mond G. Teller and Robert Bau. The authors list all of the more than three hundred molecular transition-metal hydride complexes with structures known to them up to the end of 1979 and provide a description of the general structural types. There is a brief introduction to the methods used to locate hydrogen atoms from both X-ray data and neutron diffraction. Then follows a well illustrated description of various classes of metal hydride complexes, from those containing terminal M—H bonds to metal clusters and molecular species containing interstitial hydrogen. The discussion of the structures is not particularly critical, with only a limited amount of speculation. Based largely on the approximately fifty neutron studies available, some generalizations are offered about metal–hydrogen distances. The result is a definitive survey of the literature, well organized and well illustrated. It represents very good value when one considers that an initial on-line literature search would probably cost about as much as this volume. My only criticism is that by listing only one or two authors in multiple-author references it is not possible to know which structures were determined in which laboratories.

The second, slightly longer review on *Spin Crossover in Iron*(II) *Complexes* by Phillip Gütlich is a comprehensive survey of the variety of studies made on this class of compounds which exhibit a change in magnetic moment with temperature. Results are described from measurements of magnetism, vibrational and electronic spectra, the Mössbauer effect, heat capacity, and magnetic resonance, as well as from X-ray diffraction. This review is of less immediate interest to crystallographers. Because the change in spin state invariably involves some change in structure, however, the phenomenon provides a probe into lattice effects. In a series of elegant experiments using Mössbauer spectroscopy, Gütlich and co-workers have examined the effect of diluting a spin-crossover iron(II) complex into the analogous zinc(II) lattice and found evidence for a cooperative domain model of the structural transition. Hence solid-state scientists may find these relatively obscure complexes a useful probe into lattice effects.

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Acta Cryst. (1982). B**38**, 1685

La structure de la matière – du ciel bleu à la matière plastique. By A. GUINIER. Pp. 288. Paris: Hachette, 1980. Price 140.18 FF.

This is the first of a series intended for science teachers in secondary schools in order to keep them informed of current developments in science. After a short discussion of atomic structure and chemical bonds, the author classifies matter in two states: the disordered (the perfect gas) and the ordered (the perfect crystal). A major part of the book is concerned with the field between these two extremes from liquids *via* colloids, liquid crystals, polymers, crystalline aggregates with their preferred orientations, to real crystals with their defects.

While the work covers the whole field of crystallography, there is little use of mathematics. The author's aim is not to give rigorous proofs of physical laws but to demonstrate the consequences of these laws in everyday life.

Many university teachers would do well to incorporate in their courses some of the examples given by Guinier. He reminds us in a very elegant manner that the study of physics is not confined to the laboratory but extends to the universe. It can provide explanations both for the blue colour of the sky and for the physical properties of plastics.

The author's style is so clear that it is a pleasure to recommend this book not only to science teachers (the effort for English-speakers will be repaid) but also to teachers of French in English-speaking schools. At a single blow it would improve the standard of French and increase the quality of the science intake in universities.

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Book Received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

Acta Cryst. (1982). B**38**, 1685

История кристаллографии. I: С древнейших времен до начала XIX столетия, II: XIX век. И. И. Шафрановский. **(A history of crystallography. I: From earliest times to the beginning of the nineteenth century; II: In the nineteenth century.** By I. I. SHAFRANOVSKII.) Pp. 296 (Vol. I), pp. 324 (Vol. II). Leningrad: Nauka, 1978 (Vol. I), 1980 (Vol. II). Price 2r 50k (Vol. I), 2r 40 k (Vol. II). A review of this book, by A. L. Mackay, has been published in the March 1982 issue of *Acta Crystallographica*, Section A, p. 288.

Acta Cryst. (1982). B**38**, 1685–1686

The rare earths in modern science and technology. Vol. 2. Edited by G. J. MCCARTHY, J. J. RHYNE and H. B. SILBER. Pp. xxiii + 647. New York: Plenum, 1980. Price US $59.50.

This book is the second in a series which aims to publish the proceedings of the Rare Earth Research conferences, held in North America every 18 months or so. This conference was held two years ago in North Dakota, and it is the 14th, the first having been staged in 1960. Some of the proceedings of previous conferences were published as hard-cover books but the process was interrupted; it was a pity that so much

information, encompassing the whole of rare-earth research, became buried in the almost confidential 'Report' literature. Consequently, the initiative of Plenum is welcomed by the specialists in the field.

The book is made up of short contributions from all over the world (160 papers from 18 countries) and presents the current state of research interests in the many domains involved. This covers spectroscopy (luminescence, fluorescence, laser, Mössbauer, ESR), a field for which rare-earth uses are foremost from the industrial point of view as well as from the fundamental one; metallurgy and materials preparation; solution and analytical chemistry; X-ray and neutron diffraction; transport and thermal properties; hydrides (and especially the energy-storage problem); magnetism, another field in which rare-earth materials have made an industrial breakthrough; and rare-earth technology which is of special interest to people involved in the purification and processing of rare-earth products or metals.

From the point of view of crystallography, there has always been a strong interest in rare earths especially for researchers involved in neutron diffraction. There are also some traditional crystallographic and solid-state problems which are, as yet, not well resolved, which stir interest. One of these is the order–disorder dilemma in non-stoichiometric fluorite structures, represented here by several papers. Rare earths, because of the homogeneous change in their ionic radii, are useful for structural systematics; and one finds several examples here, for instance in the field of alloys with transition metals, other intermetallics, silicates, borides, sulphides, pnictides. Both X-rays and electron microscopy were employed to solve structural problems, investigate defects and establish the systematics. High pressure and high temperature are among the techniques used to measure the sometimes complex structural trends and changes along the rare-earth series for the compounds listed above.

Neutron diffraction is of course well represented by several contributions, some of them involving the establishment of magnetic structures. This work is usually done on rather complex compounds involving, for instance, more than two cations. Contributions using neutron diffraction as a convenient tool are found in several sections of the book.

The volume gives a rich and broad insight into the living world of rare-earth research. It is truly an interdisciplinary field. Rare earths in fact provide a unique opportunity for people working in widely separated areas to come into contact and discover common problems and interests. Crystallography is essential in one form or another in almost all of the research described, and this interest carries over even to problems in solution chemistry because the rare earths can be used as structural probes in liquids, as demonstrated by several contributions.

This book, of course, like all books of this type, suffers from some inequality between the contributions, their writing, and the variable amount and quality of the information they carry; but the 632 pages, followed by a good and detailed subject index, comprise an interesting instant-photograph of rare-earth research as it stands at present, and these pages are a beautiful source for getting to know the current interests in this wide and open field.

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