



The Geochemical News

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THE GEOCHEMICAL SOCIETY COUNCIL MEETINGS

Denver, Colorado, 31 October and 2 November 1960
(Minutes abbreviated for Geochemical News)

The Council met at 2:00 P. M., October 31, at the Denver Hilton Hotel, and at 1:00 P. M., November 2, at the Brown Palace Hotel.

Present Oct. 31: L. T. Aldrich, T. F. W. Barth (presiding), F. R. Boyd, R. S. Cannon, R. M. Denning, G. T. Faust, E. W. Heinrich, E. Ingerson, B. Nagy, E. F. Osborn, J. F. Schairer, O. F. Tuttle, and A. Van Valkenburg.

Present Nov. 2: J. A. S. Adams, T. F. W. Barth, F. R. Boyd, R. S. Cannon, A. E. J. Engel, G. T. Faust, R. M. Garrels, E. W. Heinrich, E. Ingerson, and O. F. Tuttle.

REPORTS OF OFFICERS

Secretary's Report:

Two hundred and seven new members were admitted in the last year, including 48 from outside the U.S. The membership total as of November 1, 1960, is 1,943, representing 54 countries. Twenty-eight per cent of the members are from outside the U.S. Members deceased since November 1959: D. M. Davidson, J. W. Baker, E. Jensen, C. R. Fettke, C. D. Hulin, C. Andreatta, C. T. Bressler, B. Hubbard, J. E. Maynard, M. R. Thorpe, S. H. Hamilton, and E. E. Rosaire.

Treasurer's Report: (Follows Minutes)

REPORT OF COMMITTEE

Standards: (To be published in a later issue)

OLD BUSINESS

Organic Geochemistry Section: The relationship of the Society and the Organic Geochemistry Section was discussed primarily in connection with the program. Two sessions and a symposium on Organic Geochemistry were held. The organic geochemists constitute about 10% of the members of the Society, but this year about 40% of the papers presented were in geochemistry. The Council agreed that the Organic Section should be encouraged to continue to meet with the Geological Society of America, but warned that the proportion of papers in organic geochemistry accepted for future meetings might not be as large as at the Denver meeting.

NEW BUSINESS

International Aims and Policies: The chairman opened a discussion of the international aims of the Society by pointing out that many Europeans are reluctant to accept the Society as really international despite its name and its past efforts to maintain an international group of officers. Moreover, operational difficulties are created by having officers and councillors abroad while the business and

meetings of the Society are largely carried on in the United States.

Schairer said that the Geochemical Society had been a success in the United States because the relationships of the Society with other organizations made it possible for geochemists to meet with a variety of groups with related interests. He felt that the Geochemical Society should become a basically North American society with officers in this country and Canada, but efforts should be made to create an international association of geochemical societies in which the Geochemical Society would be the American representative. This association could then arrange meetings with a variety of other organizations.

Aldrich summarized the discussions held in conjunction with the meeting of the International Union of Geodesy and Geophysics in Helsinki. A Russian viewpoint was given there by Vinogradov who said that the number of geochemists in the world was small and it would be best for them to organize as a part of a larger scientific group, such as the IUGG. A large proportion of the geochemists at Helsinki were in favor of an alliance with the IUGG, but this reflected the fact that they were predominantly nuclear geochemists. It was unanimously agreed in Helsinki that geochemists could not long continue to meet as a part of the Volcanology Section of the IUGG. Tuzo Wilson attended one of the discussions and suggested that a committee be formed to explore a possible alliance with the IUGG and to be responsible for a geochemical program at the 1963 meetings of the Union in San Francisco. This committee was formed with Aldrich as chairman.

Ingerson described the discussions at the International Geological Congress in Copenhagen. A committee, analogous to the one formed for the IUGG, was set up to consider affiliation with the proposed International Union of Geology. A Commission on Geochemistry attached to the International Union of Pure and Applied Chemistry already existed. Some way of coordinating the work of these committees was needed and accordingly an inter-union committee with K.B. Krauskopf as chairman was established. Ingerson said that an international group was much needed to act as a clearing house for information on meetings of interest to geochemists. The inter-union committee could do this and should have the support of the Society. Negotiations are underway to make the inter-union committee a part of the International Council of Scientific Unions. Thus the committee can act as an interim international organization and perhaps as a nucleus for geochemical union.

The Council seemed agreed that the Society should not attempt to fill the role of an international union and also that it has proved impractical to have officers and councillors in residence abroad. In the future nominees will be chosen from members who will be in the United States or Canada during their terms of office. These may include foreign geochemists who are visiting in North America. However, efforts will continue to be made to encourage foreign membership, and the policy of having regional Vice Presidents in Oceania, Europe, Africa, South and Central America, and Asia should be re-activated. Heinrich suggested that the regional Vice Presidents might be encouraged to submit annual reports on geochemical activities in their areas.

THE GEOCHEMICAL SOCIETY ANNUAL BUSINESS MEETING

Denver, Colorado, 1 November 1960
(Minutes abbreviated for Geochemical News)

The meeting was called to order at 11:15 A.M. by the past President, J.F. Schairer. President Barth was present but due to the vocal stress of giving the Presidential address and accepting the Roebling Medal on the same morning as the business meeting, Schairer was asked to substitute as chairman for him. The Secretary, K.B. Krauskopf, is in Europe and at the suggestion of the chairman it was agreed to dispense with the reports of the Secretary and the Treasurer, and with the reading of the minutes.

OLD BUSINESS

Standards: Van Valkenburg reported that the Standards Committee had rejected the Mount Desert Island Granite as a possible reference sample to supplement G-1 after a thorough petrographic study by Felix Chayes indicated that the granite did not meet the necessary qualifications. A new sample of the Westerly granite is being sought along with a suitable dolomite rock.

M. L. Keith asked if a rhyolite glass would not be a more suitable standard than a granite and Van Valkenburg replied that this matter was under consideration.

C. H. Behre questioned the selection of a dolomite from the Ledger formation (southeast Pennsylvania) because of inhomogeneity and Van Valkenburg said that the choice of dolomite was not yet final.

Russian Translations: E. Ingerson reported that the translation of Geokhimiya is complete for the years 1956 and 1958. Numbers 1 and 2 for 1957 have been published and number 3 is in press. Publication of the remaining numbers for 1957 should be achieved by early 1961. [Since the meetings, Ingerson reports that the translations for 1957 and 1959 have been completed and 1960 through No. 5; also that Nos. 1-4 of 1957 and Nos. 1-2 of 1959 have been published.]

Five Russian books have been authorized for translation. Selected portions of Smirnov and of Betekhtin have been completed and will be published in the International Geology Review. Translation is underway on Yermakov and Strakhov. Beus, which has been translated by the Atomic Energy Division of the Geological Survey of Great Britain and turned over to the Geochemical Society for publication, is being edited by L. R. Page and published by Freeman and Co., San Francisco.

Geochimica et Cosmochimica Acta: Professor John A. S. Adams, Dept. of Geology, The Rice University, Houston 1, Texas, has been appointed an Executive Editor of Geochimica et Cosmochimica Acta, replacing Earl Ingerson. Papers submitted to this journal from the American continents should be sent to him.

Dues: Schairer said that the Council had considered the matter of dues and decided that they need not be raised in the coming year.

NEW BUSINESS

The Chairman reviewed the discussions that took place in Europe on the international organization of geochemistry (see minutes of the Council Meeting for details of these discussions).

International Indian Ocean Expedition: There will be an international expedition to the Indian Ocean next summer with participation by many oceanographic institutes here and abroad. P. E. Cloud pointed out that the expedition's program was weak in geochemistry and sedimentation and suggested that the Society might form a group to promote geochemical projects. The Council later decided to appoint an ad hoc committee to report on opportunities and available funds. The report will be published in the Geochemical News.

Thanks to Ingerson and Krauskopf: On motions by G. T. Faust and George Tunell the members voted enthusiastic thanks to Earl Ingerson and K. B. Krauskopf for their long service to the Society. Ingerson is retiring as Executive Editor of Geochimica et Cosmochimica Acta and Krauskopf as Secretary of the Society.

Pacific Science Congress: R. R. Coats pointed out that the Pacific Science Congress would be held in Hawaii next August and that some of the sessions would be of geochemical interest. The Council decided to appoint a representative to the Congress who will submit a report for the Geochemical News.

F. R. Boyd
Secretary

REPORT OF THE TREASURER OF THE GEOCHEMICAL SOCIETY FOR 1960

The Treasurer's report covers the fiscal year beginning August 1, 1959 and terminating on July 31, 1960.

Receipts

| | | |
|---|------------------|--------------|
| Dues | | \$ 3,600.98 |
| Grants from the National Science Foundation | | |
| Grants G9358 | \$ 4,980.00 | |
| Grant G12,501 | 1,510.00 | |
| Grant G10050 | <u>18,500.00</u> | |
| | \$ 24,990.00 | 24,990.00 |
| Interest on the Savings Account | | 1,016.75 |
| Royalties from Abelson-Advances in Geochemistry | | 1,454.95 |
| Reimbursement from NSF for Misc. Expenses | | <u>5.00</u> |
| | | \$ 31,067.68 |

Detailed Account of Disbursements

| | | |
|---------------------------------|--|--------------|
| Printing and Stationery | | \$ 202.50 |
| Supplies and Stationery | | 312.00 |
| Postage and Stamps | | 346.55 |
| Secretarial Service - Secretary | | 453.48 |
| Treasurer | | 465.75 |
| Editor | | 108.00 |
| Bank Charges | | |
| Returned checks | | 8.00 |
| Pergamon Press refunds | | 100.00 |
| Addressograph charges | | 212.12 |
| Geochemical News | | 1,601.03 |
| American Geological Institute | | 100.00 |
| Railway Express Company | | 4.80 |
| Telephone Calls | | 5.55 |
| GSA Program Annual Meetings | | 448.32 |
| Committee on Standards | | 10.00 |
| Articles of Incorporation | | <u>11.00</u> |
| | | \$ 4,389.10 |

Assets

| | | |
|---|--|--------------|
| Balance Savings Account August 1, 1959 | | \$ 31,835.50 |
| Balance Checking Account #33-1146-SS, August 1, 1959 | | 11,511.06 |
| Income from Dues | | 3,600.98 |
| Grants from the National Science Foundation | | 24,990.00 |
| Interest on Savings Account | | 1,016.75 |
| Royalties from the sale of Abelson-Advances in Geochemistry | | 1,454.95 |
| Reimbursement from NSF for Miscellaneous Expenses | | <u>5.00</u> |
| | | \$ 74,414.24 |

Liabilities

| | |
|--|---------------------|
| Expenses incurred in conducting the business of the Geochemical Society | \$ 4,389.10 |
| Expenses incurred in connection with the NSF sponsored Gordon Conference | 2,606.31 |
| Transfer of funds to the Translation Editor | 26,000.00 |
| Payments to NSF - Unused balance | 2,373.69 |
| Checks Outstanding August 1, 1959 | 467.05 |
| Funds held for the Translation Editor | 234,110.00 |
| | <u>\$ 69,946.15</u> |
| Balance as of August 1, 1960 | \$ 4,468.09 |

Funds of the Society

| | |
|---------------------------------------|-----------------|
| Funds held for the Translation Editor | \$ 34,110.00 |
| Balance as of August 1, 1960 | <u>4,468.09</u> |
| | \$ 38,578.09 |

Distribution of the Funds

| | |
|---|-----------------|
| Balance Savings Account August 1, 1960 | \$ 34,952.25 |
| Balance Checking Account August 1, 1960 | <u>3,625.84</u> |
| | \$ 38,578.09 |

REPORT OF THE AUDITING COMMITTEE

The Auditing Committee has examined and verified the accounts of the Treasurer of the Geochemical Society for the fiscal year beginning August 1, 1959 and ending July 31, 1960. The excellent condition of the books made the work of the Committee a very easy and pleasant task.

William L. Hill
 Charles R. Naeser
 J.J. Tregoning, Chairman

REPORT OF TELLER'S COMMITTEE OF THE GEOCHEMICAL SOCIETY

The officers elected for 1960-61 are: President, H.C. Urey; Vice President, R.M. Garrels; Secretary, F.R. Boyd, Jr.; Treasurer, G.T. Faust; Councilors, F.E. Wickman and O.F. Tuttle.

The proposed amendment to extend the terms of the secretary and the treasurer to three years was passed by a vote of 879 to 21, with 11 abstentions.

Ten ballots bore notes objecting to ballots with a single name for each office. 3% of ballots cast had write-ins.

The Teller's Committee recommends that the final date for receipt of ballots be set at two weeks before the date of the annual meetings.

William L. Hill
 Joseph J. Fahey
 Charles R. Naeser, Chairman

REPORT OF THE 1960 PROGRAM COMMITTEE

As in the case of most other member societies an unprecedented number of papers was submitted this year to the Geochemical Society. Seventy Six papers are being presented orally in seven sessions. In addition to these regular papers a special Werner Bergmann Memorial Discussion is being held by the organic section. The total number of papers presented is 93, not including this special discussion. Of the papers presented orally, 45, given in four sessions, are from the field of inorganic geochemistry, and 31, given in three sessions, deal with organic geochemistry. The papers presented by title are 12 and five respectively.

Because of the large number of papers in organic geochemistry Professor Bartholomew Nagy felt that his group should be represented at the Program Committee meeting. Therefore Professor Krauskopf appointed him as a representative of the Geochemical Society at the meeting of the program committee in August.

It should be mentioned that a number of papers of unquestioned merit could not be accommodated for oral presentation, but were accepted by title. Your program chairman feels that younger and less widely known authors benefit more from presenting papers to scientific sessions than well known and firmly established individuals. Therefore preference was often given for papers of merit by less well known people. Another, perhaps arbitrary, relegation to "by title", rather than oral, was based upon similarity of ~~subject~~ matter to that presented by the same authors at the 1959 meeting.

I would welcome any constructive suggestions concerning the selection of papers for next year's meeting. Perhaps the organic section might find an outlet for some papers by affiliating with the petroleum geologists. Such an arrangement might be welcomed by the A.A.P.G., for instance.

Reynolds M. Denning, Chairman

TRANSLATIONS IN GEOCHEMISTRY

The members of the Society are familiar with the current translation of the Russian Journal, Geokhimiya, but perhaps they are not aware that an effort is being made to select books in geochemistry and interesting and worthwhile articles from other journals for separate translation and publication. A part of this program is sponsored by the National Science Foundation and carried out by the Geochemical Society but individual articles are translated by the American Geological Institute and published in International Geology Review.

It is very difficult for the Translation Committee of the A.G.I. and the other individuals concerned to scan the literature and make final decisions about what ought to be translated. It would be very much appreciated, therefore, if members of the Society who are interested in translations and who keep up with the literature in exotic languages would be willing to serve on a Translation Committee and advise the Translation Editor about things that should be translated and help screen materials that have been suggested elsewhere. Those who are interested and willing to take part in this important project should write to the Translation Editor outlining their interests and the segment of the foreign literature they are best prepared to cover. Ordinarily papers in western languages are not translated, only those in the Eastern European and Oriental languages.

Earl Ingerson

CHEMICAL ABSTRACTS, SEC. 8, IN 1960

Continuing the custom of summarizing the work of Sec. 8, Mineralogical and Geological Chemistry, of Chemical Abstracts, I present data for Vol. 54 (1960). Reports for previous years were published in Geochemical News Nos. 9, 14, and 20.

The total number of papers abstracted (not including notices of books, cross-references to

other sections, etc.) was 3764, a new record for the ninth consecutive year. The rate of increase was less than usual: 1959-3622, 1958-3069, 1957-2904, 1956-2280. The 3764 abstracts were prepared by 284 abstractors, but 25 persons prepared 76% of the abstracts.

Speed of abstracting was a little less satisfactory in 1960; 75.0% of the abstracts were of papers published in 1959 and 1960. The comparable figures are 78.8% in 1959, 78.6% in 1958, and 80.6% in 1957. It will be noted in the table below that there has been a large increase in papers published in Russian; this slows the abstracting because of the time required to get the journals and the shortage of qualified abstractors in the difficult languages.

The table gives the data for the sources of the abstracted papers. The figures for any one year should not be taken too seriously; they are affected by such things as the publication of a large symposium (Canada, 1958) or by an abstractor of an important journal falling behind in his assignment. The most striking feature in 1960 is again the large increase of publication in the U.S.S.R., although the rate of growth shown in the table is slightly exaggerated because our coverage has improved during the past few years.

As usual, those who use Sec. 8, which I suppose includes many members of the Geochemical Society, apparently took the services rendered for granted. No comments were received in 1960, a decrease of one letter from 1959 and 1958. It seems to me that the situation is not a healthy one when the continuation of a useful service (or isn't it useful?) depends to such a large extent on the efforts of a handful of devoted persons.

All indications are that the rate of growth (10-15% per year) will be even greater in the next few years. We need more abstractors; they are paid, but the main reward is the satisfaction of helping others. Anyone interested please write to me or to Dr. C. L. Bernier, Chemical Abstracts, Ohio State University, Columbus 10, Ohio.

Country of Origin of Papers Published in Sec. 8
(Authors' countries in 1960 and 1959; country of publication 1958 and 1957)

| | 1960 | | 1959 | | 1958 | | 1957 | |
|---------------------------------|-------------|------|-------------|------|-------------|------|-------------|------|
| | No. | % | No. | % | No. | % | No. | % |
| U. S. S. R. | 1475 | 39.2 | 1112 | 30.7 | 816 | 26.6 | 542 | 18.6 |
| U. S. A. | 622 | 16.5 | 584 | 16.1 | 482 | 15.7 | 579 | 19.9 |
| Germany (W & E) | 193 | 5.1 | 242 | 6.7 | 178 | 5.8 | 172 | 5.9 |
| Japan | 120 | 3.2 | 270 | 7.5 | 225 | 7.3 | 267 | 9.2 |
| England | 111 | 2.9 | 118 | 3.3 | 168 | 5.5 | 217 | 7.5 |
| France | 91 | 2.4 | 116 | 3.2 | 106 | 3.5 | 118 | 4.1 |
| Australia | 91 | 2.4 | 67 | 1.8 | 47 | 1.5 | 98 | 3.4 |
| Czechoslovakia | 89 | 2.4 | 91 | 2.5 | 95 | 3.1 | 89 | 3.1 |
| Canada | 88 | 2.3 | 68 | 1.9 | 177 | 5.8 | 52 | 1.8 |
| Poland | 78 | 2.1 | 125 | 3.5 | 97 | 3.2 | 26 | 0.9 |
| Total (all countries) | 3764 | | 3622 | | 3069 | | 2908 | |

Michael Fleischer
U. S. Geological Survey
Washington 25, D. C .

BOOK REVIEWS

GEOLOGY OF THE INDUSTRIAL ROCKS AND MINERALS, by Robert L. Bates. 424 pages, 65 figures, 17 tables. Harper and Bros., New York, 1960. \$10.00

A valiant attempt at a genetic treatment of the geology of the economically significant non-metallic minerals and mineral aggregates (including rocks), long the *bête noir* of classificationists, is embodied in this book. It attempts to treat these substances on a strictly geological rather than a technological basis, and, to some extent, it succeeds. The author breaks down the non-metallics into industrial rocks and industrial minerals. Further subdivisions of the first class are the usual categories of igneous, metamorphic and sedimentary. The second class is subdivided into igneous minerals, vein and replacement minerals, metamorphic minerals, sedimentary minerals and sulfur, and minor industrial minerals. The criteria for the major twofold subdivision suggested by the author (Table 2.2, p. 17) are, however, essentially technological in character and thus arise some anomalies in the "genetic" classification, e. g. the relegation of nepheline syenite to the "igneous mineral" category. A total of 13 rocks and 20 minerals are described with most of the examples taken from United States deposits. Omissions noted (some listed) are quartzite, phlogopite deposits, non-pegmatitic beryllium deposits, (indeed it might be questioned whether beryl is an "industrial mineral" at all, since metallic Be is extracted from it), the occurrence of cryolite as an accessory in certain Nigerian granites, and the industrial significance of Li_2O variation in lepidolites. Most of the industrial "metamorphic" minerals actually occur in veins or as replacement deposits. Again, to maintain the genetic thesis, the minerals described in the last chapter (Minor industrial minerals) should better be apportioned to their respective genetic categories.

There are 1087 references (publisher's count), each chapter being followed by a generally well-selected list. There are geographical and subject (general) indexes.

The total result is an interesting, informative and detailed account of the nature, properties, occurrence, origin and technology of a restricted group of economically important earth materials.

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CRYSTAL STRUCTURES, Supplement V, by Ralph W. G. Wyckoff. Interscience Publishers, New York and London, 1960. \$26.50. Loose leaf.

The appearance of the fifth and final supplement of Crystal Structures will be welcomed by the many users of this valuable reference work. Due to the loose leaf format, the pages are not numbered consecutively. The reviewer did not count the pages, but it was noted that the work comprises a stack of data, diagrams, and bibliography two inches high. Instructions are given for properly distributing this fifth supplement among the earlier published sections. The complete work consists of five volumes, three inorganic and two organic. No comment on the high quality and usefulness of Wyckoff's Crystal Structures is necessary.

Reynolds M. Denning
Department of Mineralogy
University of Michigan
Ann Arbor, Michigan

MINERAL EQUILIBRIA AT LOW TEMPERATURE AND PRESSURE, by Robert M. Garrels. 254 pages, 88 figures, 11 tables, 1 appendix. Harper and Bros., New York, 1960. \$6.00

The theme of this book, "the simultaneous representation of various chemical reactions" in aqueous solutions at low temperatures and pressures, is one of the utmost importance to all geochemists. The book deals with the techniques of using thermodynamic functions to describe these reactions. It is so written that even the geologist with only subordinate experience in physical chemistry may follow logically the development of the individual chemical equations which are the bases for showing equi-

brum relations among compounds that approximate minerals under conditions simulating natural geological environments.

Chapters 1 and 2 (Introduction and Activity-Concentration Relations) are devoted to the meanings and uses of concentration units, activities, equilibrium constants, free energies, reaction types, activity coefficients, pH and Eh. Chapter 3 illustrates the techniques by means of systems containing carbonates, CO_3^{2-} and CO_2 . Chapter 4 describes the methods of determining Eh and pH and their evaluation. The construction of partial pressure diagrams, which serve to express mineral relations in terms of the common denominators of partial pressures of gases (O_2 , CO_2 and S_2), is dealt with in the fifth chapter. The longest chapter (Chapter 6, 94 pp) describes the construction of Eh-pH diagrams, their uses and their limitations, with the iron oxide minerals as the main example. The last chapters review some geologic applications of these diagrams, and the appendix lists values of standard free energies of formation of compounds, gases and ions at 25°C and at one atmosphere total pressure. In addition to selected references at the end of each chapter there is a short terminal list of references.

Geochemists are indebted to Professor Garrels not only for presenting a clear and succinct summary of these expositional techniques but also for the complete compilation of data and diagrams that accompany it. The book is a necessary addition to the libraries of all serious students of geochemistry, mineral genesis and economic geology.

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U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1459, Results of Research on Chemistry of Iron in Natural Water

Chemical and biochemical aspects of the behavior of iron in natural surface and underground waters are summarized in U.S. Geological Survey Water-Supply Paper 1459 parts A-I, the first seven parts of which have now been published. Among the topics considered in the nine reports are relationships among dissolved iron, redox potential and other dissolved substances, under conditions of chemical equilibrium in natural water, nature of organic complex ions containing iron, adsorption of foreign ions by precipitates of iron oxide, and circulation of iron in lakes and reservoirs as related to aquatic plants and microbiota.

Results now available show that iron in natural water apparently follows closely the behavior that can be predicted from chemical thermodynamics and that the iron content and pH of underground water indicate the approximate redox potential of the water in its natural state. Although oxidation of dissolved iron to nearly insoluble ferric hydroxide is rapid at near neutral pH, the formation of organic complexes, such as a ferrous-tannic acid complex studied in the research work, may slow the rate of iron oxidation considerably. Precipitated ferric hydroxide has some adsorption capacity, either for anions or for cations depending on the pH of the solution in which the precipitate forms. The hydroxide is positively charged below about pH 5.5 and negatively charged at higher pH.

The research work was done by Geological Survey chemists at Denver, Colorado. Titles of the individual parts of Water-Supply Paper 1459 now available are:

- A. "Survey of ferrous-ferric chemical equilibria and redox potentials," by J.D. Hem and W.H. Cropper.
- B. "Restrains on dissolved ferrous iron imposed by bicarbonate, redox potential and pH," by J.D. Hem.
- C. "Some chemical relationships among sulfur species and dissolved ferrous iron," by J.D. Hem.
- D. "Complexes of ferrous iron with tannic acid," by J.D. Hem.
- E. "Coprecipitation effects in solutions containing ferrous, ferric and cupric ions," by J.D. Hem and M.W. Skougstad.
- F. "A survey of pertinent biochemical literature," by E.T. Oborn.
- G. "Iron content of selected water and land plants," by E.T. Oborn.

Copies of the papers may be obtained from the Superintendent of Documents, Washington, 25, D.C., (for 15 cents each, except for F for 30 cents).

X-RAY ABSORPTION AND EMISSION IN ANALYTICAL CHEMISTRY. SPECTROCHEMICAL ANALYSIS WITH X-RAYS, by H. A. Liebhafsky, H. G. Pfeiffer, E. H. Winslow, and P. D. Zemaný. 355 pages, 101 figures, 48 tables, 3 appendices. John Wiley and Sons, Inc., New York, 1960. \$13.50.

Written especially for the analytical chemist, this book explains the methods of x-ray spectrochemical analysis through x-ray absorption or x-ray emission. The authors, all of whom are presently in the employ of General Electric Research Laboratory, have arranged their subject matter in a manner designed to satisfy readers interested in the entire subject as well as those concerned only with certain aspects of it. The 11 chapters deal with The origin and properties of x-rays; Intensity measurement and x-ray detectors; Absorptrometry with polychromatic beams, with monochromatic beams; X-ray spectra and optics; Film thickness determination; X-ray spectrography--both general and at low intensities; and Equipment and reliability. Some special topics are also discussed: Histochemical analysis; The x-ray emission electron microprobe; and Gamma ray emission and absorption.

Without doubt spectrochemical analysis with x-rays is fast developing into one of the most useful and versatile analytical methods available to the earth sciences, which require large numbers of quality analysis, readily available and reasonably priced. This technique largely meets that demand, and it behooves geologists, geochemists and mineralogists to become familiar with it. This book makes it possible.

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CRYSTAL STRUCTURE ANALYSIS, by Martin J. Buerger. 668 + xvii pages. John Wiley and Sons, New York, 1960. \$18.50.

Professor Buerger's book, Crystal Structure Analysis, covers diffraction theory, the gathering of data, and the solution of the crystal structure. The determination of the cell dimensions and space group is not considered, since these subjects are fully treated in the same author's X-ray Crystallography. A number of selected specific examples of crystal structure determinations are given. The optical analogue methods are not treated since present-day computer usage makes such methods less attractive. A particularly valuable feature of the book is the rather extensive bibliography placed at the end of each of the twenty-three chapters (except Chapter Four, which is a general outline of the steps to be taken in a crystal structure analysis). Since the development of the Patterson function is thoroughly presented in Professor Buerger's Vector Space and its Application to Crystal Structure Investigation, a detailed treatment is not included in the present text.

Crystal Structure Analysis will prove to be of great value both to advanced students and to research workers in the field. While the cost is not low, the ratio of information given per dollar is unusually high.

Reynold M. Denning

ELEMENTS OF CRYSTALLOGRAPHY AND MINERALOGY, by F. Alton Wade and Richard B. Mattox; introduction by Carey Croneis. 332 + xiii pages. Harper and Brothers, New York, April 1960. \$7.50.

Elements of Crystallography and Mineralogy by Professors F. Alton Wade and Richard B. Mattox, both of Texas Technological College, is one of several new introductory texts in the field of mineralogy. After a historical introduction, the authors consider a review of the nature of matter. A simple qualitative treatment of the structure of atoms and types of bonding is included herein. In the third chapter, "The Crystalline State", the Bravais lattices, symmetry, space groups, crystal forms, and related matters are presented. Both modified Rogers and Hermann-Mauguin symmetry symbols are used, although Rogers' symbol R_n is used not for rotary reflection, but for rotary inversion, a notation

which might cause confusion to one familiar with the Rogers' symbols. In the chapter on "The Classification of Crystals", the crystal systems are defined in terms of the conventional reference axes. Nineteen of the crystal classes are discussed in some detail, although all 32 are listed in tabular form. In the listing of symmetry elements, the only class in which a rotary inversion axis is given is class $\bar{4}$. The symbol used is, as mentioned above, A_4 . Such a listing of symmetry elements, practically neglecting composite axes, except as they appear in the Hermann-Mauguin symbols, leaves the reviewer mystified. The geometry of twinning is treated from the morphological point of view, but nothing on the genetic aspects of twinning is given.

The calculation of empirical chemical formulas from weight percentages, composition, packing, coordination, polymorphism, pseudomorphism, and the classification of the silicates, are included in Chapter 5, "Crystal Chemistry". Physical properties of minerals are described in Chapter 6, and blow pipe tests comprise most of the seventh chapter. In the remainder of the latter chapter, spectrochemical analysis, x-ray diffraction, spot tests, and differential thermal analysis receive brief treatment. X-ray fluorescence is, however, not mentioned. Ninety-eight pages constitute the descriptive portion of the text.

Economic mineralogy, metallic and non-metallic, and genetic mineralogy are covered in the last two chapters. In the chapter on mineral genesis the principal processes by which minerals form are described. There is no consideration of the phase rule, nor are the terms eH and pH mentioned.

A treatment of the stereographic projection sufficient to make understandable the use of the projection in illustrating morphological symmetry and form distribution is given in the appendix.

Determinative tables are not included.

The reviewer feels that the general selection of topics is excellent. He would also agree wholeheartedly on the value of blow pipe methods in the identification of many minerals, particularly when preceded by a careful study of physical properties.

A number of spelling and typographical errors were encountered. A number of figures have been rotated 90° or 180° in printing. In general the illustrations are adequate, but not outstanding. A number of minerals are listed as probably amorphous. The list could well be questioned. The inclusion of enstatite, stannite, and other minerals as occurring in pegmatites is misleading, if not incorrect.

In view of the several new texts in mineralogy, as well as the new editions of older well-established books, it might be well to shop around a bit before adopting the present work as a textbook.

Reynolds M. Denning

NUCLEAR FUEL ELEMENTS, ed. by Henry H. Hausner and James F. Schumar. 409 pages, 193 figures, 40 tables. Reinhold Publ. Corp., New York, 1959. \$12.50.

This, the first book to deal exclusively with nuclear fuel elements, contains 20 chapters by 20 authors representing the papers presented at the First International Symposium on Nuclear Fuel Elements held at Columbia University, January 1959. Both United States and European scientists have participated, describing their own work and its results. A sampling of the topics discussed includes nuclear fuels for present and future reactors (U, U-alloy, U-Zn hydride, Th-type, Pu, UO₂, UC, etc.); fuel element standardization, fabrication, corrosion, creep, and behavior under irradiation; and cost analysis for fabrication and reprocessing. Appendix I lists the specifications for the Army Package Power Reactor (APPR-1) fuel and control rod components; Appendix II is a bibliography on solid fuel elements with 494 entries. In addition references follow each chapter. This important up-to-date compilation is required reading for reactor engineers and designers as well as for all students of nuclear engineering. Materials engineers, metallurgists, and even crystallographers will benefit from selected parts.

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CALENDAR

April

- 21-22 Wyoming Mining Assoc. Convention, Rawlins, Wyo.
- 24-25 AIME-Southwest Mineral Industry Conf., Stardust Hotel, Las Vegas, Nevada
- 27-29 6th Ann. Inst. of Lake Superior Geology, Port Arthur, Ont., Canada. Write E.R. Mead, 213 Park Street, Port Arthur.

May

- 5- 7 10th Ind. Geol. Field Conf., Stratigraphy of the Silurian rocks of Northern Indiana, Ind. Geol. Surv. with Geol. Dept., Ind. Univ., Spencer Hotel, Marion, Ind. Write: M.E. Biggs, Geol. Surv., Bloomington, Ind.
- 11-13 GSA Rocky Mountain Sect. Mtg., Laramie, Wyo., Precambrian and sedimentary rocks and geomorphology in the Laramie Basin. Write: W.R. Keefer, Box 3007, Univ. Sta., Laramie.
- 12-14 AIME Central New Mexico Sect., 6th Ann. Uranium Symposium, Grants, N.M.
- 16-17 Canadian Nuclear Assoc. Mtg. and Conf., Lord Simcoe Hotel, Toronto.

May

- 25-26 AIME Joint Meeting Rocky Mountain Petroleum Sects. , Salt Lake City, Utah.
 25-26 37th Ann. Conf. , Lake Superior Mines Safety Council, Hotel Duluth, Minn.

June

- 5-16 The Colorado School of Mines, An intensive course in Geochemical Exploration, as applied to ore metals. For additional information and applications, write: Harold Bloom, Geol. Dept. , Colorado School of Mines, Golden, Colorado.

ION EXCHANGE COLUMN

The January 1961 issue of Research and Development reports that out of Du Pont Company's fundamental research, as reported at the sixth annual Conference on Magnetism, has come discovery of a new metallic compound--chromium manganese antimonide--with unique magnetic characteristics. Temperature changes trigger the compound's transformation: below a point predetermined by chemical composition, the material is non-magnetic; heated above the point, it becomes magnetic. By slight changes in the proportion of chromium, the transition point can be adjusted--according to experiments to date, across a range of from near absolute zero to above 100 degrees C. Apparently the magnetic change occurs because distance between the compound's atoms determines the line-up of inner magnetic forces, and this condition varies as the material expands and contracts with temperature variation. Du Pont reports that laboratory investigations of the metallic substance are shedding light on previously unknown aspects of magnetism, will extend knowledge beyond its former bounds. The discovery is credited to Drs. Thomas J. Swoboda, Tom A. Bither, William H. Cloud, Howard S. Jarrett, and Monroe S. Sadler, all of the Du Pont Central Research Department.

ein Gedicht
 gewidmet zu Hermann J. Muller, Ph. D.

DIE HEILIGE CHROMOSOMEN

Ich ging in Laboratorien,
 so führ mich hin,
 Um Tatsachen zu suchen,
 dass war mein Sinn.

Im Mikroskop sah ich
 ein Zellchen stehen,
 Wie Sterne leuchtend,
 wie Äuglein schön.

Ich wollt' es bestrahlen,
 da sagt' es fein;
 "Soll ein Chromosom
 gebrochen sein?"

Ich grub's mit seiner
 Umgebung aus,
 Zum Teiche trug ich's
 am hübschen Haus,

Und setzte es wieder
am passenden Ort,
Nun stoffwechselt es immer
un überlebt selig fort.

Jerome E. Frederick (B.A.)
Goethe's Gefunden modernisiert

Sand-in-the-gears-of-learning Department

From "An outline of the geological research work in Lithuania" in Collect. Acta Geol. Lithuanica, 1960, p. 15:

"In 1957, Board of Geology and Protection
of Bowels (attached to the Council of Ministers
of the Lithuania S.S.R.) was established."

Note: Nedr=subsurface, bowels, entrails.

E. Wm. Heinrich
Editor

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