

proved to 528,503 lb. in 1920-21, the shipments originating as follows:—Anilino red: Bombay 198 lb., United Kingdom 1296 lb., Austria 3248 lb. Lac scarlet: India 473,872 lb. Vegetable indigo: India 25,984 lb. Synthetic indigotin: Austria 10,524 lb., Belgium 3248 lb. Saffron: India 133 lb. Germany is reported to be regaining a footing in this market.—(*U.S. Com. Rep.*, June 12, 1922.)

**German Exports of Red Lead, Zinc Dust, and Bronze Powders from January to March, 1922**

Destination	Red Lead	Zinc Dust	Bronze Powders
		Metric tons	
Austria .. ..	150.1	70.1	—
Belgium .. ..	—	118.8	7.1
Czechoslovakia ..	172.1	—	—
Denmark .. ..	32.1	—	3.1
England .. ..	—	—	17.4
France .. ..	—	—	9.5
Holland .. ..	93.0	1466.2	0.8
Italy .. ..	—	—	19.7
Spain .. ..	—	—	2.0
Sweden .. ..	57.8	19.4	2.2
Switzerland .. ..	—	—	9.0
S. E. Asia .. ..	70.3	—	—
United States ..	—	—	122.4
Other countries ..	374.5	508.4	30.0
Total .. ..	968.8	2183.9	243.3
Value. mill. mk. ..	25.1	24.6	28.3

The total amount and value of the exports of the above products during 1920 were:—Red lead, 3370.4 t., 35.3 mill. mk.; zinc dust, 4261.2 t., 19.3 mill mk.; bronze powders, 832.7 t., 49.9 mill mk.

## GOVERNMENT ORDERS AND NOTICES

**EXPORT OF FERTILISERS.**—The Board of Trade has issued an open general licence authorising the exportation to all destinations of basic slag; superphosphate of lime; and manures, compound, containing either basic slag or superphosphate of lime.

**PHOSPHATE DEPOSITS IN MOROCCO.**—A copy of the *Bulletin Officiel* (No. 503, June 15), containing a report on the work of the Sheerifien Office of Phosphates during 1921, may be consulted at the Department of Overseas Trade, 35, Old Queen Street, S.W. 1.

**CHEMICAL WORKS REGULATIONS, 1922.**—The Home Secretary has issued Regulations for chemical works dated July 11, 1922, which constitute the final form of the draft Regulations issued in December, 1920, and in March, 1922. Copies may be obtained from H.M. Stationery Office, price 4d.

**SAFEGUARDING OF INDUSTRIES ACT.—Part I.**—The Board of Trade has received a complaint under Section I (5) that acetic acid of 80 per cent. grade or higher has been improperly excluded from the lists of dutiable articles. The complaint will be submitted to the Referee, and any person directly interested should communicate immediately with the Assistant Secretary, Board of Trade (Industries and Manufactures Department), Gt. George St., S.W. 1.

**INTERNATIONAL EXHIBITION OF LIQUID FUELS IN PARIS.**—This exhibition, which is being organised by the Société de Chimie Industrielle in connexion with an International Congress on Fuels (October 9—15), will be held in Paris from October 4 to 15. Applications for space should be made to Monsieur J. Gérard, Commissaire Général, 49, Rue des Mathurins, Paris, and all particulars can be obtained from the Department of Overseas Trade (Exhibitions and Fairs Division), 35, Old Queen Street, S.W. 1.

## REVIEWS

- (1) **ENGINEERING STEELS.** By LESLIE AITCHISON. Pp. xxvii.+390. London: Macdonald and Evans, 1921. Price 25s. net.
- (2) **METALLOGRAPHY.** By C. H. DESCH. *Text-books of Physical Chemistry*, edited by Sir W. Ramsay and Prof. Donnan. Third edition. Pp. x+440. London: Longmans, Green and Co., 1922. Price 16s. net.

(1) This book is published in the Reconstructive Technical Series, the aim of which is to diffuse the new knowledge and enlarged technical skill gained during recent years and so make it available for the practitioner of to-day, as a means towards greater all-round efficiency and increased competitive power in the world's markets. The series is published under the editorship of G. W. de Tunzelman. Each volume is designed to serve a particular trade or vocation, the present volume dealing with steels from the engineer's point of view and providing the information which the engineer should possess in order to enable him to understand the steels which he is using. Prof. W. C. Unwin has written the foreword in which he compares modern requirements with those of the days of wrought iron. The developments in engineering practice during the last twenty years have resulted in the necessity for steels capable of performing higher duties than the older-fashioned plain carbon steels, and the requirements of the automobile and aircraft industries in particular have created a demand for steels possessing high orders of mechanical properties. This demand for high-quality steels has led to extensive inspection and the compilation of many specifications. The earlier specifications merely aimed at securing stipulated mechanical test results but the modern requirements must necessarily include correct chemical composition and correct heat treatment.

The purely metallurgical portions of the subject are dealt with very briefly; for instance, steel-making processes occupy fifteen pages, and this chapter seems a little unbalanced as more than five of these pages are devoted to the Bessemer process which is of minor importance in connexion with the type of steels mainly dealt with in the book.

The casting and working of steel receive attention, the solidification of molten steel in ingots being followed out in detail together with the nature of the crystallisation which takes place and its bearing on the properties of the resulting metal. This is of particular importance for its bearing on the position of planes and zones of weakness in the ingot, which may become the centres of definite defects. The effect of work, such as forging, on the crystals situated in different parts of the ingot and on the mechanical properties of the steel is described.

The chapter devoted to the heat treatment of steel occupies fifty pages, the thermal equilibrium diagram of the iron-carbon system and the effect of alloying elements on the hardening of steel receiving attention. Mass and volume effects in heat treatment and the engineering value of hardened and tempered steels are also discussed. The methods used for the mechanical testing of steel receive considerable attention as it is recognised that the metal will finally be judged by its mechanical properties, and from the engineer's point of view the details of composition, heat treatment, etc. are only of

secondary value. The tests which have recently become so important to the engineer, such as hardness, impact, alternating stress, and other tests are dealt with and the mechanical properties of steel are described, the definitions of the British Engineering Standards Association for elastic limit and yield point being used. A chapter is devoted to plain carbon steels in which the effect of varying carbon, high and low manganese, mass, etc. is described and followed by details of the mechanical properties of certain steels of selected compositions. A separate chapter is devoted to the important subject of alloy steels, and in this a classification is used based on the maximum stress obtainable with the steels. Steels with air-hardening properties are described in detail. Nickel-chrome steels receive most attention, but nickel, chrome-vanadium and "stainless" or high chromium steels are also described.

Case-hardening is of considerable importance to the engineer, especially for the lighter forms of machinery, and the operation itself, the carburising mixtures, the temperature necessary, the steels suitable, and the after-treatment of the case-hardened parts receive attention. The influence of cold work on the mechanical properties of steel is of greater importance than is generally realised, and cold worked material, in the form of bright drawn bar, is largely used in the manufacture of comparatively unimportant parts, particularly those in automatic machines. The changes in mechanical properties produced by varying amounts of cold work and also by reheating to temperatures below the critical range, that is, in the operation of blueing, are illustrated by tables and curves. The concluding chapter deals with tool steels, and in this chapter it appears that a disproportionate amount of attention has been given to plain carbon tool steels and too little to self-hardening and high-speed steels.

The book contains fourteen appendices, on such subjects as the influence of sharp corners and scratches on mechanical properties, Young's modulus of elasticity, the properties of steels at high temperatures, various classes of machines for impact testing, determination of hardness; and the last one consists of a bibliography of original papers on the hardness of metals. It is illustrated by a number of photomicrographs and photomicrographs showing crystalline structure of ingots, defects met with in ingots and forgings, effect of heat treatment and similar subjects; it is a pity that among such an excellent series of photographs, a very poor hand-drawn representation of pearlite has been inserted.

This book should prove to be very useful to engineers requiring a knowledge of the possibilities of modern steels and to metallurgists requiring definite knowledge of the more recent methods of testing metals. The subject could have been treated from a somewhat broader point of view, as it must not be forgotten that the engineer has many requirements not covered by aircraft and automobile specifications, which appear to constitute the chief interests of the author.

(2) This third edition of Professor Desch's well-known book on metallography will be welcomed by all interested in the subject because in it the most important results of recent investigations and references to recent publications have been incorporated.

The last edition appeared in 1913; since then the demands for the book have been met by a new impression of the second edition, published in 1918. The most important changes have been made in the chapters dealing with the physical properties of alloys, with corrosion and with the metallography of iron and steel. With reference to the physical properties of alloys, further information is added on hardness, a subject which has received considerable attention during the last few years. The subject of corrosion also receives further treatment, the work of the Corrosion Committee of the Institute of Metals being specially referred to. In the chapter on the metallography of iron and steel, the results of the study of the space lattices by the X-ray method have been added. The actual amount of new material in this edition is not great and its increased value is due to small additions and modifications together with references to the latest work. There is probably no one with a better knowledge of the literature of the subject than the author, and his tables of alloy systems contained in the appendix of 24 pages are probably more frequently referred to by metallographers than any other published matter on the subject.

C. O. BANNISTER.

**INORGANIC CHEMISTRY.** By T. MARTIN LOWRY.  
Pp. x+943. London: Macmillan and Co., Ltd., 1922. Price 28s. net.

To everyone engaged in teaching senior students the appearance of a new book on advanced inorganic chemistry by an author of reputation is an event of very real interest. For in spite of all the developments of chemical science inorganic chemistry must remain common ground to all chemists, and no chemical education can exclude the study up to a certain point. It is, however, becoming always more difficult to fix the reasonable limits and to assort from the overwhelming mass of material such a body of facts as should be brought to the notice, and to a large extent be established in the memory, of the student. There is also the difficulty of deciding how much of the general theory of chemistry, which in recent times it has been the growing habit to detach as "physical chemistry," should be elucidated in connexion with the facts, processes and applications of inorganic chemistry. There is here a great demand on the sense of proportion of the author and, be it added, on the consideration of his critics. Finally when the selection has been made there remains the crowning task of presenting the material with the utmost lucidity, coherence, and interest attainable within the limits of a book of marketable price.

Professor Lowry has evidently taken very great pains with his book, he has secured valuable assistance from a number of highly competent authorities and he has achieved his task in rather less than a thousand well-written, well-printed, and well-illustrated pages. As soon as the book appeared the present writer read the first 200 pages and has since devoted many short periods to sampling the rest. As the result he is inclined to rate the book very highly indeed, and—though he awaits the experimental trial with students for a final judgment—to place it as a strong competitor for the first place among all books that attempt the same object, subject only to the price not proving prohibitive.