dependently of one's historical commitments. The editors have done a splendid service in making them available.

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Soviet Research in Glass and Ceramics. Chemistry collection No. 2. *Basic Science,* vols. 1 and 2; 497 pp. *Cements, Limes, and Plasters*; 203 pp. *Refractories*; 70 pp. *Glass, Glazes, and Enamels*; 197 pp. *Miscellaneous.* 31 pp. Consultants Bureau, Inc., New York, 1958. $150.

It is not convenient to comment on all of these papers. Rather it is the goal of this review to present some idea of their scientific and technological level—a level which can perhaps be expressed in terms of the experimental techniques, theories, and documentation that are employed.

The papers fall into several categories —theoretical papers, data papers, reviews, and purely engineering papers, plus several book reviews. They have appeared in several journals of applied chemistry and are not from the technological press.

There are numerous papers on phase equilibria, including water systems at room temperature and anhydrous systems at high temperatures. The water systems are carried out with standard techniques and appear to be carefully done. The high-temperature phase equilibria are usually carried out by means of the cone-fusion method; this technique, while rapid and inexpensive, is considered to be no more than exploratory in modern phase equilibria work. As an alternative, cooling curves are used. The method of phase characterization—microscopic and x-ray—is standard. In no case in this selection of papers is there a complete high-temperature phase diagram. Equipment-wise this part of the research reported is inferior.

The 12 papers in the *Refractories* section are carefully done pieces of work, reflecting the interest in high-alumina bodies and in such modern or potential refractories as boron nitride, zirconium carbide, graphite, and the borides of beryllium and magnesium.

In the *Cements, Limes, and Plasters* section, the 28 papers deal with the problems of hydration and with the effect of additives on the whole gamut of cement compositions. The most modern techniques and equipment are used in the studies discussed. Considerable space is devoted to petrographic examination of the various clinkers. The theory of the hardening of Portland cement (and the Russian role in its creation) is reviewed in a long paper. The technical part of this paper is current and quite well presented, but the paper has political and nationalistic overtones, including a quotation from Stalin: "No science can develop and prosper without combat of opinion and without free criticism." This quotation, justifying some of the author's criticism, is countered in the final paragraph of the paper by the following quotation: "Soviet students, armed with laws and methods of Dialectical Materialism, create new, purely scientific concepts, because, without Dialecticalism, there is no science."

Let us pass to another subject. A scientific author has a primary duty of adequate documentation. In these 28 "cement" papers, which cite 3 to 26 references apiece, only two references are to literature of European or American origin. This poses a problem the answer to which one can only guess at: (i) Does this particular series of laboratories lack world literature on cement? or (ii) lack knowledge of foreign languages or of translators? or (iii) reject foreign publications in this field? To this problem one can only report that, for many papers in the "glass" and "basic science" sections of this series of translations, the documentation with respect to world literature is quite adequate. This was especially true in the case of a recently translated symposium on crystal growth (issued by the same publisher), where the citation of world literature was excellent. Perhaps the absence of adequate citation in the "cement" papers as a matter of geographical obstacles.

There appears to be no pattern governing whether or not an author will include citations of obviously pertinent European or American references. In the papers on more strictly engineering and technological subjects, the citations are usually exclusively Russian. One must make allowances for the language barrier and the fact that the lifetime of Soviet science has been sufficiently long to permit the writing of adequate Russian reference books which eliminate the necessity of reference to world literature.

The 31 "glass" papers cover the field of modern glass technology. The techniques and methods of measurement are standard and adequate. The documentation shows wide reading in the world literature. There are several theoretical papers of interest.

One series of four critiques is of interest: (i) a paper criticizing the classical theory of solid phase reaction; (ii) two separate papers criticizing paper No. 1; (iii) an answer by the author of paper No. 1. The classical theory of solid phase reaction from Tamman, Hedvall, and others (metaphysicists, not dialectical materialists, and hence in error) was centered around reaction through solid-solid diffusion alone; the gas phase was not involved except in oxidation-reduction reactions. Critique i says this is in error and that the error is one of philosophical approach on the part of the founders of the theory. This author insists on the importance of vapor phase transfer in solid phase reaction. K. Marx and F. Engels are quoted in support of the philosophy. Critiques ii and iii criticize critique i for the misinterpretation of Marx and Engels. These criticisms are finally answered by the author of paper No. 1. One must point out that in current Western science the contribution of the vapor phase transfer to this reaction is gaining recognition.

In this series of translations the papers with political overtones are rare and are reviews or polemics, never experimental papers.

Finally, one should answer the question, "How many of these papers would pass the editorial board of the American Ceramic Society?" In my opinion, if one ignores the political papers, about 85 percent would be acceptable.

Incidentally, the translations are quite readable. There are occasional errors in transliteration of words, usually Western names. The reproductions are poor but simply reflect the inferiority of the original.

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On Nuclear Energy. Its potential for peacetime uses. Donald J. Hughes. Harvard University Press, Cambridge, 1957. xi + 263 pp. Illus. $4.75.

Atomic energy is here to stay, and we have to live with it. Therefore we have to know what atomic energy really is, and we have to learn about the fundamental facts which underlie all atomic energy phenomena, from the first horrifying explosions over Hiroshima and Nagasaki to the steadily growing applications for peacetime uses for our day and for the future.

Many books have been written on this subject; this one is distinguished by the ease and the superiority with which the most complicated problems are presented. The expert in the field enjoys reading the clear, well-written text, and the layman who, as a newcomer, looks for a serious, scientifically reliable introduction gets a real treat. Using only two equations in the entire book, the author develops and explains the solid facts of atomic structure, fission, chain reaction, fusion, and the many applications in such a way that he instills in the reader a keen desire to learn and to know still more.

This book mirrors the immense experience that Hughes, a leading scientist at Brookhaven National Laboratory, has had in presenting this subject in lectures to a wide variety of lay groups all over the world, both on this side of the iron curtain and behind it. Therefore his discussions on "The international atom" and on "Safety, security, and the AEC" are stimulating to the reader who is also interested in the impact of atomic energy on the social structure of our time.

The radiation biologist and the health physicist will be gratified to find in a book of this kind, written for the public and for lay groups, a competent discussion of the hazards of atomic radiation, of the genetic effects, and of the radiation safety limits.

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Progress in Nuclear Physics. vol. 6. O. R. Frisch, Ed. Pergamon Press, London, 1957. vii + 285 pp. Illus. $14.

Annual Review of Nuclear Science. vol. 7. J. G. Beckerley, Ed. Annual Reviews, Palo Alto, Calif., 1957. viii + 478 pp. Illus. $7.

In these days, when the *Physical Review* alone prints more than 6000 pages per year, the need for periodical reviews is clearly evident. No one can, without help, keep up with the developments even in his immediate area. The volumes under review are the compilations for 1957 of two series of annual reviews for the nuclear scientist. Both series have been able over the last few years to attract competent reviewers—the obvious prime requisite for success—and both have maintained high standards. Otherwise the two series, though covering much of the same ground, have quite different purposes.

The British compilation seeks to provide not-too-detailed and easily read general representations of the selected topics, with just enough references to the basic papers and current literature to guide the reader in further studies. The most valuable papers are probably those on the atomic masses, by J. Mattauch and F. Everling (A less than 40) and H. E. Duckworth (A more than 40), which provide a thorough and up-to-date discussion of the accuracies of current mass determination, a comparison of data obtained from nuclear reactions and from mass spectroscopy, and tables of the best values. The most enjoyable articles are those by G. N. Walton (on fission physics, with discussion of the fission process, the slowing down of the fragments, the effects on surrounding materials, and the chemical properties of the products) and by R. J. Eden, who gives a short guide to the variety of nuclear models that have been introduced for various purposes. There are two articles on isotope separation, by T. F. Johns (on multistage methods) and by M. L. Smith (on electromagnetic separation). K. F. Smith gives a useful discussion on nuclear moments and spins, with a survey of methods of measurement and an up-to-date table. M. B. Stearns gives a rather dry compilation of work done in the field of mesonic atoms. The book is brought to a fitting close by a short but lively discussion of nonconservation of parity, by O. R. Frisch and T. H. R. Skyrme. Altogether this volume is pleasant to read, useful, and of ephemeral value. The price is high.

The American counterpart, *Annual Review of Nuclear Science,* represents a much more ambitious undertaking: It seeks to provide authoritative and detailed technical coverage of its topics, with complete literature references up to specified dates. The present volume includes three quite outstanding articles. F. Villars gives a searching discussion of the collective model. He brings out very clearly that the simplicity of collective dynamics, as demonstrated by the possibility of describing with high accuracy, and in terms of very few parameters, many data, such as energy levels and moments, is not yet accounted for by the presently available mathematical methods. He emphasizes the inadequacy of the hydrodynamic approximation, but he holds out the hope that the method of "redundant variables" may ultimately achieve the goal of giving a unified description of single-particle and of collective motion.

R. Hofstadter, in his report on "Nuclear and nucleon scattering of high energy electrons," succeeds admirably in his goals—to get across the fundamental ideas of scattering theory and to give an up-to-date report on experimental and theoretical results. M. Gell-Mann and A. H. Rosenfeld give a lucid and authoritative representation of the field of hyperons and heavy mesons and their decay properties. The "strangeness" systematics is fully discussed, as are the consequences of parity nonconservation in weak interactions. Three other physics topics ("Mu-meson physics," by J. Rainwater; "Collisions of $\leq$ 1 Bev particles with nuclei," by S. J. Lindenbaum; "Spins and static moments of radioactive isotopes," by W. A. Nierenberg) are all very competently handled, with emphasis on basic understanding of the physics situation.

The volume contains, further, six articles on chemistry and radiobiology: "Radiochemical separations by ion exchange" (K. A. Kraus and F. Nelson); "Equipment for high level radiochemical processes" (N. B. Garden and E. Nielsen); "Cellular radiobiology" (E. L. Powers); "Biochemical effects of ionizing radiation" (B. E. Holmes); "Vertebrate radiobiology (lethal actions and associated effects)" (V. P. Bond and J. S. Robertson); "Vertebrate radiobiology (the pathology of radiation exposure)" (C. C. Lushbaugh). I, as a physicist, have no competence for judgment, though, because of my interest in nuclear energy, I certainly need information in these fields. In spite of my eagerness to learn, I found that all these articles made very dull reading. On the other hand, a radiobiologist, even with very good understanding of the physics required for his work, will find Villar's highly-rated article completely incomprehensible. Thus, while the physics part of this volume is truly excellent, it remains questionable whether it is wise to collect in one volume review articles, dedicated to the experts, covering such a large diversity of topics.

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Handbook of Magnesium-Organic Compounds. vol. I, *Reactions of Magnesium-Organic Compounds Nos. 1–7284*; vol. II, *Reactions of Magnesium-Organic Compounds Nos. 7285–13395*; vol. III, *Indexes of End-Products of Reactions, Magnesium-Organic Compounds, Authors and Co-Authors.* S. T. Yoffe and A. N. Nesmeyanov. Pergamon, London and New York, 1957. 2048 pp. $72.

This monumental work is divided into three volumes, largely for more convenient handling. The first and the second volumes contain tables, of 13,395 entries, which list the empirical formulas (in the order used in *Chemical Abstracts* indexes) and abbreviated structural formulas of reactants; the Grignard reagents used in the respective reactions; the products formed from the particular reactant and Grignard reagent; and literature references to the bibliography contained in the third volume. Volume III also contains an index of end-products arranged in order of empirical formulas, as well as an index of $RMgX$ compounds, excluding the simplest.

There is a foreword by W. Wardlaw. An English translation of the preface and of the introduction, by A. L.Mackay, is admirably suited for helping one make the fullest, most effective use of the volumes.

The preface of the book emphasizes, to an unusual extent, the contributions of Russian chemists to the development