assumes nothing without direct proof; we have no right to assume beforehand that some other law might not be found operating in the organic world. The crude calorimetric researches of Lavoisier and the early pioneers of this subject certainly showed great discrepancies between the results obtained and those calculated from the energy value of the diets employed; but as technique has improved so has it been shown that all such discrepancies were the result of imperfection in the methods used. For the improvements in method, and the patient working out of the problem as well as the final demonstration of the truth of the great law of energy conservation in the world of life, there is no one to whom we owe more than to Prof. Rubner himself.

W. D. H.

COLOUR MANUFACTURE.

A Treatise on Colour Manufacture. A Guide to the Preparation, Examination, and Application of all the Pigment Colours in Practical Use. By George Zerr and Dr. R. Rübencamp; authorised English edition by Dr. Charles Mayer. Pp. xiv+605. (London: C. Griffin and Co., Ltd., 1908.) Price 30*s.* net.

THIS volume is the most complete publication on colour manufacture which has yet been produced in English. After dealing with the general preparation of materials, and describing the various types of grinding and sifting machines, in part ii. the manufacture of artificial mineral colours in dealt with in a very thorough manner, although in certain details inaccuracies are, as is to be expected, to be found.

Part iii. deals with the raw materials used in colour making, their properties, adulterations, and tests for purity. This section should prove very valuable in many colour works where the raw materials are bought in large quantities, and reliable information of this kind will enable them to be readily examined to test their purity.

The natural mineral colours and black pigments are then dealt with, and following upon this is a description of organic colouring materials and their utilisation in making lake pigments. The first section deals with natural organic substances, while the second section deals with the application of the coal tar colours to the manufacture of lakes. This section should prove of considerable value to colour makers, as it contains a scientific classification of the coal tar derivatives, and so reveals the principles upon which such lakes must be prepared. It is, of course, impossible that such a treatment of the subject should be up to date, as fresh coal tar products and fresh methods of obtaining trustworthy lakes from them are constantly being produced, but a study of these chapters will give the student a thorough grip of the principles underlying the manufacture of these lakes, and some interesting information will be found at the end of this section of the book on the reactions of the more important lakes from artificial colouring materials, which should be of use to those who wish to match samples that have been submitted. There is also a brief account of the use of pigments in different ways which, while very general in character, contains some very interesting information.

In the appendix will be found a table of solubilities of many of the salts used by the colour maker, in cold and in hot water, which should prove of practical value, while there are in addition specific gravity tables for a certain number of these salts which should also be of use.

As has been stated, there are certain errors in detail to be noted, more especially in connection with the finer colours which are used for artists' purposes, and two of these which happened to have caught the eye of the reviewer may be pointed out. On page 154, Indian yellow is incorrectly described as being the same thing as cobalt yellow, Indian yellow being a preparation of euxanthic acid obtained from India, and cobalt yellow is described as being not very fast to air and light, while, as a matter of fact, it is one of the most permanent pigments to be found in the artist's palette. Again, under blue colours on p. 203, cobalt blue is spoken of as being now of no technical value. Considering the very large use of cobalt blue by artists and for superior decorative purposes, this statement is scarcely justifiable. The description of the manufacture of cadmium yellows is also very far from complete, and no doubt other similar small errors could be found throughout the book, and are inevitable in a work of this kind.

A more serious defect is one which is to be found in a great many works on colour manufacture. While elementary information on qualitative and quantitative analysis is published—see, for instance, the discussion of the methods of volumetric analysis on p. 343—information which it is only right to suppose is perfectly familiar to the modern colour maker and colour chemist, and simple qualitative tests are given which are to be found in all elementary books on qualitative analysis, little information is supplied as to the complete analysis of modern pigments. Such information would be of value even to the skilled analyst, who, when he comes across some pigment, wishes to know the probable defects to look for, the kinds of adulteration likely to be present, and the most rapid manner of handling with a view to making a sufficiently complete analysis for practical purposes. Some attempt to deal with this problem was made by Hurst in his book on pigments, but a more complete scientific handling of the subject is very much required.

In conclusion, this book may be safely recommended to all those interested in colour manufacture, as containing a great deal of useful and valuable information brought together in a clear and practical form.

UNIVERSITY ADMINISTRATION.

University Administration. By Charles W. Eliot. Pp. 266. (London: Constable; Boston and New York: Houghton, Mifflin and Co., 1909.) Price 6*s.* net.

UNIVERSITY politics has long been a current phrase, and questions of university government and policy have been increasingly discussed of recent years; yet, in spite of the rapid increase in the number