control Methods," at the Center for Professional Advancement, East Brunswick, N. J., and with Professor RAMON M. BARNES presented lectures in a short course "Modern Techniques of Instrumental Analysis," at the Center for Trace Characterization at Texas A & M University, in October 1977.

Professor UDEN presented invited lectures at the University of Lowell, Rensselaer Polytechnic Institute, Northwestern Universiity, Argonne National Laboratory, Olin Research Corp, the Washington D. C. Chromatography Discussion Group, and at the 4th Society for Analytical Chemistry Symposium of the Chemical Society (London) in Birmingham, England. Professor UDEN chaired one session of the Fall 1977 ACS Meeting in Chicago and also at the Pittsburgh Conference on Analytical Chemistry in March 1978. He and his students presented papers at both meetings.
His students, B. J. QUIMBY, M. F. DELANEY and R. J. LLOYD presented papers at the 2nd Joint Conference of the ACS and the Chemical Institute of Canada in Montreal in June, 1977, at the ACS Workshop on Computers in Chemistry held at Montclair State College, N. J. in June, 1977 and at the ACS Mid-Atlantic Regional Meeting, University of Delaware in April, 1977.

Professor DAVID J. CURRAN has presented papers at M.I.T. during his sabbatical (mentioned elsewhere in this issue) as well as at the Pittsburgh Conference and the 9th Materials Research Symposium, N.B.S. Together with Prof. Rudi Seitz of the University of New Hampshire, he has organized the first meeting of academic analytical chemists in New England to be held in Amherst in May, 1978. The one and one-half day conference will be devoted to discussion of problems of research and teaching in analytical chemistry.

CLASS OF 1977

Eighteen graduates are listed below together with their present whereabouts, as far as we know. It is noteworthy that a large percentage have continued in graduate school.

<table>
<thead>
<tr>
<th>NAME</th>
<th>GRADUATE SCHOOL</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AmadeoHoll, J.H.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Cohen, R. A.</td>
<td>Wayne State U.</td>
<td>Medicine</td>
</tr>
<tr>
<td>Denoyer, E. R.</td>
<td>Colorado State U.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Ford, J. R.</td>
<td>U.Mass/Amherst</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Joyce, W. F.</td>
<td>U.Mass/Amherst</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Koretsky, Diana R.</td>
<td>U. of Cal/San Diego</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Lee, W. A.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Losty, Theresa M.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Macomber, D. W.</td>
<td>U.Mass/Amherst</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Mastricola, V. I.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Moriarty, K. J.</td>
<td>U.Mass/Amherst</td>
<td>Chemistry</td>
</tr>
<tr>
<td>O'Leary, M. J.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Reid, M. J.</td>
<td>U. Colorado/Pt. Coll.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Riska, G. D.</td>
<td>U.Mass/Amherst</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Stein, R. M.</td>
<td>U. Alabama</td>
<td>Medicine</td>
</tr>
<tr>
<td>Schweiker, Viloya L.</td>
<td>Colorado State U.</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Toomey, J. E.</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Washburn, D. N.</td>
<td>U. Wisconsin</td>
<td>Chemistry</td>
</tr>
</tbody>
</table>

*** NEWS FROM ALUMNI ***

BERTRAM H. HOLLAND (BS'29) is Executive Secretary-Treasurer of the Massachusetts Secondary Principals Association.

MRS. MARY CAVLEY BIEBER (BS'36, MS'56) gives her address as 9407 Garwood St.
Silver Springs, Md. 20901 but no news items.

EMIL J. SLOWINSKI (BS '46) continues on the staff of Macalester College, St. Paul, Minn. "Emil is co-author of one of the widely used Freshman texts."

ANTHONY W. KOTULA (BS '51) is Chief of Meat Science Research Laboratory, Agricultural Marketing Research Institute, ARS, USDA, Beltsville, Md. Dr. Kotula received his B.S. in Chemistry in 1951. After serving in the Air Force as a Supply Officer, he returned to the U Mass campus to obtain his M.S. in Food Technology in 1954, and for 13 years carried out research on poultry quality. During 1961-64,
he attended the University of Maryland on a part-time basis and obtained a Ph.D. in Food Science in 1965. He was awarded the Institute of American Poultry Industries’ Award in Research (1967) for his research published in the three preceding years. In 1967 he was appointed to lead the meat marketing research program, which involves basic and applied research to develop methods for evaluating and improving meat quality to aid the regulatory agencies, the meat industry and the consumer. Such research is carried out in the Meat Science Research Laboratory, in cooperation with scientists in the state experiment stations, and with foreign researchers through the PL480 program. He has directed the research of three graduate students for the M.Sc. degree in Food Science. He served on the Executive Board of Directors, American Meat Association (1974-76), and is a member of the Institute of Food Technologists, American Society of Animal Science, Poultry Science Association, American Meat Science Association and the World Poultry Science Association. He has authored or co-authored over 76 scientific and popular articles.

ARNO LIBERLES (BS '56) is Professor of Chemistry at Fairleigh Dickinson University, Teaneck, N. J. His sabbatical in 1975-76 was spent at the Univ. of California, Berkeley, as visiting professor.

JAMES J. BURKE (BS '58) has been appointed a Monsanto Fellow in the company's program to recognize excellence among its technical personnel. The creative application of polymer research to new products was cited as the principal reason for naming Dr. BURKE, a senior research group leader with Monsanto Plastics and Resins Co. at Research Triangle Park, N. C. Some of his work relates to the development of AstroTurf. He joined Monsanto in 1963 and received his Ph.D. from M.I.T. Dr. BURKE has published and presented several papers, is an active member of various professional societies and a current officer in two of them, and has received numerous awards for his work.

The Monsanto Fellow program was established to recognize outstanding work by individual technical personnel and provides the opportunity for those who have made significant, usable technical achievements to continue in their chosen specialities. Dr. BURKE and his wife reside at 500 W. Knox St., Durham, N. C.

JOSEPH W. MAYO (BS '63) received an M.D. in June 1976 from Case Western Reserve University Medical School. He interned in Pediatrics at Cleveland Metropolitan General Hospital and Rainbow Babies & Children's Hospital in Cleveland Ohio and is now in his second year of Pediatric Residency at the Univ. of Missouri School of Medicine. He is interested in pursuing a career in Pediatrics and biochemical research in areas related to pediatric care.

JAMES E. BULGER (BA '64) continues as Assistant Professor in Chemistry, Memphis State University, Memphis, Tenn.

RICHARD V. VIVILECCHIA (BS '64) earned M.S. and Ph.D. degrees at Northeastern University in 1969. He held a post-doctoral fellowship at Dalhousie University in Halifax, N.S. in 1969-70. From 1970-72 he was with Sandoz Pharmaceuticals, Hanover, N.J. He is now Senior Research Chemist, Waters Associates Inc., Milford, Mass. Married, with two children, he says "Hello, Class of '64, let's hear from you!"

WARREN SHORE (BS '72) is with the sales division of Curtin Mathesone Scientific Co. for the New England area.
RONALD D. FELD (BS '68) earned a Ph.D. in Physiological Chemistry at the University of Wisconsin in 1974 and held a post-doctoral in Clinical Chemistry at the Univ. of Iowa (1974-1976). He is now Assistant Professor of Pathology and Director of Cove Clinical Chemistry Laboratory, Univ. of Iowa.

MEHDI MOKARRAM (Ph.D. '75) is Assistant Professor of Chemistry, and Director of the Office of Research Coordination and Education Planning, Ferdowsi University, Mashhad, Iran.

DAVID E. HENDERSON (Ph.D. '75) is now Assistant Professor of Chemistry, Trinity College, Hartford, Conn. where he will teach analytical and inorganic chemistry.

David's wife, SUSAN K. HENDERSON (M.S. '73 - Chemistry, Ph.D. '78 Food Science) is Senior Chemist at Connecticut Agricultural Experiment Station in New Haven where she is involved in analytical methods development for food and agricultural products.

JESSIE B. BOYER (M.S. '75) worked four years for Armak Co. in Chicago, the last as District Sales Manager for their subsidiary Novry Chemical. She is not working now but busy with 4-month old James F. Boyer.

BERNARD T. BEAUCHEMIN, JR. (BS '76) is a chemist in the analytical section of the organic chemical division, Philip A. Hunt Chemical Corporation, East Providence, R. I.

DAVID HAMPSHORE (BA '76) is now General Manager of the family business in Holyoke, Mass., the Industrial Chromium Corporation.

The editors regret that this Newsletter ends with sad news received just prior to printing time. On April 11, 1978, Mrs. Martha (Ludulum) Bennett, wife of EMETT BENNETT, Professor Emeritus of research chemistry, passed away at Cooley Dickinson Hospital.

Many alumni will remember Emmett and his gracious wife. They had lived in Amherst since 1934. She was a graduate of the College of Pharmacy of Ohio State University and for some years was a registered pharmacist in Columbus, Ohio. Many alumni will join the faculty in expressing their condolences to Emmett who presently resides at 384A Northampton Road, Amherst, Mass. 01002.
***** STOP PRESS - NEWS ITEM *****

U.S. Chemists to View China's New Science Plans

Next month, the first U.S. Delegation in pure and applied chemistry to visit China will leave for a three-and-a-half week tour of scientific and educational institutions and industry.

The top-flight delegation will be led by a Nobel Laureate, Dr. Glenn T. Seaborg. Among the group's ten chemists are several members of the National Academy of Sciences and PROFESSOR RICHARD STEIN of the University of Massachusetts Chemistry Department here at Amherst.
NAME: ____________________________________________
ADDRESS: ____________________________________________

__________________________________________________ ZIP

U MASS CLASS AND DEGREE ______________________________

NEWS ITEMS (include current professional position and other interests)

Your evaluation of this department - weak points, strong points, how we can improve, - especially our teaching program.

Return to: Professor John E. Roberts, Chemistry Department
GRC TOWER I
University of Massachusetts
Amherst, Massachusetts 01003