



## NEWSLETTER

JUNE 1971

### THIRD INTERNATIONAL CODATA CONFERENCE 1972

The third of the biennial International CODATA Conferences on the Generation, Collection, Evaluation, and Dissemination of Numerical Data for Science and Technology will be held in France during the last week in June, 1972. Conference Chairman will be Prof. B. Vodar, President of CODATA and Chairman of the French National Data Committee.

The First International CODATA Conference was held in June, 1968, at Arnoldshain, near Frankfurt/Main, Germany,

Fed. Rep. (see *CODATA Newsletter 1*, October 1968, page 6), and the second such Conference took place in September, 1970, at St. Andrews, Scotland, U.K. (see *CODATA Newsletter 5*, December 1970, page 2).

The exact date and location, and programme details of the Third International CODATA Conference will be announced in *CODATA Newsletter 7*.

### CODATA MEETINGS 1971

The 12th CODATA Bureau Meeting was held at the Laboratoire des Hautes Pressions, Bellevue, near Paris, France, from 18-20 March, 1971.

The 6th Annual Meeting of CODATA, together with the 13th Bureau Meeting, will be held at the National Academy of Sciences, Washington, D.C., U.S.A., from 19-21 July, 1971.

Following the Annual Meeting, a one-day Symposium and Panel Discussion on 'Principles and Practices of Data Evaluation', organized by the U.S. Numerical Data Advisory Board, will be held on 21 July, at the National Bureau of Standards, Gaithersburg, Maryland. The Symposium will be concerned with the application of statistical methods in error evaluation; evaluation of errors resulting from the choice of the wrong statistical tool, and from the application of the wrong physical model in the interpretation of experimental data; and evaluation of experimental errors. The Panel Discussion, involving journal editors and representatives of data centres, will cover problems connected with the presentation of numerical data in the primary literature, such as the economic aspects of presenting large amounts of data, and the description of research results in sufficient detail to allow meaningful evaluation.

All four CODATA Task Groups either have met or will meet during 1971. Locations and dates of these Meetings are as follows: Task Group on Computer Use, CNRS, Paris, 16 March; Task Group on Data for Chemical Kinetics, Unesco House, Paris, 3-4 May; Task Group on Key Values for Thermodynamics, National Academy of Sciences, Washington, D.C., 18-20 July, at the time of the 6th CODATA Annual Meeting and of the XXVI IUPAC Conference; and Task Group on Fundamental Constants, National Physical Laboratory, Teddington, U.K., 6-10 September, at the time of the 4th International Conference on Atomic Masses and Fundamental Constants.

The **Task Group on Data for Chemical Kinetics** at its recent meeting discussed the following topics: present status of chemical kinetic data compilation and evaluation, current and future needs of academic and industrial users, problems of format, nomenclature, classification, and presentation of kinetic data, and "key" kinetic data.

In connection with the first item on the Agenda, a report, entitled "Compilation and Data Evaluation Activities in Chemical Kinetics, Photochemistry and Radiation Chemistry", was discussed at the Meeting and approved for publication in the *CODATA Bulletin*. The Report, prepared by Dr. David Garvin, Director, Chemical Kinetics Information Center, National Bureau of Standards, U.S.A., is based upon surveys and questionnaires by Task Group members during the past year, and comprises listings and descriptions of kinetic data compilations, evaluations, reviews, and bibliographies. The project listings are divided into five main sections: Major programmes that support or undertake compilation of data (U.S. National Standard Reference Data System, U.K. Office for Scientific and Technical Information, U.S.S.R. Commission on Compilation of Rate Coefficients, CODATA Task Group on Data for Chemical Kinetics); Continuing data compilation or evaluation projects and review series; Compilations, evaluations, reviews, and bibliographies, which (a) have recently been published, (b) are in press or in an advanced state of preparation, and (c) are being prepared or planned. For each project, some or all of the following information is given: bibliographic information, an abstract indicating the pertinence of the material to the interests of the Task Group, and abbreviated "indexing information", including a category of interest, phase of reaction, and types of process covered and of data tabulated. The Report is concluded by a statistical summary of the survey, which provides information relevant to the future work of the Task Group on gaps, priorities, and needs in kinetics data compilation and evaluation.

## CODATA NATIONAL MEMBERS

### FRANCE

The 1971 membership of the French National Data Committee is as follows:

President: B. VODAR,  
Laboratoire des Hautes Pressions,  
1, place Aristide Briand, B.P. No. 30,  
92 – Bellevue-Meudon

Secretary: J. ZARA,  
Bureau National de Métrologie,  
1, rue Montgolfier,  
75 – Paris 3

Members: M. BONPAS  
Centre d'Etudes de Limeil,  
B.P. No. 27,  
94 – Villeneuve Saint Georges

S. BOURCIER,  
Tables Internationales de Constantes Sélectionnées,  
Faculté des Sciences, Tour 13,  
9, quai Saint-Bernard, 75 — Paris 5

J. N. CONTENSOU,  
Institut de Recherche d'Informatique et  
d'Automatique,  
78 – Rocquencourt

M. COURTIER,  
AFNOR,  
Tour Europe,  
92 – Courbevoie

A. DAVID,  
Institut Français des Combustibles et de l'Energie,  
3, rue Henri-Heine,  
75 – Paris 16

Y. DENIEL,  
Laboratoire de Thermodynamique et  
Physicochimie Métallurgique,  
18, rue Hoche, 38 — Grenoble

B. GRINBERG,  
Laboratoire de Métrologie des Rayonnements  
Ionisants,  
CEN/SACLAY, B.P. No. 2, 91 — Gif/Yvette

J. MACHEFER,  
CEN/SACLAY,  
B.P. No. 2,  
91 – Gif/Yvette

R. MASSOT,  
Centre d'Etudes Nucléaires,  
Cedex 85,  
38 – Grenoble

M. OLETTE,  
Institut de Recherches de la Sidérurgie,  
57 – Maizières Les Metz

P. SCHAUFELBERGER,  
Centre d'Etudes de Bruyères le Châtel,  
B.P. No. 61,  
92 – Montrouge

P. STEPHAN,  
C.N.E.T.,  
route de Trégastel,  
22 – Lannion

H. VIELLARD,  
D.R.M.E.,  
5 bis, avenue de la Porte de Sèvres,  
75 – Paris 15

The most recent meeting of the French National Data Committee took place on 27 April, 1971, at the Bureau National de Métrologie, Paris.

### GERMAN DEMOCRATIC REPUBLIC

The National Committee of the German Democratic Republic for CODATA has now been established with the following membership:

Chairman: Prof. Dr. Hans JANCKE,  
Deutsches Amt für Meßwesen und Warenprüfung,  
(German Office for Metrology and Materials  
Testing)  
Berlin

Secretary: Dr. Werner KÜNZEL,  
Deutsches Amt für Meßwesen und Warenprüfung,  
Berlin

Members: Dr. Werner RICHTER,  
Deutsche Akademie der Wissenschaften zu Berlin,  
(German Academy of Sciences, Berlin)

Prof. Dr. Margit RAETZSCH,  
Technische Hochschule für Chemie,  
(Technical University for Chemistry)  
Leuna — Merseburg

Dr. habil. Gerhard HECHT,  
VEB Leuna-Werke 'Walter Ulbricht',  
Leuna

Dr. Peter RÖSKE,  
Zentralstelle für Information der Chemischen Industrie,  
(Information Centre for Chemical Industry)  
Berlin

Dipl.-Ing. Harold BREMER,  
Institut für Leichtbau und ökonomische Verwendung von Werkstoffen,  
(Institute for Light Construction and Economic Use of Materials)  
Dresden

Some changes have taken place in the membership of the U.S. National Committee for CODATA (see *CODATA Newsletter* 5, December 1970, page 16): Mr. Donald E. Rosenheim has been replaced by Dr. Michael E. SENKO, IBM Research Laboratory, San Jose, California 95114; and the following have been appointed as Ex Officio Members: Dr. Philip L. ALTMAN, Federation of American Societies for Experimental Biology, 9650 Rockville Pike, Bethesda, Maryland 20014; Prof. John T. EDSALL, Biological Laboratories, Harvard University, Cambridge, Mass. 02138.

The Numerical Data Advisory Board of the U.S. National Academy of Sciences – National Academy of Engineering – National Research Council recently set up an *ad hoc* Panel on Marketing, chaired by Dr. H. William Koch, Director, American Institute of Physics. Other panelists included Dr. R. M. Hayes (University of California at Los Angeles), Dr. R. W. Schmitt (General Electric Co.), Mr. J. S. Murdock (Battelle Memorial Institute), and Dr. F. A. Tate (Chemical Abstracts Service). The first meeting of the Panel and invited guests in October 1970 was devoted to the products of data centres and new approaches to marketing these products.

The Office of Standard Reference Data (OSRD) of the U.S. National Bureau of Standards has recently issued two publications of interest. NBS Technical Note 553, *Critical Evaluation of Data in the Physical Sciences — A Status Report on the National Standard Reference Data System*, David R. Lide, Jr., Editor, June 1970, 77 pp., \$ 0.70, SD Catalog No. C 13.46: 553\*, is the latest status report on the OSRD and the NSRDS programme which it administers. Reviews are given of progress and important developments in each of the seven technical areas covered by the programme: thermodynamic and transport properties, atomic and molecular data, chemical kinetics, solid state data, nuclear data, colloid and surface properties, and mechanical properties, together with individual progress reports for each continuing or short-term data evaluation project supported fully or partially by the OSRD. Research on data processing by the Data Systems Design Group and the information services presently available from the OSRD are also described. Appendices to the report include listings of continuing data centres in the U.S.A., and of publications issued under the auspices of the NSRDS programme. The NSRDS — NBS series, which has been the principal outlet for evaluated data compilations and critical reviews produced under the programme, has included 33 titles, of which 70,000 copies have been distributed. In addition, almost 50 other data compilations, bibliographies, and descriptions of data—handling techniques have been published.

NBS Technical Note 554, *Annotated Accession List of Data Compilations of the NBS Office of Standard Reference Data*, compiled by Herman M. Weisman and Gertrude B. Sherwood, September 1970, 196 pp., \$ 1.50, SD Catalog No. C 13.46: 554\*, provides an annotated list of the holdings of the OSRD Data File (Library), a comprehensive collection of about 1,300 data compilations, critical reviews, bibliographies, and other reference works. Most annotations are based upon author abstracts in the original documents. Information on sources of availability for the listed publications is provided.

\*) Order by SD Catalog No. from Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20 402, U.S.A.

## INTERNATIONAL ASTRONOMICAL UNION (IAU)

The *Transactions of the International Astronomical Union, Volume XIVB, Proceedings of the Fourteenth General Assembly, Brighton 1970*, Editors, C. de Jager and A. Jappel, 1971, ca. 470 pp, ca. Dfl. 60.00, \$ 16.80, have recently been published by D. Reidel Publishing Company, P.O. Box 17, Dordrecht, The Netherlands.

This volume in four parts contains the report of the Executive Committee reviewing the administration and finances of the Union for the period 1967-1969, the complete record of the Inaugural Ceremony and of the two sessions of the General Assembly, the resolutions adopted by the Assembly, and the reports of 180 Commission meetings, including those of the Commissions on Documentation, Fundamental Spectroscopic Data, Stellar Spectra, and Spectral Classifications and Multi-band Colour Indices. Part IV of the Transactions comprises the "Astronomers Handbook", which includes information on the history, administration and finances, relationship to other international scientific bodies, services and functions, publications, and symposia of the IAU, the Style Book, the new Statutes and By-laws, Working Rules, and rules for scientific meetings, and listings of the membership of Commissions and of the Union.

## CODATA LIAISON REPRESENTATIVES

### INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

#### IAEA Activities in the Field of Nuclear Structure and Reaction Data

In recent years strong interest from various sources has been expressed to the IAEA to co-ordinate the scattered activities in the compilation, evaluation, and dissemination of non-neutron nuclear data on an international scale. In a first response to this, the IAEA convened a Consultants Meeting on Non-Neutron Nuclear Data in November, 1970, in Vienna, which reviewed the status, needs, and possible remedial measures in this field with particular emphasis on data of economic and technical importance. The Meeting concluded with a recommendation to the IAEA to establish an International Working Group for Nuclear Structure and Reaction Data. In March 1971, this Group was approved by the Director General of the IAEA. The first meeting of the Working Group will be held from 24-28 January, 1972, in Vienna. Among the major topics to be considered by the Working Group will be:

- possibilities of the co-ordination of compilation and evaluation efforts,
- priorities in data needs, particularly for applied science and technology,
- evaluation methods and criteria,
- feasibility to develop computer formats for the exchange of experimental and evaluated data information,
- recommendations regarding publication standards to authors, journal editors, and referees.

In early 1973, the IAEA plans to hold a Symposium on the Collection, Compilation, Indexing, Evaluation, and Distribution of Nuclear (including Neutron) Data. The exact date and the place of this Symposium have still to be finalized.

## IAEA Neutron Nuclear Data Meetings in the Second Half of 1971

The IAEA will hold a Specialists Meeting on the Status of Prompt Fission Neutron Spectra at its Headquarters in Vienna, 25-27 August, 1971. The reliable knowledge of the prompt fission neutron spectrum is of paramount importance both for the basic understanding of the nuclear fission process and for the design and development of nuclear fission reactors. Recent experiments indicated serious discrepancies between different sources of information on this very important subject. Therefore, the main objectives of the Meeting will be to review recent research work on the fission spectrum and to clarify the existing inconsistencies.

Between 30 August and 3 September, 1971, the IAEA will convene a Panel on Neutron Nuclear Data Evaluation. The objectives of this Panel are to review the methods, quality and present status of neutron nuclear data evaluation, as well as to examine the basic requirements and problems associated with establishing and exchanging computer-based evaluated neutron data libraries. A total of 15 countries and 2 international organizations with major nuclear data programmes will send participants to this Panel.

The next of the annual IAEA sponsored Meetings of the four neutron data centres, located at Brookhaven, Obninsk, Saclay (ENEA), and Vienna (IAEA), will take place between 25 and 29 October, 1971, at Brookhaven. The main topics of this Meeting will be to review the past year's experience with the exchange of experimental neutron data between the centres within the framework of the recently created exchange format for neutron data, EXFOR, the development of an international neutron data index, and the exchange of evaluated neutron data.

## IAEA Conference Proceedings

The International Atomic Energy Agency has recently issued two publications of interest in its Proceedings Series. *Nuclear Data for Reactors* (Proceedings Series - STI/PUB/259) contains in two volumes (Volume I, 1970, 742 pp, \$ 21.00; Volume II, 1970, 960 pp, \$24.00) the proceedings of the Second International Conference on Nuclear Data for Reactors convened by the IAEA in Helsinki, Finland, 15-19 June, 1970. The aspects of nuclear data most important for nuclear technology are covered, together with the measurement and analysis of neutron cross sections with respect to the development and systematic exploitation of high-intensity neutron sources, e.g., modern linear accelerators and cyclotrons, underground nuclear explosions, and to improvements in instrumentation and sample-preparation techniques. The systematic evaluation of fission, capture, and inelastic scattering cross sections of the most important fissile and fertile nuclei and of capture cross sections of the main structural materials are also discussed. Contents of the proceedings with number of papers presented are as follows: Volume I: General aspects of needs and uses for nuclear data (6); Cross sections and techniques for high-precision neutron nuclear data measurements (14); Nuclear data in the thermal and resonance-energy region: A>220 and A<220 (36). Volume II: Nuclear data above the resonance-energy region: A>220 and A<220 (32); Relationships of microscopic and integral data (11); Evaluation problems and methods I and II (19); Panel discussions, list of participants, and author index.

*Handling of Nuclear Information* (Proceedings Series - STI/PUB/254, 1970, 674 pp, \$ 18.00) is the proceedings of a Symposium held in Vienna, Austria, 16-20 February, 1970, which provided an opportunity for information specialists to report on their centres and services. Contents of the proceedings are as follows: Introductory paper; National and institutional information centres (5 papers); Specialized information centres (9); Information services: manual, mechanized and computerized (12); Primary publications (6); Secondary publications (6); Nuclear libraries and services (5); Organization and co-ordination of scientific conferences (4); Indexing methods and systems (4); World-wide co-operation in scientific information (5); Rapports' summaries; List of participants and author index.

IAEA publications are available from IAEA sales agents and booksellers worldwide, in the U.K. from Her Majesty's Stationery Office, P.O. Box 569, London, SE1, in the U.S.A. from UNIPUB, Inc., P.O. Box 433, New York, N.Y. 10016, or from Publishing Section, IAEA, Kärntner Ring 11, P.O. Box 590, A-1011 Vienna, Austria.

## ICSU ABSTRACTING BOARD (ICSU AB)

The ICSU AB has recently announced the availability of an *International List of Periodical Title Word Abbreviations*, prepared for the UNISIST/ICSU-AB Working Group on Bibliographic Descriptions, which has general responsibility within the UNISIST Study for standards for the transfer of basic bibliographic information. The List contains over 7000 words or word roots with their recommended abbreviations, and is available at a price of \$ 4.50 from the ICSU AB Secretariat, 17 rue Mirabeau, Paris 16e, France, or from Chemical Abstracts Service, Marketing Department, University Post Office, Columbus, Ohio 43210, U.S.A.

## UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO)

Unesco and ICSU have recently completed a feasibility study on a World Science Information System (UNISIST). The results of this study have been published in *UNISIST - Study Report on the Feasibility of a World Science Information System by the United Nations Educational, Scientific and Cultural Organization and the International Council of Scientific Unions*, Unesco House, Paris, 1971, which will be used as a reference document at the forthcoming Intergovernmental Conference for the Establishment of a World Science Information System to be held at Unesco House, Paris, from 4-9 October, 1971. The Study Report is available in English, French, Russian, or Spanish at a price of \$ 4.00, £ 1.20 from booksellers or Unesco National Distributors throughout the world. Further information from: Unesco, Place de Fontenoy, 75 Paris 7e, France.

## WORLD FEDERATION OF ENGINEERING ORGANIZATIONS (WFEO)

At the most recent meeting of the WFEO Committee on Engineering Information, London, March 1971, and at the 12th CODATA Bureau Meeting, Paris, March 1971, a proposal was considered and approved for the establishment of a Joint WFEO/CODATA Committee to study the possibilities for future co-operation between the two organizations with particular emphasis on materials property data for science and engineering. The membership of this Joint Committee is now under consideration.

## CONFERENCES

The 7th INTERNATIONAL CONFERENCE ON THE PROPERTIES OF STEAM (ICPS) was held in Tokyo, Japan, in 1968. The Proceedings of the Conference (239 pp) were published in 1970 by the American Society of Mechanical Engineers (ASME), United Engineering Center, 345 East 47th Street, New York, N.Y. 10017, U.S.A., and are available from ASME, or from Institution of Mechanical Engineers, London, U.K., Japan Society of Mechanical Engineers, Tokyo, Japan, and Verein Deutscher Ingenieure, Düsseldorf, Germany, Fed. Rep., at a price of \$ 25.00, £ 10.42.

For the first time in the history of the ICPS, the 7th Conference was primarily a scientific meeting, with emphasis on the transport rather than the thermodynamic properties of water substance. For the Technical Sessions, the 70 papers accepted were divided into six areas: measurement of equilibrium properties, measurement and formulation of viscosity, measurement and formulation of thermal conductivity, formulation of equilibrium properties, thermodynamic and transport properties of heavy

water, and miscellaneous properties of water substance, each of which was summarised by a rapporteur, and then opened for general discussion. Special lectures were also arranged on topics relating to transport properties, as follows: "The Viscosity of Water Substance; Status Report - 1968", Prof. J. Kestin, Brown University, Providence, U.S.A., "Modern Methods of Measuring the Thermal Conductivity of Liquids and Gases and Their Application to the Study of Water and Steam", Prof. N. B. Vargaftik, Aviation Institute, Moscow, U.S.S.R., and "Statistical Mechanical Theories of Transport Properties", Dr. R. S. Brokaw, Lewis Research Center, NASA, Cleveland, Ohio, U.S.A. The texts of these special lectures, and the rapporteurs' summaries and discussions of the technical sessions (but not the original papers) are reproduced in the Proceedings. At the opening of the Conference, three Technical Committees on Equilibrium Properties, Transport Properties, and Heavy Water and Other Properties of Ordinary Water Substance were appointed, in order to identify those specific research and other tasks which would benefit from clearly defined procedures of international collaboration. The final reports of these Committees and of a Committee on Future Organization are included in the Proceedings. In accepting the report of the Committee on Future Organization, the 7th ICPS set up an Executive Committee, which will eventually become that of a permanent body provisionally called the International Organization for the Properties of Steam (IOPS), and which will draft the statutes of IOPS. The Conference also accepted the offer of ASME to continue to provide an International Secretariat for ICPS.

In addition to the above reports, the Proceedings of the 7th ICPS also include a Foreword outlining the history of the ICPS, reports on Business Sessions, membership of Committees, and an Appendix comprising a correction to the published "1968 IFC Formulation for Scientific and General Use".

The next meeting of the ICPS Executive Committee will be held in New York in October, 1971, and the 8th International Conference on the Properties of Steam will take place in France in 1973.

The 3rd CONFERENCE ON NEUTRON CROSS SECTIONS AND TECHNOLOGY was held at the University of Tennessee, Knoxville, Tennessee, U.S.A., from 15-17 March, 1971. The Conference programme comprised 6 invited and over 70 contributed papers, presented in 6 sessions as follows: Integral Tests and Sensitivity to Microscopic Data (Invited papers: "Critical Experiments and Spectrum Measurements on the Validity of Microscopic Data", E. D. Pendleburg, AWRE, Aldermaston, Reading, Berks., U.K., "Progress in Meeting Cross Section Needs from a Fast-Reactor Designer's View", W. W. Little and R. W. Hardie, WADCO Corporation, U.S.A.); Fast

Neutron Cross Sections ("Fast Neutron Cross Sections - Theory and Experiment", P. A. Moldauer and A. B. Smith, Argonne National Laboratory, U.S.A.); Evaluating and Handling of Neutron Cross Section Data ("Numeric Data Libraries of the Neutron Cross Section Center", M. D. Goldberg, NNCSC, Brookhaven National Laboratory, Upton, New York, U.S.A.); Present and Future Applications of Cross Section Technology; Advances in Flux and Neutron Cross Section Data Standards ("Present Status of Standards", H. H. Landon, National Bureau of Standards, Washington, D.C., U.S.A.); and Neutron Cross Sections in the Resonance Energy Region ("Status and Comparison of Techniques for Resonance Measurements", M. S. Moore, Los Alamos Scientific Laboratory, New Mexico, U.S.A.).

The Proceedings of the Conference have been published in two volumes by the USAEC Division of Technical Information Extension, Oak Ridge, Tennessee, and are available for \$ 6.00 from National Technical Information Service, Springfield, Va. 22151, U.S.A.

A FORUM ON THE MANAGEMENT OF INFORMATION ANALYSIS CENTERS was organized by the U.S. COSATI (Committee on Scientific and Technical Information) Panel on Information Analysis Centers, and held at the National Bureau of Standards, Gaithersburg, Maryland, U.S.A., from 17-19 May, 1971. The Forum covered some of the major operational problems of information analysis centres, in particular computer operation and application, relationship to and uses of abstracting and indexing services, and marketing. The Proceedings of the Forum will be published by the ERIC Clearinghouse on Library and Information Sciences, 1140 Connecticut Avenue, N.W., Suite 804, Washington, D.C. 20036, U.S.A.

The 24th INTERNATIONAL GEOLOGICAL CONGRESS will be held in Montreal, Canada, from 21-30 August, 1972. Section 16 of the Technical Programme is entitled *Computer-based Storage, Retrieval and Processing of Geological Information*, and is organized in co-operation with the IUGS Committee on Storage, Automatic Processing and Retrieval of Geological Data (COGEO DATA), and the Canadian Centre for Geoscience Data, 601 Booth Street, Ottawa 4, Ontario, Canada. Papers covering the following topics will be presented: content, notation and structure of data files, including the selection of standard parameters; operating computer systems applied to geological information; computer-based data files; computer-based bibliographic, abstracting and indexing services; and simulation and modelling. Further information from: Organizing Committee, 24th International Geological Congress, 601 Booth Street, Ottawa 4, Ontario, Canada.

## COMPILATION OF HIGH ENERGY PHYSICS RESULTS

DOUGLAS R. O. MORRISON  
CERN, Geneva, Switzerland

### ABSTRACT

The problem and status of compilation of data from high energy physics are discussed. The two major groups compiling data are the Particle Data Group, Berkeley, and the European HERA Group based at CERN, Geneva. Their styles of compilation are compared. The future problem of combining Data Summary Tapes is described.

### HIGH ENERGY PHYSICS

High energy physics is also called elementary particle physics, since it deals either with results of reactions produced at high energy (in the GeV range), or with experiments involving elementary particles which can often only be produced in high energy interactions. This is only an approximate definition since the bounds of any subject are always difficult to define. Apart from some cosmic ray work, the data are obtained mainly

using large particle accelerators. At present the United States spends in this field about \$ 150 million per year, Europe slightly more. The Soviet expenditure on high energy physics is also considerable, and at present their largest accelerator is the 76 GeV machine at Serpukhov, U.S.S.R. A 200 GeV machine has recently become operational at Batavia, near Chicago, and a 300 GeV accelerator will be built by twelve European countries at CERN\*, Geneva.

Because of their cost, particle accelerators tend to be built at national or international research centres, but most of the physics analysis is performed by university departments.

\* The European Organisation for Nuclear Research, CERN, was founded in 1954. It has twelve member nations: Austria, Belgium, Denmark, France, Germany, Fed. Rep., Greece, Italy, The Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. It operates 30 GeV and 600 MeV accelerators.

## DATA COMPILATIONS - GENERAL

A large number of publications on high energy physics are produced and it is a major problem to collect, compile and publish summaries of the data. Many data compilations have been made for various subjects and some of these have been published, but at present only two groups are active in compiling and publishing data regularly. One is the Particle Data Group (PDG) at the Lawrence Radiation Laboratory, Berkeley, whose first publication was in 1958, and the other is the HERA (High Energy Reaction Analysis) Group which is European and based in CERN, who first published in 1969.

The PDG at Berkeley is a well-organized group with an annual budget of about \$ 150,000. The HERA Group, which started more recently, has no separate budget and is run by research physicists as extra work which they hope will also be useful to them in their research. The two Groups collaborate and their work is complementary though with some inevitable overlap. To save distribution costs, each Group sends negatives of their reports to the other for printing.

Berkeley distributes the reports to North and South America, the Far East and Australasia, while CERN sends reports to the rest of the World.

In the U.S.S.R., an extensive compilation of interaction cross sections, together with some theoretical comments was made by Barashenkov (1) and published in 1966, but the work does not seem to have continued.

In Japan, a group of twelve physicists, led by H. Kanada, T. Kobayashi and Y. Sumi, made a survey of hadron interactions in the GeV region which was published as a special *Supplement to the Progress of Theoretical Physics* (2). In addition to the data compilation, brief reviews of different subjects and of various phenomenological models are included. The *Supplement* is quite long (420 pages), and covers data from around 1960 up to the end of October 1966. Since the work was originally initiated in connection with the proposed construction of a 40 GeV accelerator, it has not been continued in this form, although some of the authors now collaborate with the Particle Data Group.

A listing of current reports from the Particle Data and HERA Groups is given in the Bibliography.

## THREE TYPES OF DATA COMPILATION

Data compilations may be grouped in three broad classes:

### A. Review of particle properties

The compilation and review made by the Berkeley Group since 1958 is so complete and well-established that it remains unique. The properties (mass, width, decay rates, quantum numbers) of leptons, mesons, and baryons - both stable particles and resonances, are listed, evaluated, arranged and summarized. A small booklet giving the "best" values and some other useful information is also published, and is carried in their pockets by most high energy physicists. The number of particle properties may, at least at present, be considered to be finite.

### B. Compilation of reaction characteristics

Interactions between elementary particles produce many different intermediate and final states and the experiments are performed at many different incident energies. The data are mass distributions, total cross sections, differential cross sections, angular distributions, polarization, etc. The data are potentially infinite in extent. It is only in the last few years that large compilations have been issued and they still do not cover all branches of the subjects. The Particle Data and HERA Groups are now the main publishers in this field. These compilations are generally from 100 to 300 pages in length.

### C. Compilation of Data Summary Tapes

In many studies of reactions, each event is measured separately, and, after analysis, the essential characteristics are recorded on a Data Summary Tape (DST). Further analyses to derive physics results are then performed by using the results on the DST. The number of ways of analysing the data is, however, very large - for example, in a typical study of 10,000 events recorded in a bubble chamber, with five outgoing particles, the mass, momentum and angles of emission of each particle will be recorded, and many different correlations between these quantities can be studied. Only a few of the results of these analyses are generally published; the others are not, because of their number or because they would require multi-dimensional plots. Thus the problem is more complicated than for type B compilations. No compilations of Data Summary Tapes have been made where the tapes are generally available, although a number of experimental groups have combined their DST's to publish their results together. This is a problem for the future.

While some of the type B compilations list the data with few critical comments, this is not the case for most of this type nor for the "Review of Particle Properties". It is generally found necessary to exclude certain data, because of redundancy or other reasons. For the "Review of Particle Properties", a major effort has been made to evaluate errors, introduce scaling factors, and generally make the reader aware of these and other problems.

## THE BERKELEY PARTICLE DATA CENTER

In 1958, Barkas and Rosenfeld published a first "Review of Particle Properties" as UCRL-8030, which contained 20 pages. From this evolved the Particle Data Center at Berkeley led by Prof. Arthur H. Rosenfeld. The latest edition of the Review (3) has 11 authors and contains 138 pages.

The Particle Data Center has been supported mainly by the Physics Division of the Lawrence Radiation Laboratory, together with support from the Atomic Energy Commission Division of Technical Information, the NBS Office of Standard Reference Data, and the Information Program of the American Institute of Physics. The Center is the headquarters and catalyst for a worldwide association of some 35 particle physicists who publish various reports under the name of the Particle Data Group. There are four activities - two major and two minor:

1. The "Review of Particle Properties", discussed above, is issued twice a year; the summer version is a special issue of *Physics Letters*, while the winter version is published in *Reviews of Modern Physics*. Additional copies are ordered by Berkeley and CERN and supplied on request - about 3,000 and 2,000 copies, respectively. Publishing through regular journals can result in a slight saving in cost.
2. More recently a series of reports, UCRL-20 000, has begun to appear, compiling cross sections for particle reactions. The ca. 35 co-authors read, mark and evaluate papers and then send them to Berkeley for encoding. The LRL physicists produce the books and do the systems development. They also check, using *Nuclear Science Abstracts*, that no published papers have been missed.
3. Preparation of special compilations which are issued only once.
4. Data retrieval and bibliographic searches of information stored in a computer file.

## THE EUROPEAN HERA GROUP

In 1967 and 1968, a number of European physicists felt it necessary to compile data on particle reactions, mainly to help them in their research. To co-ordinate and help these efforts a small committee was set up consisting of J. Badier, D.R.O. Morrison (Secretary), F. Muller, M. Roos, and B. Sadoulet. Some 20 European physicists expressed interest, and an organization was established, the High Energy Reaction Analysis (HERA) Group. As with the Berkeley Group, one of the basi

principles was that the data should be collected on tapes. Programmes to do the work were prepared and distributed. The work is done part-time by research physicists, but using the CERN computer, library, and publishing facilities. Although these physicists use the compilations in their own research, the compilations are published in a general form as a service to the scientific community.

## THE FUTURE

With the continuing increase in the rate of publication of data, the need for compilations becomes ever greater; thus the existing publications must continue and will probably be expanded. These compilations are relatively simple since they can generally be expressed as one-dimensional distributions. Many theories, however, require multi-dimensional results and this is only possible by use of Data Summary Tapes. At present, DST's are exchanged or combined by research groups, and theoreticians can ask experimentalists to supply certain results. The general problem of compiling DST's is, however, not an easy one in terms of the money and manpower involved and in the utilization of unpublished data. At the Argonne National Laboratory, near Chicago, a serious attempt was made to set up a National Data Bank containing DST's produced in the United States, but despite its initial nation-wide support, it seems that the project has not been continued.

In 1967, several groups working on  $K^+p$  reactions combined to establish the World  $K^+$  DST. This now contains about half the world data and first publications are being made.

Thus, in conclusion, there is a great need for data compilation in the fast expanding field of high energy physics. While a number of successful compilations are being issued regularly, the field is not completely covered. Most work is done by active research workers, but the technical support they have is inadequate.

## REFERENCES

1. "Interaction Cross Sections of Elementary Particles", V. S. Barashenkov, Nauka Publishing House, Moscow, 1966, also available from Israel Program for Scientific Translations, P.O.B. 7145, Jerusalem, IPST Cat. No. 2191.
2. *Supplement to the Progress of Theoretical Physics*, Extra Number, 1967.
3. M. Roos, C. Bricman, A. Barbaro-Galtieri, L. R. Price, A. Rittenberg, A. H. Rosenfeld, N. Barash-Schmidt, P. Söding, C. Y. Chien, C. G. Wohl, and T. Lasinski, *Physics Letters* **33B** [1], 1970.

## BIBLIOGRAPHY: LIST OF COMPILATIONS OF CROSS SECTIONS\*

**CERN HERA 69-1\*\*** (November 1969)

G. GIACOMELLI, P. PINI, S. STAGNI  
*A Compilation of Pion-Nucleon Scattering Data.*

**CERN HERA 69-2** (April 1969)

B. SADOULET  
*Data Compilation of Anti-Proton Reactions into Antihyperon-Hyperon.*

**CERN HERA 69-3** (December 1969)

G. GIACOMELLI  
*A Compilation of Total and Total Elastic Cross-Sections.*

**CERN HERA 70-1** (June 1970)

P. SPILLANTINI, V. VALENTE  
*A Collection of Pion Photoproduction Data.*

**CERN HERA 70-2** (July 1970)

J. D. HANSEN, D. R. O. MORRISON, N. TOVEY, E. FLAMINIO  
*Compilation of Cross-Sections, I - Proton Induced Reactions.*

**CERN HERA 70-3** (August 1970)

E. FLAMINIO, J. D. HANSEN, D. R. O. MORRISON, N. TOVEY  
*Compilation of Cross-Sections, II - Antiproton Induced Reactions.*

**CERN HERA 70-4** (September 1970)

E. FLAMINIO, J. D. HANSEN, D. R. O. MORRISON, N. TOVEY  
*Compilation of Cross-Sections, III -  $K^+$  Induced Reactions.*

**CERN HERA 70-5** (September 1970)

E. FLAMINIO, J. D. HANSEN, D. R. O. MORRISON, N. TOVEY  
*Compilation of Cross-Sections, IV -  $\pi^+$  Induced Reactions.*

**CERN HERA 70-6** (October 1970)

E. FLAMINIO, J. D. HANSEN, D. R. O. MORRISON, N. TOVEY  
*Compilation of Cross-Sections, V -  $K^-$  Induced Reactions.*

**CERN HERA 70-7** (October 1970)

E. FLAMINIO, J. D. HANSEN, D. R. O. MORRISON, N. TOVEY  
*Compilation of Cross-Sections, VI -  $\pi^-$  Induced Reactions.*

**UCRL-20 000  $K^+N$**  (September 1969)

*A Compilation of  $K^+N$  Reactions.*

**UCRL-20 000  $YN$**  (January 1970)

*A Compilation of  $YN$  Reactions.*

**UCRL-20 001** (January 1970)

*Compilation of Elastic Scattering Data.*

**UCRL-20 030  $\pi N$**  (February 1970)

*$\pi N$  Partial-Wave Amplitudes.*

**UCRL-20 000  $NN$**  (August 1970)

*$NN$  and  $ND$  Interactions (Above 0.5 GeV/c) - A Compilation.*

**DESY-HERA 70-1**

P. JOOS  
*Compilation of Photoproduction Data Above 1.2 GeV/c.*

## Availability of Copies

For: North and South America, Australasia and the Far East, write to:  
Technical Information Division,  
Lawrence Radiation Laboratory,  
Berkeley, California 94720,  
U.S.A.

For: All other areas, write to:  
CERN - Scientific Information Service,  
CH 1211 Geneva 23,  
Switzerland

\* Note: Some of the more recent compilations in this listing are described in detail under "New Publications", page 8.

\*\* Out of print

## NEW PUBLICATIONS

### NUCLEAR PROPERTIES

**NSRDS-UCRL-20 000 NN, NN and ND Interactions (Above 0.5 GeV/c) - A Compilation**, by Odette Benary and LeRoy R. Price, Lawrence Radiation Laboratory, University of California, Berkeley, California 94720, U.S.A., and Gideon Alexander, Tel-Aviv University, Ramat Aviv, Tel-Aviv, Israel, August 1970, 358 pp, is the third and most recent in a new series of compilations produced by the Particle Data Group.

The compilation includes data from the literature up to 1 July 1970, reporting pp, np, nn, pd, and nd interactions from 0.5 to 70 GeV/c. Cross sections, angular distributions, polarizations, and data fits are displayed, and a complete listing of the selected data, and momentum and keyword indexes are included.

The computer-based series comprises tabulated and graphical data on total and differential cross sections, polarizations, mass spectra, and other similar data. Literature coverage is complete from January 1968, and selected earlier results are also included. The first two reports in the series, NSRDS-UCRL-20 000 K+N, "A Compilation of K+N Reactions", September 1969 (now out of print) and NSRDS-UCRL-20 000 YN, "A Compilation of YN Reactions", January 1970 (see *CODATA Newsletter* 5), covered K+N and YN reactions respectively. Future reports are scheduled to cover  $\pi$ +N, NN,  $\pi$ -N, and K-N reactions. All compilations will be up-dated periodically, as necessary.

The Particle Data Group is an international co-operative effort involving the Berkeley Particle Data Center, Lawrence Radiation Laboratory, University of California, and several physicists in France, Germany, Fed. Rep., Israel, Japan, Switzerland (CERN), U.K., and U.S.A. Close co-operation is maintained with the High-Energy Reaction Analysis (HERA) Group, European Organization for Nuclear Research (CERN), Geneva, Switzerland, in order to minimize duplication of effort in programming and data collection, and to expedite distribution of reports of both Groups (see below).

**UCRL-20 001, Compilation of Elastic Scattering Data**, by Geoffrey C. Fox, Cavendish Laboratory, University of Cambridge, U.K., and C. Quigg, Lawrence Radiation Laboratory, January 1970, 35 pp, is an "interim" compilation produced under the auspices of the Particle Data Group. Data for the elastic scattering of  $\pi^+$ ,  $\pi^-$ ,  $K^+$ ,  $K^-$ , p, and  $\bar{p}$  on protons are presented in graphical and tabular form.

The High-Energy Reaction Analysis (HERA) Group of the European Organization for Nuclear Research (CERN), CH 1211 Geneva 23, Switzerland, commenced publication of computer-based compilations in 1969, and has to date produced ten such compilations, as follows:

**CERN/HERA 69-1, A Compilation of Pion-Nucleon Scattering Data**, by G. Giacomelli, P. Pini, and S. Stagni, Istituto di Fisica dell'Università, Bologna, Italy, and Istituto Nazionale di Fisica Nucleare, Sezione di Bologna, Italy, November 1969, 114 pp (now out of print), is a "computerized" tabulation of pion-nucleon data on total, total elastic and total charge exchange, differential and polarization cross sections with an estimated systematic or scale error, together with an extensive list of references.

**CERN/HERA 69-2, Data Compilation of Antiproton-Proton Reactions Into Antihyperon-Hyperon**, by B. Sadoulet, HERA Group, CERN, April 1969, 139 pp, presents the existing differential cross section data (up to June 1968) for the reactions  $\bar{p} \rightarrow \bar{Y}Y'$ , where Y and Y' represent any hyperon. All available data are tabulated without any judgement of quality, and summary plots of differential cross section versus momentum transferred (0-1.5 GeV<sup>2</sup>) with fitted curves are provided.

**CERN/HERA 69-3, A Compilation of Total and Total Elastic Cross-Sections**, by G. Giacomelli, Istituto di Fisica dell'Università, Bologna, Italy, Istituto Nazionale di Fisica Nucleare, Sezione di Bologna, Italy, and HERA Group, CERN, December 1969, 35 pp, comprises a computerized tabulation of total, total elastic, and total charge exchange cross section data on hadron nucleon scattering. Some experimental data were interpolated using semi-empirical methods.

**CERN/HERA 70-1, A Collection of Pion Photoproduction Data, I - From the Threshold to 1.5 GeV**, by P. Spillantini and V. Valente, Laboratori Nazionali di Frascati, Frascati, Italy June 1970, 155 pp, is a complete and computerized collection of pion photoproduction data on differential cross sections recoil polarization, and asymmetry ratio with polarized gamma-rays, from the threshold to 1.5 GeV. The report is divided into three sections, list of references, list of experiments, and data compilation which includes the systematic (or scale) errors and estimated total errors.

**CERN/HERA 70-2, Compilation of Cross-Sections, I - Proton Induced Reactions**, by J. D. Hansen, D. R. O. Morrison, N. Tovey, HERA Group, CERN, and E. Flaminio, Istituto di Fisica dell'Università di Pisa ed I.N.F.N., Sezione di Pisa, Italy July 1970, 97 pp, is the first in a series of publications by the same authors containing cross sections for reactions with incident protons, antiprotons, pions, and kaons on targets of protons, neutrons, deuterons, and helium nuclei. The computer-based series follows a common format and covers a similar time period; all data published prior to January 1970 are compiled and some 1970 data are also included. Each report covers cross section data (total, elastic, quasi two-body, many body and phenomenological, i.e., prong number) for reactions induced by a given incident particle. Tables and graphs of the variation of cross section with incident laboratory momentum are given, together with values for the rate of decrease of cross section with incident momentum. Other compilations in the series published to date are as follows:

**CERN/HERA 70-3, Compilation of Cross-Sections, II - Antiproton Induced Reactions**, August 1970, 113 pp.

**CERN/HERA 70-4, Compilation of Cross-Sections, III - K<sup>+</sup> Induced Reactions**, September 1970, 88 pp.

**CERN/HERA 70-5, Compilation of Cross-Sections, IV -  $\pi^+$  Induced Reactions**, September 1970, 120 pp.

**CERN/HERA 70-6, Compilation of Cross-Sections, V - K<sup>-</sup> Induced Reactions**, October 1970, 212 pp.

**CERN/HERA 70-7, Compilation of Cross-Sections, VI -  $\pi^-$  Induced Reactions**, October 1970, 172 pp.

All the above particle data compilations in both the NSRDS-UCRL and CERN/HERA series are published and distributed in North and South America, Australasia, and the Far East by Technical Information Division, Lawrence Radiation Laboratory, Berkeley, California 94720, U.S.A., and in the rest of the world by Scientific Information Service, CERN, CH 1211 Geneva 23, Switzerland.

**Atlas of Particle Production Spectra**, by H. Grote, R. Hagedorn, CERN, and J. Ranft, Karl-Marx-Universität, Sektion Physik, Linnéstraße 5, 701 Leipzig, German Democratic Republic December 1970, 229 pp, is a computer-produced compilation of momentum spectra of secondary particles produced in p and p-nucleus collisions. The calculations are based upon the thermodynamic model, which together with the computer programme, is described in five reprints which form an introduction to the *Atlas*. The plots of laboratory spectrum as a function of secondary particle momentum are arranged in order of increasing values of the "three digit number" (target, particle primary momentum), and are divided into two sections according to target type, hydrogen and non-hydrogen. The *Atlas* is available from the Scientific Information Service, CERN.

**Properties of Nuclei with Mass Number  $A = 174$** , by V. A. Balalayev, *et al.*, Institute of Nuclear Physics, Academy of Sciences of the U.S.S.R., Moscow, U.S.S.R., Nauka Publishing House, Leningrad, U.S.S.R., 1969, 1 r. 50 k. This critical analysis of theoretical and experimental work on the properties of atomic nuclei  $A = 174$  provides the most reliable information on the characteristic energy levels and other properties of these nuclei.

**Tables of Resonance Integrals of Elements and Isotopes**, Nuclear Physical Data Series, Volume 3, by T. V. Golashvili, GSSSD-VNIKI (State Service for Standard and Reference Data - National Institute of Coding and Classification), Moscow, U.S.S.R., 1969, 33 pp. These tables present the existing experimental data on resonance integrals of elements and isotopes; a bibliography of 96 references is included.

**CINDA 71, An Index to the Literature on Microscopic Neutron Data**, Complete Issue (supersedes all earlier issues), USAEC Division of Technical Information Extension, P.O. Box 62, Oak Ridge, Tenn. 37830, U.S.A., U.S.S.R. Nuclear Data Centre, Fiziko-Energeticheskij Institut, Obninsk, Kaluzhskoj Obl., U.S.S.R., ENEA Neutron Data Compilation Centre, B.P. 9, 91 Gif-sur-Yvette, France, and IAEA Nuclear Data Section, Kärntnering 11, A-1010 Vienna, Austria, January 1971, 1286 pp, \$ 24.00 (including two supplements to be issued later).

Originated in 1956 by H. Goldstein, CINDA is a computerized index to the world literature on microscopic neutron cross-sections and related parameters, resulting from experiment, theory, and evaluation. The CINDA system is operated as a co-operative effort by the four regional centres named above. The bibliography includes cross-references to the internationally available neutron data files. CINDA 71 is the first issue to be produced by means of computer-controlled phototypesetting.

CINDA is available as an IAEA publication through the IAEA sales agents, or through the four regional centres from which up-to-date computer-retrievals on specified CINDA information can be requested.

**Neutron Fluence Measurements** (IAEA Technical Reports Series No. 107), International Atomic Energy Agency, 1970, 184 pp, \$ 5.00, is a compilation and evaluation of available data on the phenomena of absorption of energy from neutrons and gamma-rays, by metals subjected to radiation. Contents include sections on neutron spectra, thermal, intermediate, and fast neutrons, and an index.

The **NNCSC Newsletter** in its seventh and most recent issue (March 1971) lists additions during January and February 1971 to the CSISRS (Cross Section Information Storage and Retrieval System) experimental data storage library, and also catalogues (summarizing previous issues of the Newsletter) the entire contents of the ENDF/B-II (Evaluated Nuclear Data File) at the present time. The NNCSC Newsletter and further information are available from: National Neutron Cross Section Center, Brookhaven National Laboratory, Upton, N.Y. 11973, U.S.A.

**Handbook on Neutron Activation Analysis**, by I. A. Maslov and V. A. Luknizkij, Nauka Publishing House, U.S.S.R., 1970, ca. 500 pp, 1 r. 50 k., includes a comprehensive table of radioactive isotopes, which is unique in the world's literature. A table on activation at saturation, based on the first table, and data on gamma-spectroscopy are also included, together with information on safety and on sources of error in the results of neutron activation analysis.

**Handbook of Nuclear Data for Neutron Activation Analysis**, by A. I. Aliev, V. I. Drynkin, D. I. Leipunskaya, and V. A. Kasatkin, Atomizdat Publishing House, Moscow, U.S.S.R., 1969, translated from the Russian, available from Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., September 1970, 329 pp, \$ 15.00, DM 60,-. This handbook contains the essential nuclear data required in neutron activation analysis, which include the various cross sections of neutron activation reactions for thermal, fission, and fast neutrons (14 MeV). Values of the self-shielding coefficient are

given for neutrons with different energy distributions, and the characteristics (half-lives, decay constants, etc.) of the radioactive isotopes, i.e., activation products, are listed. A survey of the excitation functions of neutron threshold reactions leading to the production of radioactive isotopes is also included.

**Gammaenergietafellen zur Aktivierungsanalyse, Tables of Gamma Ray Energies for Activation Analysis, Tableaux des Energies Gamma pour l'Analyse par Activation** (Thiemig-Taschenbücher, Band [Volume] 38), by Christoph Meixner, Jülich, Germany, Fed. Rep., Verlag Karl Thiemig KG, Postfach 900740, 8 München 90, Germany, Fed. Rep., 1970, 256 pp, DM 16,80. These tables, intended to facilitate photopeak analysis, are divided into five sections covering nuclides arranged by atomic number, in ascending order of gamma-energies, and of half-life, selected nuclides and their gamma-energies below 100 keV, and gamma-energies of nuclides suitable for calibrating spectrometers. The explanatory text and introduction are given in German, English, and French.

An earlier related volume in the Thiemig-Taschenbücher series (Band 34) is *Tabelle Spezifischer Gammastrahlenkonstanten, Table of Specific Gamma Ray Constants, Tableau des Constantes Spécifiques des Rayonnements Gamma*, by Dieter Nachtigall, Euratom, Geel, Belgium, with R. Barthelemy, D. Gelly, H. Meloni, H. van de Beek, and W. van Suetendaël, 1969, 98 pp, DM 9,80, in which the specific gamma-ray constants for approximately 700 radioactive nuclides are tabulated.

## ATOMIC AND MOLECULAR PROPERTIES

**Atomic Data**, "A Journal Devoted to Compilations of Experimental and Theoretical Results in Atomic Physics", is the counterpart in the field of atomic physics to the compilation journal *Nuclear Data*, and includes collections and evaluations of data on energy levels, wave functions, line-broadening parameters, collision processes, various interaction cross sections of atoms and simple molecules, transition probabilities, penetration through matter of charged particles, etc. Contents of Volume 1, Number 4, November 1970, which completes Volume 1 of *Atomic Data*, are as follows:

A Compound Atom State in Xenon Parameters for the Xe-Ion, C. Foglia,  
K X-Ray Transition Probabilities, G. C. Nelson, B. G. Saunders, and S. I. Salem,  
Theoretical Electron Scattering Amplitudes and Spin Polarizations. Selected Targets, Electron Energies 100 to 1500 eV, Manfred Fink and Albert C. Yates,  
World-Wide News, and Cumulated Author and Subject Indexes for Volume 1.

The most recent issue, Volume 2, Number 1, December 1970, includes the following compilations:

Matrix Elements of Atomic Interaction Operators for  $d^n$  Configurations, J. A. Barnes, B. L. Carroll, L. M. Flores, and R. M. Hedges,  
Magnetic Interactions in Transition Metal Ions. Part I. Electronic Configurations  $d^2$ ,  $d^3$ , and  $d^4$ , Wai-Kee Li,  
Magnetic Interactions in Transition Metal Ions. Part II. Bivalent Cations of the First Transition Series, Wai-Kee Li,  
Calculated Ionization Potentials for Multiply Charged Ions, Thomas A. Carlson, C.W. Nestor, Jr., Neil Wasserman, and J. D. McDowell.

Subscription price per volume of four issues of *Atomic Data* is \$ 20.00; single issue price is \$ 4.00. Correspondence on contributions to the Editor, Dr. Katharine Way, Department of Physics, Duke University, Durham, N.C. 27706, U.S.A., and on subscriptions to the publisher, Academic Press, 111 Fifth Avenue, New York, N.Y. 10003, U.S.A., and Berkeley Square House, London W1X6BA, U.K.

**Solutions of the Simplified Self-Consistent Field for All Atoms of the Periodic System of Elements from  $Z = 2$  to  $Z = 92$ ,** by P. Gombás, Director, Research Group for Theoretical Physics, Hungarian Academy of Sciences, and T. Szondy, Division Leader, Computing Centre, United Hungarian Chemical Companies, published in the Socialist countries by Akadémiai Kiadó Budapest, Publishing House of the Hungarian Academy of Sciences (distributor KULTURA, POB 149, Budapest 62), and in all other countries by Adam Hilger Ltd., 31 Camden Road, London, NW1, U.K., 1971, 82 pp, £ 5.00. Following an explanatory introduction in English and German, the first and second approximations to the solutions for the electron wave functions for all elements from helium to uranium inclusive are tabulated. A graphical comparison between the eigenvalues of the authors' approximations (derived from a simplified self-consistent field method) with exact solutions for the few atoms for which they are known is also presented.

**NBS Special Publication 320, Bibliography on Atomic Transition Probabilities, January 1916 through 1969,** by B. M. Miles and W. L. Wiese, 1970, \$ 1.25, SD Catalog No. C13.10:320\*, is a recent publication from the NSRDS Atomic Transition Probabilities Data Center (see CODATA *International Compendium of Numerical Data Projects*, 3.2.2.).

**Bibliography of Low Energy Electron Collision Cross Section Data (1967-1969), JILA Information Center Report 10,** by G. E. Chamberlain and L. J. Kieffer, February 1970, 44 pp, is available on request and free of charge from the Atomic Collision Information Center, Joint Institute for Laboratory Astrophysics (JILA), University of Colorado, Boulder, Colorado 80302, U.S.A. (see CODATA *International Compendium of Numerical Data Projects*, 3.2.5.).

**Tables Internationales de Constantes Sélectionnées - International Tables of Selected Constants, Volume 17, Données Spectroscopiques relatives aux Molécules Diatomiques - Spectroscopic Data relative to Diatomic Molecules,** established under the direction of Prof. B. Rosen, Institute of Astrophysics, University of Liège, Belgium, Editor, S. Bourcier, Faculté des Sciences - Paris VI, Tour 13, 11 quai Saint-Bernard, 75 Paris 5e, France, Pergamon Press, 4-5 Fitzroy Square, London, W1, U.K., and Fairview Park, Elmsford, N.Y. 10523, U.S.A., 1971, 522 pp, ca. F. 423.30, £ 25.00, \$ 60.00. This most recent volume in the New Series of the "International Tables of Selected Constants" is an up-dated and extended version of Volume 4 with the same title published in 1951, and is the result of an international collaborative effort involving 35 scientists in 14 laboratories throughout the world, under the direction of Prof. B. Rosen. The most important information and data on the electronic spectra and spectroscopic properties of 720 diatomic molecules (approximately double the number in the first edition) are tabulated, and a bibliography of 5140 references is provided. The present volume represents a complete survey of the literature up to the end of 1967, with the more important work published in 1968 and 1969 also included. With the help of the French Centre National de la Recherche Scientifique, the annual publication starting in 1971 of critical abstracts containing data on the properties of diatomic molecules is planned. For details of earlier volumes of the "International Tables of Selected Constants", refer to section 2.2. of the CODATA *International Compendium of Numerical Data Projects*.

**Electron Impact Phenomena and the Properties of Gaseous Ions,** Revised Edition, by F. H. Field and J. L. Franklin, Academic Press, New York and London, 1970, 563 pp, \$ 15.00, comprises two sections, theoretical and experimental, and the data compilation, including tabulated values for ionization potentials, appearance potentials, and heats of formation of gaseous positive ions. The literature (1200 references) is covered from 1955 to June, 1966. (See also NSRDS-NBS-26, *Ionization Potentials, Appearance Potentials, and Heats of Formation of Gaseous Positive Ions*, by J. L. Franklin, J. G. Dillard, H. M. Rosenstock, J. T. Herron, K. Draxl, and F. H. Field, 1969, \$ 4.00, SD Catalog No. C 13.48 : 26\*).

**Chemical Bonds and Bond Energy,** by R. T. Sanderson, Department of Chemistry, Arizona State University, Tempe, Arizona, U.S.A., Academic Press, New York and London, 1970, 232 pp, \$ 11.50, presents tabulated values of the calculated bond energies of over 500 compounds, including almost every gas phase inorganic molecule for which data have been reported, 98 representative organic compounds, and over 100 binary solids.

**Ion - Molecule Reactions,** by E. W. McDaniel, *et al*, John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, 374 pp, ca. £ 9.50, \$ 19.95. This first volume of a scheduled series of critical reviews of the literature provides a comprehensive coverage of both the theoretical and experimental aspects of ion-molecule reactions. Reaction rates from ionospheric and airglow data are discussed, and relevant data on 230 ion-molecule reactions are included.

**UCRL - 50174, Compilation of X-Ray Cross Sections\***, Section I, 18 pp, Section II Revision 1, 353 pp, Section III, 194 pp, Section IV, 40 pp, January 1970, \$ 12.00 complete, \$ 3.00 per section (\$ 2.60, \$ 0.65 microfiche), by W. H. McMaster, N. Kerr Del Grande, and J. H. Mallett, Lawrence Radiation Laboratory, Livermore, California, U.S.A., and J. H. Hubbell, Director, NBS X-Ray Attenuation Coefficient Information Center, is a tabulation of approximately 10,000 X-ray cross section values derived from critically evaluated data in the range 1 keV to 1 MeV. Coherent (Rayleigh) scattering, incoherent (Compton) scattering, photoelectric, and total cross sections for 87 elements are given, together with miscellaneous data including the fit coefficients for obtaining scattering and photoelectric cross sections at energies other than those tabulated. The scattering cross sections were computed, while the photoelectric cross sections were obtained by least squares fitting of experimental data (when the data were both available and reliable), by calculation from theory (in regions where the data were insufficient or unreliable), and by interpolation (in regions where neither experimental nor theoretical values were available). The results of the evaluation, which were based on existing data files at the Lawrence Radiation Laboratory and at NBS, are described in Section I, presented in graphical and tabular form in Section II, compared with the input data in Section III, and presented at selected wavelengths of particular use to X-ray crystallographers in Section IV. In addition, the experimental data, their source, and the weighting values used in the compilations are listed (Section III, Appendix A). Section II Revision 1 of UCRL - 50174 is also available in ENDF/B format as the 1 keV to 1 MeV portion of a 1 keV to 100 MeV tape (DCL - 7) from the Radiation Shielding Information Center, Oak Ridge National Laboratory, Oak Ridge, Tenn. 37830, U.S.A., or the National Neutron Cross Section Center, Brookhaven National Laboratory, Upton, N.Y. 11973, U.S.A., or for OECD member countries, from the European Nuclear Energy Agency, Neutron Data Compilation Centre, B.P. No. 9, 91 - Gif-sur-Yvette, France.

**A Bibliography of *Ab Initio* Molecular Wave Functions,** by W. G. Richards, Brasenose College, Oxford University, U.K., T. E. H. Walker and R. K. Hinckley, Oxford University Press, Ely House, 37 Dover Street, London W1X4AH, U.K., 1970, 80 pp, £ 2.00. *Ab initio* molecular wave functions calculated on a non-empirical basis are now available for a few hundred molecules. In this annotated bibliography, each molecule is treated separately with an indication of geometry, method of calculation, and computed properties, in addition to a chronological bibliography.

**NBS - OSRDB - 70 - 3, Semiempirical and Approximate Methods for Molecular Calculations - Bibliography and KW Index,** by George A. Henderson and Sandra Frattali, Georgetown University, Washington, D.C., U.S.A., 1969, \$ 3.00 per, \$ 0.65 microfiche, AD - 705 110\*\*, is a bibliography listing and subject index of research papers in the field of non-*ab-initio* calculations on the electronic states of small molecules. Papers included are those covered by *Physical Abstracts* from 1960 to May 1969, with some additional entries.

earlier than 1960. This publication is the third in a new bibliographic series (NBS — OSRDB) recently inaugurated by the Office of Standard Reference Data of the U.S. National Bureau of Standards, in order to make available to the scientific and technical community the bibliographic files established and used by the data centres and compilation projects as a basis for the data compilation and evaluation activities within their particular technical area.

**Digest of Literature on Dielectrics**, Vol. 32, 1968, prepared by the Committee on Digest of Literature, Conference on Electrical Insulation and Dielectric Phenomena, Division of Engineering, National Research Council, published by the National Academy of Sciences, 2101 Constitution Avenue, Washington, D.C. 20418, U.S.A., 1970, 508 pp, \$ 35.00. The *Digest* has been issued annually since 1936, and comprises a compilation of information published during the year on dielectric phenomena. Tables of dielectric constants and dipole moments and dielectric relaxation times are included. For further information and details of earlier volumes, see CODATA *International Compendium of Numerical Data Projects*, 3.2.14.

## SPECTRA

**Infrared Band Handbook**, 2nd Revised Edition, edited by Herman A. Szymanski, Dean of Faculty, Alliance College, Cambridge Springs, Pennsylvania, U.S.A., and Ronald E. Erickson, Chemistry Department, University of Montana, Missoula, Montana, U.S.A., Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, Vol. 1, 754 pp, Vol. 2, 737 pp, \$ 115.00 (two volume set). This comprehensive compilation of band positions of organic and inorganic compounds, tabulated according to the wavelength of their infrared absorption spectra, combines more than 10,000 new entries with the 16,000 items originally published in the first edition of the Handbook (1963) and its four subsequent Supplements (1964, 1966). For each compound, the following data are given: wave number, physical state, structural group, special information, and reference to source material.

**CIPAC Handbook**, I. Analysis of Technical and Formulated Pesticides, compiled by R. de B. Ashworth, J. Henriët, and J. F. Lovett, edited by G. R. Raw, Collaborative International Pesticides Analytical Council (CIPAC) Ltd., and W. Heffer and Sons Ltd., Hills Road, Cambridge, U.K., 1970, 1080 pp, £ 10.00. Methods of analysis for pesticides used in crop protection, including insecticides, fungicides, herbicides, rodenticides, attractants, and repellents, are detailed, together with the necessary data for infrared analysis.

**Organic Electronic Spectral Data**, Vol. VI: 1962-1963, John P. Phillips, J. Cymerman Craig, and Leon D. Freedman, Editors, John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, 1324 pp, \$ 40.00. This most recent compilation in the series (see CODATA *International Compendium of Numerical Data Projects*, 3.2.31.) continues the survey of ultraviolet and visible spectral data published in the literature since 1946. The name and formula of the chemical compound, organized according to the molecular formula index system used by Chemical Abstracts and Beilstein, are tabulated with data on the wavelength of maximum absorption and molar absorptivity, and literature references.

**Tables of Electronic Spectra of Anthraquinone and its Derivatives**, by V. Ya. Fain, Khemia Publishing House, Moscow, U.S.S.R., 1970, ca. 375 pp, 1r. 10k. Quantitative data on ca. 2500 ultraviolet and visible absorption spectra of anthraquinone and more than 1200 of its derivatives are compiled in these tables. In the literature review, the effects on anthraquinone absorption spectra of its derivatives, the nature of the solvents and temperature are also discussed.

**Spectrum Lines of Rare Earths Arranged by Wavelengths**, by J. Wysocka-Lisek, Lublin Scientific Society, Warsaw, Poland, available from Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., 1970, 583 pp, \$ 15.20,

DM 60,-. This compilation (in English) comprises tables of spectrum lines of the rare earths in the interval 1000-2000 Å, and arranged according to increasing wavelength.

**Molecular Photoelectron Spectroscopy; A Handbook of He 584 Å Spectra**, by D. W. Turner, Laboratory of Physical Chemistry, University of Oxford, U.K., C. Baker, B. P. Chemicals, Epsom, Surrey, U.K., A. D. Baker, Department of Chemistry, University of Swansea, Wales, U.K., and C. R. Brundle, Bell Telephone Laboratories, New Jersey, U.S.A., John Wiley and Sons Ltd., 1970, 386 pp, £ 7.50, \$ 19.50. The results of an extensive survey of the photoelectron spectra of a wide range of compounds are presented. A large amount of previously inaccessible data, including over 300 DE spectra using the helium resonance line, is included in the Handbook.

**The Mass Spectrometry Data Centre** at the Atomic Weapons Research Establishment (AWRE), Aldermaston, U.K., operates as the world-wide clearing house for collection and dissemination of mass spectral data. The Centre was established in 1965, and is supported jointly by the U.K. Office for Scientific and Technical Information (OSTI) and the Department of Trade and Industry. Since 1966, the Centre has published the *Mass Spectrometry Bulletin*, a monthly guide to the current literature on mass spectrometry and allied subjects. The *Bulletin* is produced from card input by an IBM 360/75 computer and is printed using Lumi-type photo-typesetting. As part of its clearing house function, the Centre stores and distributes on magnetic tape a collection of 10628 mass spectra, comprising 6628 spectra from the ASTM, Dow, TRC and API RP 44 collections, and 4000 spectra from the Centre's own collection, which is also available as *Mass Spectral Data Sheets*. The Centre has recently produced an *Eight Peak Index of Mass Spectra* (also available on magnetic tape), in which the eight principal peaks in 17124 mass spectra are indexed by molecular weight, molecular formula, and fragment ion *m/e* values. A computer programme to identify unknown spectra by matching against a library of spectra has also been developed. Current publications and output of the Mass Spectrometry Data Centre are as follows:

Mass Spectrometry Bulletin, Annual subscription (12 issues and cumulated annual index issue), \$ 74.50 (air mail),

Mass Spectrometry Bulletin on magnetic tape, 1971, \$ 720.00; 1966-1970, \$ 2400.00,

Mass Spectral Data Sheets (per 1000), \$ 108.00 (plus postage),

Complete spectra (10628) on magnetic tape, \$ 1176.00,

Eight Peak Index of Mass Spectra, \$ 84.00 (plus postage); on magnetic tape, \$ 960.00,

Complete spectra and Eight Peak Index on magnetic tape, \$ 1896.00,

IBM 360/50 Matching Programme, \$ 960.00.

The *Bulletin* is distributed through the British Information Services, 845 Third Avenue, New York, N.Y. 10022, U.S.A., or Her Majesty's Stationery Office, Atlantic House, Holborn Viaduct, London EC1P 1BN, U.K. Order forms for data sheets and tapes and further information are available from: Mass Spectrometry Data Centre, AWRE, Aldermaston, Reading RG7 4PR, U.K.

**Tables for Use in High Resolution Mass Spectrometry**, by R. Binks, J. S. Littler, and R. L. Cleaver, Chemistry Department, University of Bristol, U.K., incorporating *Chemical Formulae from Mass Determinations*, by D. Henneberg and K. Casper, Max-Planck-Institut für Kohlenforschung, Mülheim/Ruhr, Germany, Fed. Rep., Heyden and Son Ltd., Spectrum House, Alderton Crescent, London, NW4, U.K., 1970, 180 pp main volume + 32 pp booklet, £ 10.80, \$ 26.00, DM 97.00. This publication brings together a complete set of tables to assist the operator of a high resolution mass spectrometer in the calibration of the instrument and in the determination of exact masses of ions. The accompanying booklet provides tables for the conversion of these accurate masses to chemical formulae. Explanatory text is given in English, French, and German.

**Compilation of Reported  $F^{19}$  NMR Chemical Shifts; 1951 to Mid-1967**, by Claude H. Dungan and John R. van Wazer, John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, no paging, \$ 14.50. This compilation and interpretation of  $F^{19}$  nuclear magnetic resonance (NMR) chemical shift data covers the following groups of compounds: fluorine bonded to an element other than carbon, fluorine bonded to carbon (excluding fluorobenzene derivatives), and fluorinated benzenes and their derivatives. More than 6000 chemical shift values are tabulated, covering the literature for the period 1946 to September 1967.

The **American Petroleum Institute Research Project 44** (API RP 44) compiles, calculates, critically evaluates, and publishes tables of selected physical and thermodynamic property values and selected spectral data in five categories (infrared, ultraviolet, Raman, mass, nuclear magnetic resonance) for all classes of hydrocarbons and certain classes of organic sulphur and organic nitrogen hydrocarbon derivatives of interest to the

petroleum and petrochemical industries. These publications are known collectively under the title, *Selected Values of Properties of Hydrocarbons and Related Compounds*.

**The Thermodynamics Research Center (TRC) Data Project** (formerly the Manufacturing Chemists Association Research Project) publishes similar data in *Selected Values of Properties of Chemical Compounds* for all classes of organic compounds, other than hydrocarbons, and for certain classes of inorganic compounds of interest to the chemical industry.

The API RP 44 and TRC Projects are organized within the Thermodynamics Research Center (Director: B. J. Zwolinski), Texas A & M University, U.S.A. Both projects issue initial sets of loose-leaf sheets in all six data categories, revised and updated by semiannual supplements. Prices including postage of initial sets and 1971 supplements, together with number of data sheets available, are summarized in the table below. Further details from: Data Distribution Office, Thermodynamics Research Center, Texas A & M Research Foundation, F. E. Box 130, College Station, Texas 77843, U.S.A.

Categories of Data Sheets	American Petroleum Institute Research Project 44 <i>Selected Values of Properties of Hydrocarbons and Related Compounds</i>			Thermodynamics Research Center Data Project <i>Selected Values of Properties of Chemical Compounds</i>		
	Data Sheets Available	Price, Initial Sets	Price, 1971 Supplements	Data Sheets Available	Price, Initial Sets	Price, 1971 Supplements
A. Tables of selected values of <b>PHYSICAL AND THERMODYNAMIC PROPERTIES</b> , including status sheets	2563	\$ 826.55	\$ 72.00	1079	\$ 357.50	\$ 48.00
B. <b>SELECTED INFRARED SPECTRAL DATA</b> , including indices	3079	981.30	30.00	665	222.25	60.00
C. <b>SELECTED ULTRA-VIOLET SPECTRAL DATA</b> , including indices	1154	369.05	16.00	166	58.75	16.00
D. <b>SELECTED RAMAN SPECTRAL DATA</b> , including indices	501	173.15	16.00	81	33.25	16.00
E. <b>SELECTED MASS SPECTRAL DATA</b> , including indices	2681	848.00	52.00	330	114.90	38.00
F. <b>SELECTED NUCLEAR MAGNETIC RESONANCE SPECTRAL DATA</b> , including indices	966	312.65	48.00	929	301.55	30.00
Totals	10944	\$ 3510.70	\$ 234.00	3250	\$ 1088.30	\$ 208.00

## SOLID STATE PROPERTIES

### CRYSTALLOGRAPHIC PROPERTIES

**Standard X-Ray Diffraction Powder Patterns**, by Howard E. Swanson, Howard F. McMurdie, Marlene C. Morris, and Eloise H. Evans, \$ 1.50, SD Catalog No. C13.44:25\*, is the eighteenth and most recent in a series of publications by the U.S. National Bureau of Standards containing information on X-ray diffraction powder patterns. This section includes standard X-ray diffraction patterns (53 experimental, 28 calculated) for 81 substances, and a cumulative index for all publications in the series. The compilation, evaluation, and experimental work at NBS are part of a continuing programme to extend and up-date the "Powder Diffraction File" (see CODATA *International Compendium of Numerical Data Projects*, 3.3.3.).

**Interpretation of Electron Diffraction Patterns**, 2nd Edition, by K. W. Andrews, D. J. Dyson, and S. R. Keown, British Steel Corporation, Rotherham, U.K., Adam Hilger Ltd., 60 Rochester Place, London, NW1, U.K., available in U.S.A. from Plenum Publishing Corporation, 1970, ca. 240 pp, ca. £ 7.00. The second edition of this aid to the solution and interpretation of electron diffraction patterns includes tables and diagrams for general use under the following headings: calculation of interplanar spacings and angles, tetragonal system, hexagonal and rhombohedral systems, cubic system, standard diffraction patterns, twins in cubic crystals, superimposed patterns and projections (for martensite transformations, etc.). Data for specific materials, carbides and nitrides, pure metals and graphite, and intermetallic compounds and phases, are also included.

### ELECTRICAL PROPERTIES

**NBS Technical Note 365-1, Survey of Electrical Resistivity Measurements on 8 Additional Pure Metals in the Temperature Range 0 to 273 K**, by L. A. Hall and F. E. E. Germann, \$ 1.00, SD Catalog No. C13.46:365-1\*, is an extension of an earlier survey, NBS Technical Note 365, *Survey of Electrical Resistivity Measurements on 16 Pure Metals in the Temperature Range 0 to 273 K*, by L. A. Hall, 1968, 111 pp, \$ 0.60, which covered data for the metals Al, Be, Co, Cu, Au, In, Fe, Pb, Mg, Mo, Ni, Nb, Pt, Ag, Ta, and Sn. The more recent publication, covering the metals Cd, Cr, Mn, Ti, W, Va, Zn, and Zr, is restricted to measurements of temperature-dependent resistivity in very pure metals between the temperatures 0 and 273 K. For each metal, the following information is given: sources of data and additional references of possible interest, authors' comments on the factors influencing the character of the experimental data, e.g., purity, heat treatment and structure, tables of data, and a plot of the ratio, resistivity at given temperature: resistivity at 273.15 K, versus temperature. This continuing data project, established in 1966, is based at the Cryogenic Data Center, Cryogenics Division, Institute for Materials Research, National Bureau of Standards, Boulder, Colorado 80302, U.S.A., and is supported by NASA and the NBS Office of Standard Reference Data.

**Electrical Properties of Polymers**, by V. I. Sazhin, Khemia Publishing House, Moscow, U.S.S.R., 1970, ca. 500 pp, 1r. 76 k. Experimental data on the basic electrical properties of polymers are collected and systematized. Properties covered include electrical conductivity, dielectric loss and permeability, and static electricity. These properties are discussed in connection with the formation of macromolecules and of super-molecular structure in polymers, for large ranges of temperature, electrical field frequency, and other variables.

### THERMODYNAMIC PROPERTIES

**Thermochemistry of Transition Metal Complexes**, by S. J. Ashcroft and C. T. Mortimer, Department of Chemistry, University of Keele, Staffordshire, U.K., Academic Press, Berkeley Square House, London W1X 6BA, U.K., and 111 Fifth Avenue, New York, N.Y. 10003, U.S.A., 1970, 478 pp, £ 6.50, \$ 19.50. Based on an extensive literature survey (1000 papers) up to mid-

1968, this book provides a critical review of the available thermochemical data for over 1500 complex systems involving transition metals with organic and inorganic ligands.

**Bulletin of Thermodynamics and Thermochemistry**, No. 14, Editor, Edgar F. Westrum, Jr., prepared under the auspices of the Commission on Thermodynamics and Thermochemistry of the International Union of Pure and Applied Chemistry (IUPAC), 1971. The fourteenth and most recent issue of this annual publication has recently become available. The *Bulletin* contains listings of thermodynamic and thermochemical research work in progress in ca. 200 laboratories throughout the world, and indexes to the published thermodynamic literature of the past year. Topics covered include thermochemical quantities, thermal properties, vaporization studies, other non-calorimetric studies, and correlation and compilation work. Summaries of the thermodynamic properties of engineering materials are also given. Copies of the *Bulletin* are available at a price of \$ 12.00 from the University of Michigan, Publications Distribution Services, 615 E. University Avenue, Ann Arbor, Mich. 48106, U.S.A. Editorial and related correspondence should be addressed to Prof. Edgar F. Westrum, Jr., Department of Chemistry, University of Michigan, Ann Arbor, Mich. 48106, U.S.A.

The January 1971 **Supplement to Selected Values of Thermodynamic Properties of Metals and Alloys**, by Ralph R. Hultgren, et al, Department of Mineral Technology, University of California, Berkeley, California 94720, U.S.A., contains critically evaluated thermodynamic data for the elements As and Zn, and for the alloy systems Ag-Sb, Al-Au, Al-Bi, Al-Cd, Al-Ga, Al-In, Al-Pb, Al-Sn, Au-Bi, Au-Fe, Au-Hg, Au-Na, Au-Pb, Au-Pd, Au-Sb, Au-Tl, and Cu-Si. For further details on the project and earlier publications, see *CODATA Newsletter* 5, page 26, and *CODATA International Compendium of Numerical Data Projects*, 3.4.9.

**NBS Technical Note 392, Thermodynamic Properties of Compressed Gaseous and Liquid Fluorine**, by Rolf Prydz and Gerald C. Straty, \$ 1.50, SD Catalog No. C13.46:392\*, presents temperature, pressure, and density data for fluorine experimentally determined by the gas expansion method over the ranges 53-300 K, 0.0003-24 MN/m<sup>2</sup>, and 0.03-45 moles per litre. Values of thermodynamic quantities, including isothermal and isochoric derivatives, second and third virial coefficients, internal energy, enthalpy, entropy, specific heats, and velocity of sound, were derived from the experimental data, and are tabulated at temperature intervals of 2 or 5 K.

**Thermodynamics of Reaction of Oxygen-Containing Aliphatic Organic Compounds**, by J. G. Petrenko and V. I. Phylippova, Nauka Publishing House, U.S.S.R., 1970, ca. 172 pp, 61 k. This reference book includes in 225 tables the results of thermodynamic calculations on 219 reactions of formation and dissociation of low-oxygen organic compounds of the aliphatic type. A bibliography on the thermodynamic properties of these substances is also included.

**Handbook of Phase Diagrams of Silicate Systems, Volume 1, Binary Systems**, 2nd Edition, by N. A. Toropov, V. P. Barzakovskij, V. V. Lapin, and N. N. Kurtseva, Nauka Publishing House, U.S.S.R., 1970, ca. 1125 pp, 3 r. This handbook contains the most important information on silicate systems of Al, Fe, Nb, Ti, Zr, and many other systems including those containing oxides of the rare earth elements, uranium, plutonium, etc. (more than 800 systems). In addition to the great amount of tabular and graphical information, methods of synthesis, and analysis of phase transformations are described, and several constants (optical properties, structural characteristics) are included. This second edition of Volume 1 of the Handbook, which is 50% larger than the first edition, also describes in detail the latest research on solid phase reactions for systems at equilibrium and in the metastable condition, and covers phase transitions at high pressures.

**Handbook of Phase Diagrams of Silicate Systems, Volume 2, Metal-Oxygen Components of Silicate Systems**, by N. A. Topopov, V. P. Barzakovskij, I. A. Bondar, and Yu. M. Udalov, Nauka Publishing House, U.S.S.R., 1970, ca. 500 pp, 2 r. Comprehensive reference data are given on metal-oxygen systems, including all oxides of rare earth elements, Ti, Zr, V, Nb, Ta, Cr, Mo, W, U, Mn, Fe, Co, and Ni, and other high melting point oxides of importance in modern technology. The lower oxides of Si, Al, Ge, Sn, and Pb, and the polymorphism of the common oxygen compounds of these elements are described in detail. Both phase relations and polymorphism with respect to temperature and pressure of these various oxide phases are shown, and some structural and optical properties are included.

The U.S. National Bureau of Standards Alloy Data Center has recently had two handbooks translated into English. **Handbook of Binary Metallic Systems**, by A. E. Vol (translated from the Russian), Volume I, 1959, 635 pp, \$ 9.48 (TT66-51149\*\*), Volume II, 1962, 870 pp, \$ 11.88 (TT66-51150\*\*). In addition to the phase diagram, information given may include crystal structures, mechanical properties, physical properties, e.g., density, electrical resistance, thermal conductivity, and heat capacity, chemical properties, corrosion resistance, and literature references. Volume I covers ca. 250 binary systems of Ac, Al, Am, Ba, Be, B, and N, while Volume II includes ca. 350 binary systems of Bi, Dy, Eu, Fe, Ga, Ge, H, Hf, Ho, V, and W.

**A Compendium of Constitutional Ternary Diagrams of the Metallic Systems**, by W. Guertler, M. Guertler, and E. Anastasiadis (translated from the German), 1959, \$ 10.00 (TT69-55069\*\*), is divided into three parts: Part I covers all of the binaries and ternaries formed between Mn, Fe, Co, Ni, Cu, Pd, Ag, Pt, and Au; Part II includes all of the binaries (except those included in Part I) between Mg, Al, Si, Mn, Fe, Ni, Cu, and Zn, but only six of the possible ternaries, all of which contain Al as one of their constituents; and Part III extends the compilation to some ternary systems not found in Part II, together with other miscellaneous binary and ternary systems.

**NBS Special Publication 327, Equilibrium Critical Phenomena in Fluids and Mixtures: A Comprehensive Bibliography With Key-Word Descriptors**, by Stella Micheals, Melville S. Green, and Sigurd Y. Larsen, \$ 4.00, SD Catalog No. C13.10:327\*, is intended to include all studies of equilibrium properties of the critical point of liquid-vapour systems and of binary and ternary liquid mixtures published between 1 January 1950 and 31 December 1967. Each of the 1088 references is assigned key-word descriptors based upon type of research, type of system, property measured, theoretical method used, and chemical name of substance measured. An author index is provided, together with a subject index with which all papers described by a given key-word can be identified.

## THERMOPHYSICAL PROPERTIES

**Thermophysical Properties of Freon - 22**, by A. V. Kletskiy, GSSSD (State Service for Standard and Reference Data), Moscow, U.S.S.R., 1970, 77 pp, 29 k. This book reviews Soviet and western research work on the thermodynamic and thermophysical properties of Freon-22, one of the most widely used refrigerants. Tables of the thermodynamic properties of the superheated vapour in the temperature and pressure ranges -100 to 250° C and 0.02 to 65 bar, and of the saturated vapour from -105° C to the critical point are presented. Analyses and tables are also included of data on the thermal conductivity, viscosity, surface tension, and dielectric properties of Freon-22.

**Thermophysical Properties of Gaseous and Liquid Methane**, by V. A. Zagurchenko and A. M. Zhuravlev (Publication No. TT70-50097\*\*) is the third Soviet data compilation to have been translated and published for the U.S. Department of Commerce and National Science Foundation. The contents of this compilation were described in *CODATA Newsletter 4*, page 15. This and the earlier translations, *Thermophysical Properties of Gases and Liquids, No. 1*, V. A. Rabinovich, Editor, (Publication No. TT69-55091\*\*), and *Thermophysical Properties of Liquid Air and its Components*, by A. A. Vasserman and V. A. Rabinovich, (Publication No. TT69-55092\*\*), are available for \$ 3.00 each.

## TRANSPORT PROPERTIES

**Tracer Diffusion Data for Metals, Alloys, and Simple Oxides**, by John Askill, Physics Department, Millikin University, Decatur, Illinois, U.S.A., Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, 107 pp, \$ 12.50, is a compilation of all radioactive tracer diffusion data (over 1200 entries) of metals in pure metals, alloys, and simple oxides reported in the literature between 1938 and the end of 1968.

**Viscosity of Gases and Gas Mixtures: A Handbook**, by I. F. Golubev, State Publishing House for Physics and Mathematics, Moscow, U.S.S.R., 1969, translated from the Russian, available from Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., December 1970, 246 pp, \$ 18.00, DM 70,-. The published experimental data on the viscosity of many gases and gas mixtures over wide ranges of temperature and pressure are presented, and are analysed together with the appropriate computation methods. Experimental methods and various types of viscometer are surveyed and described.

## SOLUTION PROPERTIES

**Handbook of Metal Ligand Heats and Related Thermodynamic Quantities**, by James J. Christensen, Department of Chemical Engineering Science, Brigham Young University, Provo, Utah, U.S.A., and Reed M. Izatt, Department of Chemistry, Brigham Young University, Marcel Dekker, Inc., 95 Madison Avenue, New York, N.Y. 10016, U.S.A., 1970, 324 pp, \$ 14.50, £ 6.90, comprises a comprehensive tabulation of heats ( $\Delta H$ ) for metal-ligand interactions in solution, together with the related thermodynamic quantities  $\log K$ ,  $\Delta S$ , and  $\Delta C_p$ , where available. In addition to the numerical values, the following information is included in the Table: appropriate reaction, temperature, method and conditions of measurement, literature references, and pertinent supplemental information. The majority of the data is taken directly from the published literature reviewed up to mid-1969, but in several cases additional calculated values are quoted, and where sufficient data for a given reaction were available, selected values are given. Five indexes (author, empirical formula, element, synonym, and reference) provide cross-references to the tabulation.

The *Handbook* is the first publication from the Center for Thermochemical Studies established in 1969 at Brigham Young University, Provo, Utah 84601, U.S.A., and directed by James J. Christensen, Reed M. Izatt, and Delbert J. Eatough. The Center is involved in basic and applied research in areas of thermochemical interest, e.g., determination of mechanisms of metal-ion transport through membranes, and of thermodynamic values associated with liquid-liquid separation technology. One objective of the Center is to compile and critically evaluate numerical data on the heats and related thermodynamic properties of metal-ligand interaction in solution, proton ionization in solution, and mixing of non-electrolyte solutions.

**Acidity Functions**, by Colin H. Rochester, Academic Press, Berkeley Square House, London W1X 6BA, U.K., and 111 Fifth Avenue, New York, N.Y. 10003, U.S.A., 1970, 300 pp, \$ 13.00, contains numerous and comprehensive data tables in chapters on the Hammett acidity function and on acidity functions for solutes other than neutral Hammett bases.

## CHEMICAL KINETICS

**Supplementary Tables of Bimolecular Gas Reactions**, by E. Ratajczak and A. F. Trotman-Dickenson, University of Wales Institute of Science and Technology (UWIST), Cardiff, Wales, U.K., 1970, 100 pp, available for £ 1.00 post free from Publications Department, UWIST, King Edward VII Avenue, Cardiff CF1 3NU, Wales, U.K. These Tables, produced under the auspices of the Office for Scientific and Technical Information, Department of Education and Science, U.K., are a supplement to *NSRDS - NBS - 9, Tables of Bimolecular Gas Reactions*, by A. F. Trotman-Dickenson and G. S. Milne, October 1967,

129 pp, \$ 2.00, SD Catalog No. C13.48:9\*. Based on a comprehensive literature survey from 1 January 1966 to 31 December 1968, the Supplementary Tables cover the kinetics of bimolecular and termolecular gas reactions that do not involve atoms or molecules in electronically excited states. Bimolecular reactions are here defined as reactions in which two molecules are involved as reactants, that yield two or more molecules as products. Those reactions in which two molecules combine to form one molecule are most usefully considered as the reverse of unimolecular reactions, which will be dealt with in another survey. Reactions of oxygen and nitrogen atoms have been omitted from the present tables, since they will also be considered in a future survey.

**Redistribution Reactions**, by J. C. Lockhart, Department of Inorganic Chemistry, The University, Newcastle upon Tyne, U.K., Academic Press, Berkeley Square House, London W1X 6BA, U.K., and 111 Fifth Avenue, New York, N.Y. 10003, U.S.A., January 1971, 173 pp, £ 4.45, \$ 9.50. This is the first reference book to give a comprehensive coverage of redistribution phenomena for the entire Periodic Table. The kinetic and thermodynamic data for those redistribution reactions for which such quantitative information is available (56 elements) are summarised in 80 tables. Literature coverage extended to late 1969.

**NBS List of Publications No. 68, Chemical Kinetics of Reactions of the Sulfur Oxides, S-Atoms, SH and H<sub>2</sub>S: Dissociation, Photolysis and Reactions with H, O, O<sub>2</sub>, O<sub>3</sub>, and the Nitrogen Oxides**, August 1970, available free of charge from the Chemical Kinetics Information Center, Room B158, Chemistry Building, National Bureau of Standards, Washington, D.C. 20234, U.S.A. This bibliography lists research papers on the reaction kinetics of gas phase reactions of the sulphur oxides, sulphur atoms, thiyl (thiohydroxyl) radical, and hydrogen sulphide with hydrogen atoms, oxygen atoms, hydroxyl radical, molecular oxygen, ozone, nitric oxide, and nitrogen dioxide. The listing of bibliographic information on almost 40 reactions is based upon the files of the Chemical Kinetics Information Center (see CODATA *International Compendium of Numerical Data Projects*, 3.5.1.), and a survey of *Chemical Abstracts* 1962-1970.

## OPTICAL PROPERTIES

**Handbook of Applied Optics: Mathematical Tables**, by Leo Levi, Department of Physics, City College, City University of New York, U.S.A., Gordon and Breach Science Publishers Ltd., 12 Bloomsbury Way, London, WC1, U.K., and 440 Park Avenue South, New York, N.Y. 10016, U.S.A., ca. 600 pp, in preparation. This handbook is intended to provide a single source for numerical values of functions needed in optical system analysis and design. Contents include elementary functions, error function and Fresnel integrals, blackbody radiation tables - radiant, photon, luminous functions for perfect lens, circular aperture, monochromatic radiation.

**Optical Properties of Metals**, Nauka Publishing House, U.S.S.R., 1970, ca. 500 pp, 1r. 60 k., includes theoretical and experimental data on the optical properties of metals, and related information on intermolecular forces.

## ANALYTICAL CHEMISTRY

**The Analytical Chemistry of Nitrogen and Its Compounds**, Editors, C. A. Streuli and P. R. Averell, John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, Part I, 429 pp, Part II, 333 pp, \$ 35.00 for two part set. These volumes provide a comprehensive treatment of the analytical chemistry of nitrogen compounds, excluding alkaloids. Methods are described and data is given for qualitative, quantitative, and structural analysis; where necessary for analytical procedures, separation methods are also covered, together with all relevant physico-chemical data.

**The Analytical Chemistry of Sulfur and Its Compounds**, Editor, J. H. Karchmer, Wiley, Chichester and New York, Volumes 1 and 2, 1970, in press. Volumes 1 and 2 of this book cover the chemical and physical properties, usages, and means of detection and determination of respectively inorganic and organic sulphur compounds.

**Analytical Chemistry of Gallium**, by A. M. Dymov and A. P. Savostin, translated from the Russian by J. Schmorak, Ann Arbor Science Publishers, Ann Arbor, Michigan, U.S.A., 1970, 262 pp, \$ 20.00. In addition to analytical and testing procedures for gallium and its compounds in both raw and refined states, the physico-chemical, chemical, and analytical properties are covered, and a 45-page bibliography is provided.

**Analytical Chemistry of Proactinium**, by E. S. Pal'shin, *et al*, translated from the Russian by J. Schmorak, Ann Arbor Science Publishers, 1970, 233 pp, \$ 20.00. This description of the physical, chemical, and physico-chemical methods of testing and analysis of proactinium and its compounds contains many tables of properties and other relevant data and a comprehensive and up-to-date list of 708 references.

## MISCELLANEOUS

**Tables for Group Theory**, by P. W. Atkins, M. S. Child, and C. S. G. Phillips, Oxford University Press, Ely House, 37 Dover Street, London W1X 4AH, U.K. 1970, 32 pp, £ 0.25. Group theoretical methods are now being extensively applied in many areas of chemistry and physics. This booklet provides the essential tables - character tables, direct products, descent in symmetry and subgroups - required for these methods, together with general formulae, examples, and other relevant information.

**Point Group Character Tables and Related Data**, by J. A. Salt-house and M. J. Ware, Chemistry Department, University of Manchester, U.K., Cambridge University Press, Bentley House, 200 Euston Road, London NW1 2DB, U.K., 1970, 64 pp, £ 1.00. This collection of 60 tables provides the essential numerical data for the use of group theory in spectroscopic studies.

**Tables for the Compressible Flow of Dry Air**, Second Edition (Any Units), by E. L. Houghton and A. E. Brock, Edward Arnold (Publishers) Ltd., 41 Maddox Street, London W1R OAN, U.K., 1970, 96 pp, £ 1.00. These tables cover the following types of compressible flow for dry air: isentropic flow, Prandtl-Meyer expansive flow, flow in a constant area duct with heat exchange (Rayleigh flow), flow in a constant area duct with wall friction (Fanno flow), plane normal shock flow (adiabatic flow in a constant area duct), and plane oblique shock flow.

**NBS - OSRDB - 70 - 1 - V1 and - 70 - 1 - V2, High Pressure Bibliography 1900-1968**, by L. Merrill, High Pressure Data Center, Brigham Young University, Provo, Utah 84601, U.S.A., Volume 1, \$ 7.00 paper, \$ 0.65 microfiche (PB - 191174\*\*), Volume 2, \$ 7.00 paper, \$ 0.65 microfiche (PB - 191175\*\*), is another publication in the new NBS-OSRDB bibliography series (see page 10). The bibliography covers the literature from 1900 to 1968 on high pressure research in chemistry, physics, geology, mechanics, and biology. The pressure range is divided into two regions, static and dynamic, and generally falls within the limits 5 and 80 kbars. Volume 1 comprises the bibliography of 10,331 references and an author index, while Volume 2 is the subject index arranged alphabetically by the key words appearing in the titles.

**Mössbauer Effect Data Index, Covering the 1969 Literature**, Editors, John G. Stevens, Argonne National Laboratory, U.S.A., and Virginia E. Stevens, University of North Carolina, Asheville, U.S.A., Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., January 1971, 292 pp, \$ 24.00 (\$ 16.00 for personal orders). This cumulative index to the experimental data and literature of Mössbauer effect research from 1969 is an up-dating of *Mössbauer Effect Data Index, 1958-1965*, published in 1967.

\*\* Order by AD, PB, or TT No. from National Technical Information Service, Springfield, Va. 22151, U.S.A.

**Bibliography on the Fatigue of Materials, Components and Structures, 1838-1950**, by J. Y. Mann, Aeronautical Research Laboratories, Melbourne, Australia, Pergamon Press, 4-5 Fitzroy Square, London, W1, U.K., and Fairview Park, Elmsford, N.Y. 10523, U.S.A., 1970, 316 pp, \$ 16.00, £ 6.00, is a comprehensive collection of the most important literature (4080 references) dealing with the behaviour and performance of materials, mechanical components, and structural elements under fatigue load conditions.

## EARTH AND COSMIC SCIENCES

**Handbook of Activity Diagrams Depicting Chemical Equilibria in Geologic Systems Involving an Aqueous Phase at One Atm. and 0° to 300° C**, by Harold C. Helgeson, Thomas H. Brown, and Robert H. Leeper, Freeman, Cooper and Company, 1736 Stockton Street, San Francisco, California 94133, U.S.A., 1970, 256 pp, \$ 7.50, is a compilation of activity diagrams depicting chemical equilibrium among minerals and aqueous solutions for a variety of geologic systems at one or more of the following temperatures: 0, 25, 60, 100, 150, 200, 250, and 300° C. Such diagrams facilitate prediction and interpretation of the chemical environments in which mineral assemblages form in geochemical processes, and also enable the experimental geochemist to define critical experiments and interpret his results in terms of the composition of the aqueous phase.

**Gamma-Ray Spectrometry of Rocks (Methods in Geochemistry and Geophysics, 10)**, by John S. Adams, Professor of Geology, Rice University, Houston, Texas, U.S.A., and Paolo Gasparini, Professor of Earth Physics, Istituto di Fisica Terrestre dell'Università, Napoli, Italy, Elsevier-North Holland, P.O. Box 211, Amsterdam, The Netherlands, 1970, 308 pp, Dfl. 65.00, \$ 21.00. The aim of this book is to summarize all the information necessary for designing a laboratory for gamma-ray spectrometry of natural samples, planning a research programme for mineral exploration, or simply dealing with natural radioactivity. Special emphasis is therefore given to tables and figures, through which the decay schemes of natural radioisotopes and the characteristics of different detectors are illustrated. Appendices on absorption coefficients of various materials as functions of energy, and gamma spectra of natural radioisotopes and fall-out fission products are included.

**Lead Isotopes**, by Bruce R. Doe, U.S. Geological Survey, Springer-Verlag, Heidelberger Platz 3, 1 Berlin 33, and 175 Fifth Avenue, New York, N.Y. 10010, U.S.A., 1970, 137 pp, \$ 10.40, discusses the variation of lead isotopes in minerals and rocks, with explanations and applications. Appendices contain many tables of data on various characteristics of rocks.

**Measurements of Spectral Irradiance Underwater**, by John E. Tyler and Raymond C. Smith, Scripps Institution of Oceanography, California, U.S.A., Gordon and Breach Science Publishers Ltd., 12 Bloomsbury Way, London, WC1, U.K., and 440 Park Avenue South, New York, N.Y. 10016, U.S.A., 1970, 116 pp, £ 9.75, \$ 23.40, presents detailed experimental and computed data on the spectral components of the energy available from the sun and sky at the water surface and at various depths in many different types of water.

**Atmospheric Optics**, Nikolai B. Divari, Editor, Department of Higher Mathematics, Odessa Polytechnic Institute, U.S.S.R., translated from the Russian by Stephen B. Dresner, Consultants Bureau, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, 178 pp, \$ 27.50. This collection of 31 research papers on various topics of interest to astrophysicists and astronomers includes many tables and graphs, e.g., of astronomical and actinometric values of standard atmospheric transmittance.

**Annuaire du Bureau des Longitudes 1971**, Bureau des Longitudes de France, Gauthier — Villars/Dunod, 92, rue Bonaparte, Paris 6e, France, 1971, 904 pp, 90 F. This annual publication contains numerous numerical data on astronomy, meteorology, oceanography, geodesy, geophysics, physical geography, demography, and metrology.

**Temperature, Pressure, Density, and Wind Measurements in the Stratosphere and Mesosphere 1968** (NASA TR R - 340), Scientific and Technical Information Division, National Aeronautics and Space Administration (NASA), Washington, D.C. 20546, U.S.A., 1970, 75 pp, \$ 3.60, comprises complete data from a total of 36 rocket soundings conducted during 1968. Temperature, pressure, density, and wind profiles from 30 acoustic grenade experiments and from pilot probe experiments are tabulated.

**Annals of the International Years of the Quiet Sun (IQSY)**, A. C. Stickland, Editor, Volume 6, *Survey of IQSY Observations and Bibliography*, 1970, 608 pp, \$ 30.00, Volume 7, *Sources and Availability of IQSY Data*, 1970, 368 pp, \$ 17.50, M.I.T. Press, Cambridge, Massachusetts 02142, U.S.A. Volume 6 includes an extensive classified bibliography of ca. 5300 references to articles on solar-terrestrial research carried out in more than 70 countries during the IQSY, 1964 and 1965; Volume 7 includes a catalogue of data available at world data centers for the IQSY disciplines 1957-1965.

**Catalogue of Star Clusters and Associations**, Second Edition, by G. Alter, J. Ruprecht, and V. Vanysek, edited by G. Alter, B. Balázs, and J. Ruprecht, Akadémiai Kiadó Budapest, Publishing House of the Hungarian Academy of Sciences, distributor KULTURA, POB 149, Budapest 92, Hungary, 1970, 76 pp + 3085 cards, \$ 36.00. Since the publication of the first edition of this catalogue in 1958, the great increase in the number of identified objects has made the production of this new edition necessary. The Catalogue is divided into three parts: Part I now includes 1039 open star clusters, 5 moving star clusters, and 11 star groups, for which a new ordering system is used; Part II includes 70 star associations of the type OB, together with a new nomenclature; and Part III is concerned with 28 extragalactic objects.

**Proper Motion Survey with the Forty-Eight-Inch Schmidt Telescope; the Zone +70 to +75**, by Willem J. Luyten, Professor of Astronomy, The University of Minnesota, U.S.A., The University of Minnesota Press, Minneapolis, Minn., U.S.A., 1970, 144 pp, consists of tables of data giving the proper motions of 7041 stars with declinations between +70 and +75. The data were measured from 22 pairs of photographic plates taken by the National Geographic Society-Palomar Observatory Survey in two sets between 1950 and 1955, and 1963 and 1967.

## BIO-SCIENCES

**Strength of Biological Materials**, by Hiroshi Yamada, Professor of Anatomy, Kyoto Prefectural University of Medicine, Kyoto, Japan, edited by F. Gaynor Evans, Professor of Anatomy, University of Michigan Medical School, Ann Arbor, Michigan, U.S.A., The Williams and Wilkins Company, 428 East Preston Street, Baltimore, Maryland 21202, U.S.A., July 1970, 308 pp, \$ 22.50. This reference book is a large compilation of data in both graphical and tabular form (235 figures, 190 tables) on the mechanical properties, e.g., tensile, compressive, bending, torsional, and impact strengths, and expansion, bursting, tearing, cleavage, abrasion, shearing, crushing, and hardness, of a wide range of biological materials including various organs and tissues of humans, other mammals, birds, reptiles, amphibians, and fish. The effects of age changes on the "human" data are also detailed.

**Physical Properties of Plant and Animal Materials**, Volume 1: Structure, Physical Characteristics and Mechanical Properties, by Nuri N. Mohsenin, Professor of Agricultural Engineering, Pennsylvania State University, U.S.A., Gordon and Breach, Science Publishers Ltd., 12 Bloomsbury Way, London, WC1, U.K., and 440 Park Avenue South, New York, N.Y. 10016, U.S.A., 1970, 736 pp, £ 15.00, \$ 36.00. This book collates and analyses those physical properties of economically important bio-materials, which are significant in their physical description and mechanical characterization, with respect to their application in design of machines, structures, and processes, and quality evaluation. The bio-materials covered include raw plant and animal materials such as grains and seeds, forage and silage, fruits and vegetables, meat, eggs and dairy products, as well as organic fluids and some processed food material.

**Biochemistry of Antibodies**, by R. S. Nezlin, Institute of Molecular Biology, Academy of Sciences of the U.S.S.R., translated from the Russian by M. C. Vale, Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, 381 pp, £ 25.00. Data on the properties, structure, and biosynthesis of antibodies are collated and discussed, with extensive documentation and many charts, graphs, and diagrams.

**A Handbook of Alkaloids and Alkaloid Containing Plants**, by R. F. Raffauf, John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, 1275 pp, £ 23.40. This handbook comprises a computer print-out in tabular form of the biological origin, chemical and physical properties, structure, and bibliography of the known alkaloids. The presentation is unique in that the information is arranged in internally cross-indexed tables giving the botanical source names, molecular formulae, weights, and structures, and other physical data for these compounds.

#### HANDBOOKS FOR BROAD FIELDS OF SCIENCE AND ENGINEERING

**Gmelins Handbuch der anorganischen Chemie**, 8. Auflage - **Gmelin Handbook of Inorganic Chemistry**, 8th Edition, produced by the Gmelin Institute for Inorganic Chemistry and Related Fields, Frankfurt/Main, Germany, Fed. Rep., a member organization of the Max Planck Society for the Advancement of Science, in association with the German Chemical Society, and published by Verlag Chemie GmbH, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep. (from whom full information is available). The following volumes, with their Gmelin "System numbers", have been published during 1970 and 1971:

**14. Carbon/Kohlenstoff**, Part/Teil C, Section/Lieferung 1: Compounds with rare gases, hydrogen, and oxygen (up to physical properties and multi-component systems of CO and CO<sub>2</sub>), 1970, 584 pp, DM 698,-, \$ 188.75.

**21. Sodium/Natrium**, Supplement Volume/Ergänzungsband, Section/Lieferung 5: Compounds of sodium and halogens (excluding simple halides), Sodium systems with various anions from oxygen to bismuth, Systems with sodium and lithium and their compounds, 1970, 508 pp, DM 612,-, \$ 166.00.

**22. Potassium/Kalium**, Supplement Volume/Ergänzungsband, Section/Lieferung 3, 1970, 186 pp, DM 214,-, \$ 58.00.

**46. Zinn/Tin**, Part/Teil A: History of tin and its compounds, 1971, 465 pp, DM 580,-, \$ 154.30.

**47. Lead/Blei**, Part/Teil C, Section/Lieferung 3: Compounds from lead and silicon to lead and radium, 1970, 406 pp, DM 502,-, \$ 137.50.

**49. Niobium/Niob**, Part/Teil B, Section/Lieferung 1: Compounds up to niobium and bismuth, 1970, 424 pp, DM 515,-, \$ 141.00.

**50. Tantalum/Tantal**, Part/Teil B, Section/Lieferung 1: Compounds and systems of tantalum and rare gases up to tantalum and bismuth, 1970, 275 pp, DM 344,-, \$ 94.00.

**61. Silver/Silber**, Part/Teil A, Section/Lieferung 1: History, Occurrence, 1970, 144 pp, DM 180,-, \$ 49.50. Section/Lieferung 2: Technology and preparation, Isotopes, Atom, Molecules, Physical properties of the metal, 1970, 350 pp, DM 421,-, \$ 115.50. Part/Teil B, Section/Lieferung 1: Compounds with rare gases, hydrogen, oxygen, nitrogen, fluorine, and chlorine, 1971, 573 pp, DM 689,-, \$ 187.90.

**63. Ruthenium**, Supplement Volume/Ergänzungsband, 1970, 586 pp, DM 689,-, \$ 186.50.

**Main Supplement to 8th Edition, Volume/Band 1, Noble Gas Compounds/Edelgasverbindungen**, 1970, 160 pp, DM 98,-, \$ 27.00.

**Beilsteins Handbuch der organischen Chemie**, 4. Auflage/4th Edition, produced by the Beilstein Institute for Organic Chemistry, Frankfurt/Main, Germany, Fed. Rep., and published by Springer-Verlag, Heidelberger Platz 3, 1 Berlin 33 (from whom full information is available). The following volumes of the 3rd Supplement (III. Ergänzungswerk) have been published during 1970 and 1971:

**Band (Volume) 8**, Isocyclische Oxy-Oxo-Verbindungen, Teil (Part) 3, 1970, DM 1496,-. Teil (Part) 4, 1970, DM 1436,-. Teil (Part) 5, Sachregister für Bände 7 und 8 und Ergänzungen zu den Sachregistern der vorangehenden Bänden des III. Ergänzungswerkes (Subject Index for Volumes 7 and 8 and Supplement to the Subject Indexes of Earlier Volumes of the 3rd Supplement), 1971, DM 518,-.

**Band (Volume) 9**, Isocyclische Monocarbonsäuren und Polycarbonsäuren, Teil (Part) 1, 1970, DM 1192,-. Teil (Part) 2, 1971, DM 1238,-. Teil (Part) 3, 1971, DM 996,-.

**Handbook of Chemistry and Physics**, 51st Edition, Editor, Robert C. Weast, The Chemical Rubber Co., Cleveland, Ohio, U.S.A., published in Europe by Blackwell Scientific Publications, 5 Alfred Street, Oxford OX1 4HB, U.K., and Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., December 1970, 2400 pp, £ 14.00, DM 99.80.

**CODAB-ORCHEM**, produced by Science DataBank, Inc., an affiliate of The Chemical Rubber Co., is a magnetic tape database which comprises data from the 466 page Table of Physical Constants of Organic Compounds as it appears in the 51st Edition of the *Handbook of Chemistry and Physics*, and other related entries compiled especially for this new research tool, including the Chemical Abstracts Registry Number, the structural formula in Wiswesser Line Notation, and digitized representations of infrared, ultraviolet, and nuclear magnetic resonance spectra. Properties of the approximately 15,000 organic compounds covered include molecular formula and weight, colour, crystalline form, specific rotation, melting and boiling points, density, refractive index, and solubility. CODAB-ORCHEM, which can operate in batch, remote job entry, or interactive environments, provides for the first time a computer-manipulable database which integrates both structural and physical property data, facilitating rapid identification of unknown compounds, structure-property correlation and property prediction, and complex engineering design calculation. This database will be expanded by the addition of more organic compounds and of other data categories, e.g., thermodynamic and chromatographic properties, and other databases on analytical toxicology, engineering, biochemistry, and inorganic chemistry are planned. Further information from Science DataBank, Inc., 18901 Cranwood Parkway, Cleveland, Ohio 44128, U.S.A.

**D'Ans/Lax: Taschenbuch für Chemiker und Physiker**, Editors, K. Schäfer und C. Synowietz, Springer-Verlag, Heidelberger Platz 3, 1 Berlin 33, Band (Volume) III: Eigenschaften von Atomen und Molekülen (*Properties of Atoms and Molecules*), 1970, 670 pp, DM 48,-, \$ 13.20.

**NBS Special Publications 315-3** (1970, \$ 0.55, SD Catalog No. C13.10:315-3\*) and **315-4** (1970, \$ 0.75, SD Catalog No. C13.10:315-4\*), **The Bibliography on the High Temperature Chemistry and Physics of Materials**, Editor, J. J. Diamond, published under the auspices of the Commission on High Temperature and Refractories of the International Union of Pure and Applied Chemistry (IUPAC).

**Handbook of Electronic Charts, Graphs, and Tables**, by John D. Lenk, Prentice-Hall, Englewood Cliffs, New Jersey, U.S.A., and Durrants Hill Road, Hemel Hempstead, Herts., U.K., 1970, 224 pp, £ 5.50, \$ 10.95, is intended to provide quick solutions to complex electronic calculations and to bridge the gap between the theoretical fundamentals of electronics and practical applications, by the graphical representation of various equations and basic data used in electronic technology.

**Electronic Reference Tables, Charts, and Nomographs**, by R. F. Graf, Van Nostrand Reinhold, 430 Park Avenue, New York, N.Y. 10022, U.S.A., and Winsor House, 46 Victoria Street, London, SW1, U.K., 1971, 320 pp, £ 9.00, \$ 19.20, is a comprehensive reference book containing an extensive selection of practical tables, charts, formulae, and nomographs for general use in electronics and electrical engineering.

**Radio Valve and Transistor Data**, 9th Edition, Editor, A. M. Ball, Butterworth and Co. (Publishers) Ltd., 88 Kingsway, London, WC2, U.K., 1970, 256 pp, £ 0.75, contains up-to-date and comprehensive information for the technician in the electronics engineering and radio and television fields.

**Radar Cross Section Handbook**, by George T. Ruck, D. E. Barrick, W. D. Stuart, and C. K. Krichbaum, Electromagnetics Division, Battelle Memorial Institute, Columbus, Ohio, U.S.A., Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., and Donington House, 30 Norfolk Street, London WC2R 2HA, U.K., 1970, 2 volumes, 935 pp, \$ 75.00, £ 35.00, DM 274.50. This handbook includes an extensive collection of both experimental and calculated scattering properties of various types of radar target, presented in tables, graphs, and equations.

**Book of Tables on Welding and Soldering**, VEB Fachbuchverlag, Karl-Heine-Straße 16, 7031 Leipzig, German Democratic Republic, 1970, ca. 230 pp, M 14,-, is a pocketbook of tables of the most important data on all common methods of welding and soldering.

**Festigkeitswerte von Schweiß- und Lötverbindungen, Strength Values of Welded and Soldered Joints**, by A. Neumann, VEB Verlag Technik, Postfach 1512, Oranienburger Strasse 13/14, 102 Berlin, German Democratic Republic, 1970, 236 pp, M 22,-, includes Wöhler curves and results of fatigue tests and notched bar impact tests on soldered joints and steel and aluminium welded joints.

**Handbook of Tables for Applied Engineering Science**, Editors, Ray E. Bolz, Dean of Engineering, Case Western Reserve University, U.S.A., and George L. Tuve, The Chemical Rubber Co., Cleveland, Ohio, U.S.A., Blackwell Scientific Publications, 5 Alfred Street, Oxford OX1 4HB, U.K., and Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., December 1970, 988 pp, £ 15.00, DM 100,-. This handbook contains more than 700 tables and graphs of data essential for all fields of engineering. Extensive cross-referencing and indexing facilitate rapid access to the desired data.

**De Laval Engineering Handbook**, 3rd Edition, Editor, Hans Gartmann, compiled by the engineering staff of De Laval Turbine, Inc., McGraw-Hill, 330 West 42nd Street, New York, N.Y. 10036, U.S.A., November 1970, 512 pp, \$ 12.50, includes many tables and diagrams of the most important data on turbines, pumps, engines, compressors, filters, gears, and condensers.

**Handbook of Heating, Ventilating and Air Conditioning**, 6th Edition, by J. Porges and F. Porges, Butterworth and Co. (Publishers) Ltd., 88 Kingsway, London, WC2, U.K., 1970, 328 pp, £ 4.00, contains conversion tables, physical and thermal properties of materials, design criteria, and many other tabulated data.

**Handbook of Architectural and Engineering Data for Architects, Engineers, and Contractors**, by J. Veldman, Prentice-Hall, Englewood Cliffs, New Jersey, U.S.A., and Durrants Hill Road, Hemel Hempstead, Herts., U.K., July 1970, 750 pp, is a source book of basic architectural and engineering data, including standards, data tables, conversion factors, formulae, statistics, and related information.

## HANDBOOKS FOR SPECIAL SUBSTANCE CATEGORIES

**Metals Handbook**, 8th Edition, Volume 5, American Society for Metals, Metals Park, Ohio 44073, U.S.A., 1970, 488 pp, \$ 30.00, £ 14.70, is the latest volume in a series which supersedes the one-volume 7th edition of the *Metals Handbook*.

**Aerospace Structural Metals Handbook**, Mechanical Properties Data Center, Belfour Engineering Company, 13919 West Ba Shore Drive, Traverse City, Michigan 49684, U.S.A., American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pennsylvania 19103, U.S.A., 2200 pp, complete 3 volume set \$ 60.00, 1968, 1969, and 1970 supplements \$ 20.00 each. The three volumes of this handbook include 4600 graphs, 1500 data tables, and 3500 references, giving comprehensive coverage of available aerospace structural alloy properties.

**Rare Metals**, by O. A. Songina, Metallurgia Publishing House, Moscow, U.S.S.R., 1964, translated from the Russian, available from Verlag Chemie, Postfach 129/149, 6940 Weinheim/Bergstr., Germany, Fed. Rep., October 1970, 565 pp, \$ 22.00, DM 80,-. This book comprises an exhaustive, critical survey of recent literature data on the physical and chemical properties of electro-chemistry, geology, analysis, technology, and uses of rare metals, including Re, Mo, W, V, Nb, Ta, Zr, Hf, Ge, Si, Y, La, U, Ga, In, Tl, Be, Li, Rb, Cs, Se, and Te.

**Handbook of the Rare Elements**, by M. A. Filyand and E. Semenova, Metallurgical Institute, U.S.S.R., Macdonald and Co. (Publishers) Ltd., 49/50 Poland Street, London W1 2LG, U.K., Volume 1, 1968, 266 pp, £ 6.30, Volume 2, 417 pp, £ 7.50, Volume 3, 1970, 303 pp, £ 8.25. This three volume reference work represents the first major attempt to compile the numerous theoretical and experimental data not available on the rare elements. Physical and chemical property data from over 500 monographs and journals are presented in 1300 tables. Volume 1 covers trace elements (Ga, In, Tl, Ge, Se, Te, Re) and light elements (Li, Be, Rb, Cs, Volume 2 refractory elements (B, Ti, Zr, Hf, W, Mo, Ta, Nb, V), and Volume 3 radioactive elements (Ra, U, Th, Pu) and rare earth elements (La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Sc, Y).

\* Order by SD Catalog No. from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, U.S.A.

**Corrosion Properties of Yttrium**, Atomizdat Publishing House, Moscow, U.S.S.R., 1969, ca. 192 pp, 42 k., includes data on the physico-chemical properties and corrosion resistance in gaseous and aqueous media of yttrium and its most important compounds. The applications of yttrium in nuclear technology are described, including the interaction of the metal with nuclear construction and fuel materials, and its influence on the corrosion resistance of a number of metals and alloys.

**Corrosion Resistance of Titanium Alloys**, by F. N. Tavadze and S. N. Mandgzhladze, Metallurgia Publishing House, Moscow, U.S.S.R., 1969, ca. 288 pp, 80 k., is a collection of results of Soviet and other research work on the corrosion resistance, and the electrical, mechanical, physico-chemical, and technological properties of titanium alloys.

**Physical and Chemical Properties of Metallic Oxides**, Editor, G. V. Samsonov, Metallurgia Publishing House, Moscow, U.S.S.R., 1969, ca. 720 pp, 1 r. 90 k. The electrical, magnetic, optical, thermodynamic, mechanical, thermal, nuclear, and refractory properties of metallic oxides are described, and binary phase diagrams of metal-oxygen systems are included.

**Multicomponent Oxide Systems**, by A. S. Berezhnoy, Naukova Dumka Publishing House, Ukrainian S.S.R., 1969, ca. 1080 pp, 4 r. After a general discussion of complex systems, the constitution in the solid state of the nine-component system  $\text{CaO-MgO-FeO/Fe}_2\text{O}_3-\text{Cr}_2\text{O}_3-\text{Al}_2\text{O}_3/\text{ZrO}_2-\text{TiO}_2-\text{SiO}_2$ , and more than 500 of its sub-systems with various numbers of components, is described. The solid state reactions in these systems and the properties of the compounds formed are also covered.

**Non-metallic Nitrides**, by G. V. Samsonov, Metallurgia Publishing House, Moscow, U.S.S.R., 1969, ca. 360 pp, 1 r. 70 k., includes crystallographic, electrical, and thermal properties of non-metallic nitrides, and all known phase diagrams of systems of non-metallic elements and nitrogen.

**Nitrenes**, Editor, Walter Lwowski, New Mexico State University, U.S.A., John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, 457 pp, \$ 23.50, is a compilation of information and data on the chemistry of the nitrenes (NH) and the derivatives produced by substitution of the hydrogen in NH.

**Handbook of Electronic Materials**, Volume 1, *Optical Materials Properties*, 1971, Volume 2, *III-V Semiconducting Compounds*, 1971, Volume 3, *Silicon Nitride for Microelectronic Applications: Part I, Preparation and Properties*, 1971, Electronic Properties Information Center (EPIC), Hughes Aircraft Company, California, U.S.A., Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., \$ 10.00 per volume.

**Electronic Properties of Materials; A Guide to the Literature**, Volume 1, Editor, H. T. Johnson, 1965, 2000 pp, Volume 2, Editor, D. L. Grigsby, 1799 pp, 1967, Volume 3, 1971, Electronic Properties Information Center, Plenum Publishing Corporation, \$ 395.00 per set or \$ 150.00 per volume.

The Electronic Properties Information Center (EPIC), established in 1961, is operated by the Components and Materials Laboratory, Aerospace Group, Hughes Aircraft Company, under contract to the U.S. Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio. The Center covers over 100 electronic, optical, and magnetic properties of all materials relevant to the field of electronics: insulators, semiconductors, metals, superconductors, ferrites, ferroelectrics, ferromagnetics, electroluminescents, thermionic emitters, and optical materials, including infrared transmitting and solid-state laser materials. Comprehensive and critically evaluated compilations are generated by EPIC in the form of data sheets, data tables, and state-of-the-art surveys. In addition to its formal publications, now being issued by the Plenum Publishing Corporation, the Center provides "Interim Reports", which

are informal compilations of data and information prepared in answer to technical requests and of general interest, special bibliographies, the quarterly *EPIC Bulletin*, and retrieval guide and technical advisory services. The following reports are now being compiled by EPIC: **Niobium Alloys and Compounds - Data Tables**; **Group IV Semiconducting Materials - Data Tables**; **Silicon Nitride for Microelectronic Applications: Part 2, Applications - Survey Report**, and will be published in the *Handbook of Electronic Materials* series. Further information and a Publications Availability List are available on request from: Electronic Properties Information Center (EPIC), Hughes Aircraft Company, Culver City, California 90230, U.S.A.

**Handbook of Materials and Processes for Electronics**, Editor, Charles A. Harper, Westinghouse Electric Company, U.S.A., McGraw-Hill, 330 West 42nd Street, New York, N.Y. 10036, U.S.A., 1970, 1344 pp, \$ 33.50, covers the electrical, magnetic, mechanical, and physical properties of chemicals and other materials used in the electronics industry, including plastics, laminates and composite structures, elastomers, ceramics, glasses, micas, semiconductors, and ferrous and non-ferrous metals.

**Silicon Carbide**, Editor, I. N. Frantsevich, Institute of Materials Science, Academy of Sciences of the Ukrainian S.S.R., translated from the Russian by Simon Lyse, Consultants Bureau, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, 276 pp, \$ 35.00. This collection of 41 papers on current Soviet research on various aspects of the chemical technology of silicon carbide includes many tabular and graphical data, in addition to photomicrographs, X-ray photographs, and drawings.

**Structure and Properties of Inorganic Solids**, by Francis S. Galasso, United Aircraft Research Laboratories, U.S.A., Pergamon Press, Headington Hill Hall, Oxford OX3 0BW, U.K., and Fairview Park, Elmsford, N.Y. 10523, U.S.A., 1970, 297 pp, \$ 13.50, contains information on the structure and properties of metals, intermetallics, halides, hydrides, carbides, borides, and oxides, ordered according to their structural type: CsCl, NaCl, ZnS, NiAs, perovskite, spinel, corundum, beta tungsten, graphite, and their related structures. This reference volume includes many tables and molecular configurations, and extensive bibliographies.

**Synthetic Peptides**, Volume 1, by G. R. Pettit, Van Nostrand Reinhold, 430 Park Avenue, New York, N.Y. 10022, U.S.A., and Winsor House, 46 Victoria Street, London, SW1, U.K., 1970, 468 pp, \$ 19.95, includes information from a comprehensive literature survey from 1960-1970 on what synthetic peptides have been prepared, the physical constants of each, and the primary references. Approximately 10,000 experiments are summarized in the tables comprising this book.

**Polyimides; A New Class of Heat-Resistant Polymer**, by N. A. Adrova, *et al*, Institute for High Molecular Compounds, Academy of Sciences of the U.S.S.R., translated from the Russian by J. Schmorak, Daniel Davey, Hartford, Conn., U.S.A., 1970, 162 pp, \$ 11.00. Physical properties and thermal and chemical stability of polyimides of different chemical structures are discussed in this Soviet monograph, originally published in 1968. Data are based on a survey of the scientific literature up to 1966. Information on the synthesis, transformations, and uses of polyimides is also included.

**Engineering Properties of Thermoplastics**, A Collective Work Produced by Imperial Chemical Industries Ltd., Plastics Division, U.K., Editor, R. M. Ogorkiewicz, Imperial College of Science and Technology, London, U.K., John Wiley and Sons Ltd., Baffins Lane, Chichester, Sussex, U.K., and 605 Third Avenue, New York, N.Y. 10016, U.S.A., 1970, 318 pp, £ 6.00, \$ 17.50. The mechanical and physical properties of a wide range of thermoplastics, e.g., polypropylene, polythene, nylon, acrylics, PVC, PTFE, are described, facilitating the design of plastic components.

**Epoxide Resins**, by W. G. Potter, Butterworth and Co. (Publishers) Ltd., 88 Kingsway, London, WC2, U.K., 1970, 256 pp, £ 4.50, provides a concise, critical survey of the preparation, structure, and properties of epoxide resins, their cured systems, and the major end uses for these systems.

**Adhesives Handbook**, A Practical Guide to the Properties and Applications of Adhesives, by J. Shields, British Scientific Instrument Research Association (SIRA), South Hill, Chislehurst, Kent, U.K., Butterworth, London, 1970, 364 pp, £ 8.00. Compiled by SIRA for the U.K. Ministry of Technology, this handbook comprises a comprehensive reference work on the wide variety of adhesive materials now available, and their use as bonding agents. Tables summarize the mechanical, physical, and chemical properties of adhesives to facilitate selection, and an adhesives products directory describes commercially available adhesives, their properties, applications, and working life in service.

**Industrial Solvents Handbook, 1970**, by Ibert Mellan, Noyes Data Corporation, Park Ridge, New Jersey 07656, U.S.A., 1970, 478 pp, \$ 20.00, contains 821 tables of data selected from the manufacturers' literature on the physical properties of a wide range of industrial solvents, and the degrees of solubility of materials in these solvents.

**Flat Glass Technology**, by Rune Persson, Grängesberg Company, Stockholm, Sweden, Plenum Publishing Corporation, 227 West 17th Street, New York, N.Y. 10011, U.S.A., 1970, 167 pp, \$ 12.50, includes information on the chemical, mechanical, optical, thermal, acoustical, and electrical properties of manufactured flat glass used in the building industry.

## NOMENCLATURE, SYMBOLS, UNITS, STANDARDS

**International Union of Pure and Applied Chemistry (IUPAC)**, IUPAC Secretariat, Bank Court Chambers, 2/3 Pound Way, Cowley Centre, Oxford OX4 3YF, U.K.

**Information Bulletin**, three issues per year, £ 1.00, \$ 2.50, IUPAC Secretariat, provides a news medium for the various activities of IUPAC, especially of chemical topics which require regulation, standardization, or codification. The Bulletin also includes details of recent or forthcoming international symposia sponsored by IUPAC. Subscribers also receive the two series of Appendices to the Bulletin: Tentative Nomenclature, Symbols, Units, and Standards; and the new series of Technical Reports.

Number 39, February 1971, 92 pp, includes "Electrochemical Kinetics, Guidelines for Design of Mechanistically Significant Experimentation" (Commission on Electrochemistry).

## Appendices (to Information Bulletin) on Tentative Nomenclature, Symbols, Units, and Standards, irregular, free of charge, IUPAC Secretariat:

Number 9, February 1971, 6 pp, *Abbreviations and Symbols for Nucleic Acids, Polynucleotides and their Constituents* (IUPAC-IUB Commission on Biochemical Nomenclature),

Number 10, February 1971, 17 pp, *Abbreviations and Symbols for the Description of the Conformation of Polypeptide Chains* (IUPAC-IUB Commission on Biochemical Nomenclature),

Number 11, February 1971, 4 pp, *Recommendations for the Presentation of Raman Spectra for Cataloging and Documentation in Permanent Data Collections* (Commission on Molecular Structure and Spectroscopy),

Number 12, February 1971, 3 pp, *List of Abbreviations for Synthetic Polymers and Polymer Materials* (Commission on Macromolecular Nomenclature),

Number 13, February 1971, 13 pp, *Basic Definitions of Terms Relating to Polymers* (Commission on Macromolecular Nomenclature).

**Appendices (to Information Bulletin), Technical Reports**, irregular, free of charge, IUPAC Secretariat:

Number 1, in preparation, *Collaborative Study of a Method for Determination of Concentration and Purity of Aflatoxin Standards and Use of the Method for Measuring Stability of the Standards*.

**American Society for Testing and Materials (ASTM)**, 1916 Race Street, Philadelphia, Pennsylvania 19103, U.S.A.

**Methods for Emission Spectrochemical Analysis**, 6th Edition (E-2 Compilation), 1971, 1112 pp, \$ 30.00, less 20% to ASTM members. This publication describes 51 standard methods and recommended practices, 9 proposed methods, and 127 suggested methods for the spectrochemical analysis of metallic and non-metallic materials. Sections on nomenclature, computations, and general practices are also included.

Two recent Soviet publications dealing with respectively units and terminology are as follows:

**Units of Physical Quantities and Dimensions**, by L. A. Sena, Nauka Publishing House, U.S.S.R., 1969, ca. 305 pp, 56 k., describes details of the establishment of a system of units, and of the bases of dimensions. In addition to the International System of Units (SI) which is being increasingly accepted and recognized, other systems of units are discussed.

**Physical Optics: Terminology**, Nauka Publishing House, U.S.S.R., 1970, ca. 125 pp, 35 k., includes equivalent terms in Russian, German, and English, for a wide range of topics concerning optical properties and radiation.

## ICSU CODATA Central Office

Westendstraße 19, 6 Frankfurt/Main, Germany, Fed. Rep., Tel. (0611) 748044, Cable: ICSUCODATA

Executive Director: Dr. Christoph Schäfer

Scientific Officer: Dr. Tangis Golashvili

Scientific Editor: Mr. Martin Lewis

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