As a result of investigations started in 1926 the Soviet Government has announced the discovery of rich potash salts near Solikamsh in the Ural Mountains. Mining operations were started this summer employing about 5000 men.

Pennsylvania State College is erecting a new Mineral Industries Building at a cost of over $300,000. It will be the largest academic building on the campus. The four floors will contain a large number of laboratories, class rooms and offices to care for all instruction and research work in ceramics, geology, mineralogy, geography, oil and gas production, mining and metallurgy. It is hoped to have the building ready for use when college opens in September 1930.

BOOK REVIEWS

THE LABORATORY INVESTIGATION OF ORES. A SYMPOSIUM. ERNEST E. FAIRBANKS AND OTHERS. 262+ix pages. McGraw-Hill Book Co., *New York*. 1928. Price $3.50.

This book, edited by Ernest E. Fairbanks, consists of thirteen contributions (chapters) written by twelve authors, and deals with the various laboratory methods employed at present in the investigation of ore minerals. The titles of the chapters and list of authors are as follows:

Historical review of the study of polished sections of opaque minerals. Waldemar Lindgren.

Microscopes, their construction and use. Ernest E. Fairbanks.

Crystal analysis by means of x-rays. Wheeler P. Davey.

Practical photomicrography. R. P. Loveland and A. P. H. Trivelli.

Dielectric methods. Ernest E. Fairbanks.

Genetic significance of grain. Alfred C. Lane.

Ore-mineral sequence. R. J. Colony.

The microscopic criteria of replacement in the opaque ore minerals. W. H. Newhouse.

The textural relationships of the opaque manganese minerals. G. A. Thiel.

Geologic thermometry. N. L. Bowen.

The enrichment of silver ores. F. N. Guild.

Zonal distribution. Ernest E. Fairbanks.

Ore dressing microscopy. G. M. Schwartz.

The book contains many well chosen illustrations and readily holds the attention of the reader. The question of the evidence illustrating sequence of crystallization has quite naturally brought forth conflicting views by two of the authors. Further field and laboratory work will unquestionably throw additional light on the interpretation of marginal relations. In fact, a manuscript received from Mr. H. E. McKinstry, which will appear shortly in this Journal, records additional field evidence on this interesting question.

The chapter on Geologic Thermometry by N. L. Bowen has been reprinted by the Geophysical Laboratory of the Carnegie Institution of Washington, D. C. and issued as *Paper No.* 671 of their publications.

W. F. H.

LEHRBUCH DER KRISTALLPHYSIK (MIT AUSSCHLUSS DER KRISTALLOPTIK) WOLDEMAR VOIGT. 213 figures in the text and a Table, pages XXXVI+978, 15×22.5 cm., reprinted from the first edition of 1910 by B. G. Teubner, *Leipzig* and *Berlin*, **1928.** Price 41 R. M.

This is a reprint of the first edition, printed in 1910, which has now been out of print for some time. The fundamental and exhaustive character of this work has earned for it in some quarters the name "The crystallographers bible"; its reappearance in accessible form is most welcome.

The only changes compared with the first edition are an introductory page by M. v. Laue, and a third and new appendix reprinted from a paper of Voigt of 1915. The introduction by v. Laue is an interesting comment by the one man most responsible for our present detailed knowledge of the atomic structure of crystals on the permanent value of the purely formal method of attack, involving only general considerations of thermodynamics and symmetry, characteristic of Voigt's treatment. The appendix deals with secondary effects in piezoelectric phenomena. These secondary effects are in general too complicated to yield to mathematical treatment, and in the body of the book Voigt neglected them with the pious hope that they would turn out to be too small to be measurable. In the appendix it is shown that in the special case of crystal rods of circular cross section the secondary effects may be rigorously treated mathematically, and that they are indeed small enough to be neglected in the substances whose piezoelectric constants have hitherto been determined, although there is no reason to think that we may always be as fortunate in the future.

It is much to be regretted that an index was not added to the book on this reprinting, since the lack of an index was a very serious handicap to the convenient use of the first edition; an index of the numerical results obtained experimentally for different actual crystals would have been particularly helpful.

I suppose that this book will always remain one of the monumental achievments of physics, a perfect example (except perhaps for parts of the treatment of thermo-electric effects and the transverse thermogalvano-magnetic effects) of the power and application of a very general method of attack. At the same time, I believe a word of warning is not out of place against the illusion of absolute proof that such methods sometimes convey. No general method of analysis can yield results of absolute experimental validity, but assumption is bound to creep in, in the fundamental hypotheses, if nowhere else. Two sorts of hypothesis as to the physical facts have to be made before the methods of Voigt can be applied. The first is the assumption of Neumann's law, that is, that no physical phenomenon in a crystal can have elements of symmetry which are not shown by the external crystal form. Although this is a very wide generalization from experience, there seems to be no sort of necessity in it, and indeed our detailed atomic picture indicates a basis on which the law might fail. The second assumption is that most of the crystal effects can be treated as first order effects; since there are important differences of symmetry between first and second order effects, this assumption essentially enters any conclusions drawn about the behavior of actual crystals. It follows that such a simple conclusion as, for example, that the electrical resistance of a cubic crystal is the same in all directions, can have no absolute validity, contrary to a common impression, but must ultimately be asked to stand the test of experiment.

P. W. BRIDGMAN