

RARE-EARTH INFORMATION CENTER NEWS



ENERGY AND MINERAL RESOURCES RESEARCH INSTITUTE
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GMELIN HANDBOOKS

Volume C8 (1981) and D1 (1980) are the latest two volumes of *Gmelin Handbooks* from system number 39 to be reviewed in the *RIC News*. System 39 includes 23 volumes of reference books on the rare earths. The prices of volumes C8 (416 pages) and D1 (256 pages) are DM1147 (~U.S. \$390), and DM587 (~U.S. \$200), respectively. Information about the *Gmelin Handbooks* and addresses of their dealers may be obtained from Springer-Verlag, 4005-Marketing Gmelin, Heidelberger Platz 3, D-1000 Berlin 33, West Germany.

Sulfide-Halides and Oxoacids-of-Sulfur

Volume C8 cover the sulfide halides and the salts of the oxoacids of sulfur and their derivatives, as well as the associated alkali double compounds. Some of the compounds discussed are sulfides, sulfates, sulfite-metallates, sulfatometallates, oxysulfides, hydroxysulfates, thio-sulfates, and ethylsulfates.

The largest chapter is on the sulfates, for which crystallographic and IR and Raman spectroscopic studies, as well as data on thermal decomposition of the hydrates, are presented. The alkali sulfate-rare earth sulfate systems and the crystallographic properties of the double compounds involved are the main emphasis in the chapter on alkali sulfatometallates. The number of publications that deal with the thermal and magnetic properties of the ethylsulfates is large and the data are compiled in tables to make a more meaningful presentation. In most chapters comparative and generally valid data for the compound class are presented in a separate section preceding treatment of the specific individual compounds. The physical properties of

Awards and Rewards

Dr. Velmer Fassel, deputy director of the Ames Laboratory and distinguished professor in the College of Sciences and Humanities of Iowa State University, was presented the Iowa Award of the American Chemical Society. The award is a gold medal and was presented to Fassel at the society's banquet in May of 1983. The purpose of the award is to recognize meritorious achievements by Iowa chemists and is awarded only when the society judges a recipient worthy. Fassel became the twenty-first person to receive the medal. The award recognizes Fassel's research contributions to analytical applications of atomic emission, absorption, and fluorescence spectroscopy, including applications in the rare earth field. A specific achievement cited is the development of the inductively coupled plasma source. The ICP-AES instrument is presently marketed by more than 20 firms worldwide and used in an estimated 3,000 laboratories.



Fassel was also the 1983 winner of the Harvey W. Wiley Award. The \$2,500 award, given to emphasize the role of the scientist in protecting the consumer and the quality of the environment, is administered by the Association of Official Analytical Chemists.

rare earth ions in crystal lattices, as well as the chemistry of complexes, are only superficially treated as these topics are or will be treated in other volumes of the *Gmelin Handbooks*.

(Continued on page 4)

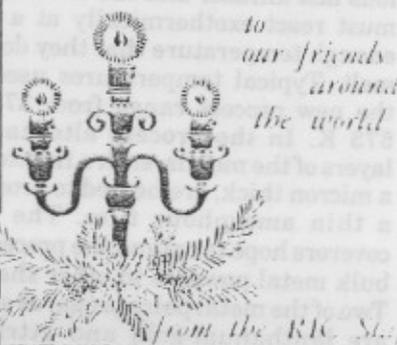
CLASSIC

Current Contents, No. 37, 20 (1983), has named "Matrix Elements and Operator Equivalents Connected with the Magnetic Properties of Rare Earth Ions," by K. W. H. Stevens, a Citation Classic. Published in *Proc. Phys. Soc. London A*, 65, 209-15 (1952) the paper, according to *Current Contents*, has been cited in over 580 publications since 1961. In a note by the author, Stevens states that the paper was almost not published. It was turned down by one journal as being of "insufficient interest." The paper was laid aside in a drawer and was only submitted to the publisher at the urging of a colleague.

Rare Earthers

Isidor S. Hirschhorn, better known as "Is," has retired from Ronson Metals Corporation. He is now president of the newly formed Lanthanide Research Corporation. One facet of his new position is to act as a consultant to Ronson. Erwin M. Ganz has been named acting general manager of Ronson Metals Corporation.

WARMEST
SEASONS GREETINGS



RE'S in the News

Refrigeration

A new method of refrigeration that can produce temperatures near -400°F (33 K) without the use of electricity and with few moving parts has been tested at the Jet Propulsion Laboratory, Pasadena, California. The energy to operate the refrigerator can come from the sun or low-temperature "waste" heat. Lanthanum pentanickel (LaNi_5), which can absorb large amounts of hydrogen gas at room temperature, is the key. LaNi_5 is in three separate chambers with one of the three being in the hydride form. The hydride is heated to $\sim 220^{\circ}\text{F}$ (377 K), giving off H_2 gas to form the binary intermetallic compound. The H_2 gas is compressed in the process, passed through a heat exchanger, and then expanded. The cooling produces some liquid H_2 that at 20 K cools the cryogenic equipment. The H_2 gas from the cooling cycle cools the warm LaNi_5 and is absorbed by the LaNi_5 in another chamber. The cycle is then repeated using the newly formed hydride.

AMORPHOUS ALLOYS

Most amorphous metals and alloys are presently made by quenching molten solutions so quickly that crystals do not have time to form. Two limitations of this method are that the metals must be miscible and the final product is limited to films.

W. L. Johnson, R. Schwarz, and co-workers of the California Institute of Technology believe they have overcome the film limitation. They have developed a process involving a "rapid diffusion reaction" in which the metals interdiffuse to form an alloy that has a glasslike structure. One of the metals must be an anomalous fast diffuser and the two metals must react exothermically at a low enough temperature that they do not melt. Typical temperatures used in the new process range from 373 to 573 K. In the process alternating layers of the metals, each a fraction of a micron thick, are heated to produce a thin amorphous film. The discoverers hope to extend the process to bulk metal powders in other shapes. Two of the metal pairs prepared so far are lanthanum-gold and yttrium-gold.

PROCEEDINGS

16th RERC

The Proceedings of the Sixteenth Rare Earth Research Conference held April 18-21, 1983 in Tallahassee, Florida have been published in the *Journal of Less-Common Metals*. Issue numbers 1 and 2 of Volumes 93 and 94 have been devoted to the proceedings. Each registrant will receive a set of bound journals as part of their registration package. Libraries and individuals that did not attend the conference may order the *Proceedings of the Sixteenth Rare Earth Research Conference* from the following address: Elsevier Sequoia S.P., Special Services, P.O. Box 851, 1000 Lausanne 1, Switzerland. The cost for both Volumes 93 and 94, is 400 Swiss francs (approximately U.S. \$186).

Over 190 lectures and posters were presented during the conference on a wide variety of topics in rare earth science and technology. The topics covered included the following: comparison of lanthanide-actinide chemistry and physics, surface spectroscopy, organometallic chemistry, magnetic superconductors and spin glasses, lanthanide bioinorganic chemistry, crystal fields and spectroscopy, industrial applications of the rare earths, lanthanide-transition metal intermetallics and hydrides, inorganic structures of low valent compounds, and structure-property relationships.

NATO Summer School

The proceedings of the NATO Advanced Study Institute held in Braunlage, West Germany, in July of 1982 were published in August 1983 by D. Reidel Publishing Company. Entitled *Systematics and the Properties of the Lanthanides* the proceedings are edited by S. P. Sinha, contains 648 pages, and cost Dfl 195. (Dutch Guilders) or U.S. \$85.00. It can be ordered from D. Reidel Publishing Company, P.O. Box 17, 3300 AA Dordrecht, Holland, or 190 Old Derby Street, Hingham, Massachusetts 02043, U.S.A.

The purpose of the summer school was to bring a group of experts and participants together to promote interdisciplinary interactions and exchange of ideas. The five areas chosen for emphasis were as follows:
(Continued on page 3)

ANALYTICAL CHEMISTRY

The RIC recently received the second volume of a 2 volume treatise entitled *Analytical Chemistry of the Rare Earths* (in Chinese). For an earlier announcement of the first volume see *RIC News*, XVII [2] 4 (1982). This second volume (1983), like the first (1981), was edited by Zhang Ying-e and published by Science Press, 137 Chao Yong Men Nei Dajie, Beijing, People's Republic of China. The 2 volumes contain 949 pages and 1763 references. They cost 7 yuan in China and about 20 yuan (approximately U.S. \$12) elsewhere.

The chapter headings in volume 2 are as follows: (11) X-Ray Fluorescence Spectrometry; (12) Other Instrumental Methods; (13) Separation and Determination of Scandium; (14) Analysis of the Rare Earths in Minerals and Rocks; (15) Analysis of the Rare Earths in Metallurgical Technology; and (16) Determination of the Rare Earths in Irons, Steels and Alloys.

ZEOLITE CATALYSTS

Although the majority of the zeolites discussed and the applications involved do not refer to rare earths, this review of the most important advances in the utilization of zeolites in catalysis in recent years (1977-1981) and the trends in the development of research in the field should prove of interest to many of our readers. The report by Ya. I. Isakov and Kh. M. Minachev, published in *Uspekhi Khim.*, 51, 2069-95 (1982) with the English translation in *Russ. Chem. Rev.*, 51, 1188-1204 (1982), contains 252 references and gives a good overall picture of the field in which rare earths play an important part.

New applications of zeolites in catalysis are being discovered all the time, with research being carried on to find specific syntheses necessary for the solution of many important problems in science and industry. More than 250 papers are published annually and the volume of information makes it extremely desirable to have reviews that periodically examine the accumulated data and analyze trends.

\$\$ SPONSORS \$\$

The second quarter of fiscal year 1984 matched the first quarter with 11 companies renewing their sponsorships. This includes one company that renewed sponsorship after missing a year. We are 4 sponsors ahead of last year but 6 behind two years ago. If we are to set any records we need your help in the second half of the year. The 11 companies that gave this quarter are listed below with the number of years that company has supported the Center given in parentheses.

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IUPAC Solubility Data

The International Union of Pure and Applied Chemistry (IUPAC) has undertaken an ambitious addition to its numerical data projects. IUPAC is sponsoring a Solubility Data Project. Its objective is the preparation of comprehensive critical compilation of data on solubilities in all physical systems, of gases, liquids, and solids. The editor-in-chief for the large series of volumes is A. S. Kertes of The Hebrew University, Jerusalem, Israel.

Volume 13 of the *Solubility Data Series* is entitled, "Scandium, Yttrium, Lanthanum and Lanthanide Nitrates." S. Siekierski, T. Mioduski, and M. Salomon are editors, evaluators, and compilers for this volume. O. Popovych assisted with the compiling. This volume deals with the solubilities of the nitrates of the elements commonly referred to as the rare earths. All solubility data for binary and multicomponent systems, except for molten systems or systems involving a salt of an anion other than nitrate (e.g. a metal halide), are included. Both aqueous and nonaqueous solvents are evaluated. The literature is covered through 1982.

The book contains 490 + xxiv pages and was published by Pergamon Press in 1983. The cost for volume 13 is U.S. \$100 or £56. Orders may be placed through Pergamon Press, Maxwell House, Fairview Park, Elmsford, New York 10523, or their offices around the world. Libraries may want to establish standing orders for the series as they are published. There will be at least three more volumes dealing with the solubilities of rare earth compounds.

NATO Summer School (Continued from page 2)

systematics, structure, electronic and magnetic properties, spectroscopic properties, and geochemistry of the rare earths.

The first 13 chapters are based on the lectures given by the invited lecturers who were asked not only to review their topic but to add new materials and current concepts. The lecturers were asked to speculate on future developments in their fields and Chapter 14 contains 4 reports summarizing the predicted trends.

NATO Study Institute

A NATO Advanced Study Institute on "Fundamental and Technological Aspects of Organo-*f*-Element Chemistry: Chemical and Physicochemical Properties of Lanthanide and Actinide Organometallic Compounds" has been set for September 10-21, 1984, in Acquafredda di Maratea, Italy. The lecture topics selected with the lecturers in parentheses are as follows: New Synthetic Approaches and Strategies (R. Anderson); Supported *f*-Element Catalysts: Structures, Reactions and Technology (D. G. H. Ballard); Industrial and Process Aspects of Organo-*f*-Element Chemistry (M. Bruzzone); Bonding Aspects of *f*-Element Structural Chemistry (V. W. Day); Electronic Structure: Review and New Developments (N. Edelstein); Magnetic Resonance Spectroscopy (R. D. Fischer); Photoelectron Spectroscopy and Bonding (I. Fragal ); *f*-Elements in Organic Synthesis (H. Kagan); Reaction Patterns of Actinide Hydrocarbyls and Hydrides (T. J. Marks); Organolanthanides: Review and New Developments (H. Schumann); Cyclooctatetraene Complexes (A. Streitwieser); Organometallics Containing Classical Ligands (J. Takats); Frontier Elements: Connections with *f*-Elements (J. Teuben); *f*-Element Photochemistry (O. Traversa); and Homogeneous Organo-*f*-Element Catalysis: Reaction Mechanisms and Applications (P. L. Watson).

The program will be organized in such a manner as to bring together the lecturers and participants via a series of lectures, discussions, seminars, and tutorials. A meaningful and comprehensive picture of the organometallic chemistry of the lanthanides and actinides is the aim of the school. All lectures will be given in English.

Attendance will be limited to approximately 80 scientists and a certain number of NATO grants are available to help defray travel and housing expenses of academic participants. For more information contact either Dr. Tobin J. Marks, Department of Chemistry, Northwestern University, Evanston, Illinois 60201, U.S.A., or Dr. Ignazio Fragal , Dipartimento di Chimica, Universita di Catania, Viale A. Doria 6, 95125 Catania, Italy.

Gmelin Handbooks

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Coordination Compounds

Volume D1 is the first in a series of volumes that deal with rare earth complexometric chemistry. After a short introductory chapter on the subject, two chapters on specific areas are presented. The volume is supplemented by a formula index listing all ligands and their molecular formulas.

Chapter 2 describes complexes with nitrogen donor ligands. Thermodynamic data, formation constants, and/or kinetic data are presented before the syntheses and properties of isolated complexes. The majority of work is on tripositive ions. When information is available on divalent or tetravalent rare earth complexes these are described after the trivalent complexes. The ligands include ammonia, hydrazine, amines, polyamines, heterocyclic amines, and heterocyclic polyamines. Solution studies of and the syntheses and properties of isolated complexes are included in this chapter.

Chapter 3 describes some of the complexes derived from ligands that contain both nitrogen and oxygen donor atoms. Examples of ligands of this type are amino acids, amine-N-polycarboxylic acids, aromatic and N-heterocyclic amine carboxylic acids, hydrazinecarboxylic acids, hydrazinepolycarboxylic acids, etc. Most of the work reported deals with complexes in solution, but some information is given on isolated complexes.

CONGRATULATIONS

Professor Harry J. Svec, distinguished professor in the College of Science and Humanities, Iowa State University, has been named a fellow of the American Association for the Advancement of Science. The certificate attesting to this appointment was awarded to Dr. Svec at a retirement coffee on July 1, 1983. After 42 years with the Manhattan Project and the Ames Laboratory he has decided to devote more time to writing and to enjoying life. Most of his research activities were concerned with mass spectroscopy including work on the analysis of rare earth materials of the highest purity.

**MEETINGS
Spectra Symposium**

An International Symposium on Rare Earth Spectroscopy has been scheduled for September 10-15, 1984 in Wrocław, Poland. The objective of the symposium will be the presentation of the latest results concerning electronic structure and spectroscopic properties of rare earth ions and the possibilities of their application in the field of laser technology. The topics selected for the conference include: (1) spectroscopic methods in structural study of lanthanide compounds; (2) environmental or host effects on hypersensitivity and the intensities of *f-f* and *f-d* transitions; (3) luminescence of lanthanide ions; (4) nonradiative processes in luminescent materials; (5) energy transfer; and (6) technology and material science of rare earth lasers.

Lectures will be in English and both oral and poster sessions will be held. Deadlines for submission of abstracts will be February 28, 1984, but those interested in attending should get their names on the mailing list as quickly as possible by writing Dr. J. Legendziewicz, Institute of Chemistry, University of Wrocław, Joliet-Curie 14, 50-383 Wrocław, Poland.

Magnetic Materials

The 2nd International Conference on Physics of Magnetic Materials will be held September 17-22, 1984 in Warsaw, Poland. The main purpose of the conference is to present the latest achievements in current research, new developments, and trends in the field of magnetic materials, especially on the preparation, structure, and properties of spin glasses and amorphous magnetic materials. These include rare earth alloys and com-

Syo-Iti Kobayasi

Rare earth science lost an outstanding theorist and the world lost a kind and wonderfully enthusiastic person when the Korean Air Lines Flight 007 was shot down over Russian territorial waters on September 1, 1983. Professor Syo-Iti Kobayasi had spent the summer at the Ames Laboratory in Ames, Iowa, working with Professor Bruce Harmon of the solid state physics group. His wife, Ikuko, had joined him the middle of August and they were returning home when the event occurred. Professor Kobayasi and his group at Nihon University were featured in the September 1, 1983, issue of the *RIC News*. It is difficult to accept the loss of a close friend in such tragic circumstances.

G. V. RAYNOR

A pioneer in the rare earth alloy field, G. V. Raynor passed away October 20, 1983 in Birmingham, England. G. V., as he was commonly called, suffered a heart attack on October 2 (his seventieth birthday) and never fully recovered. His major fields of study were the metallurgy of magnesium and alloying theory. Among the alloys he studied were those of the rare earths with rare earths and with thorium, aluminum, cobalt, palladium, tin, and indium.

The proceedings of the conference will be published. Deadline for application is February 29, 1984. For more information or to be put on the mailing list, please contact the conference secretary: Dr. Danuta Zymierska, Institute of Physics, Polish Academy of Sciences, al. Lotników 32/46, PL-02-668 Warsaw, Poland.

**Rare-Earth Information Center
Energy and Mineral Resources Research Institute
Iowa State University
Ames, Iowa 50011**