

and the advice of others. The reader gets little more assurance from the chapter on milk products. He is told that the colloid chemistry of butter-making affords one of the most striking examples of a highly developed technical process the fundamental principles of which are still not understood, and that much less is known of the colloid chemistry of cheese-making.

In his discussion of soil, the author misses his best chance of showing that its colloidal nature is of great importance to the farmer through the phenomenon of base exchange. True, this property is still under investigation; but there is much definite information which could have been put in a practical form that would have shown the magnitude of the base-holding power of various

classes of soil in relation to the nutrient requirements of crops. The three references to base exchange are too academic and also too scrappy to be of service to practical agriculturists.

The investigation of the soil from the colloidal point of view is of recent development, and it is no discredit to those concerned that much of the field is still *sub judice*. Until the position has been clarified by further research, and indeed until a more straightforward definition of the word 'colloid' can be given, it seems better to refrain from forcing the subject into prominence in the curriculum of a course in agriculture. The teaching methods which Dr. Marshall condemns as haphazard may be better than he thinks.

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## Electricity in Metals

### Elektronenleitung:

Galvanomagnetische, Thermoelektrische und Verwandte Effekte. Von Prof. W. Meissner. Unter Mitwirkung von Dr. M. Kohler und Dr. H. Reddemann. (Handbuch der Experimentalphysik. Herausgegeben von W. Wien und F. Harms. Band 11, Teil 2.) Pp. xii+547. (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1935.) 44 gold marks.

SO much has recently been written on the theoretical aspects of the conduction of electricity by metals, of the problems of supra-conductivity, of the poor conductor and of galvanomagnetic effects that it is very satisfactory to have available this excellent book on the experimental side. For it marshals the experimental facts in a handy manner, and deals with the proof of fundamental laws like that of Ohm and with the more recent characteristic temperature relations such as that of Grüneisen, and illustrates them with a wealth of experimental data which can only be found with difficulty elsewhere. The technique and results of modern work on resistance of metals under pressure and on the influence of magnetic fields upon resistance are well described. The survey of the electrical behaviour of alloys is adequate and special attention is paid to the resistance of powders. The determination of the Wiedemann-Franz ratio is fully discussed and the data well considered. Supra-conductivity, naturally, receives very full treatment from W. Meissner, and many readers will find the section of the book which deals with it particularly valuable. Some discussion of photo-electric effects is given, but as these were fully treated in vol.

23 (Part 2), only special features are dealt with here. The first part of the book closes with an interesting outline of modern theories of electrical conduction.

The second part of the volume deals with galvanomagnetic and thermomagnetic effects and forms an important source of information; for the descriptions of experimental measurements of the twelve separate effects into which galvanomagnetic phenomena may be divided are to be found scattered throughout a wide range of original papers, and little seems to have been done to classify these experiments or to compare them at all critically. It can be said, too, that the treatment of thermo-electric phenomena is unusually clear and good, particular emphasis being placed on the properties of single crystals.

Some fifty-four pages of references are given, and it is here that an improvement could easily have been made. Presumably, the subject matter of each reference is discussed somewhere in this book, and it would have been very helpful if the number of the page on which it is treated had been added. On perusing these many hundreds of references, one cannot help being struck by the small number of the references to papers published by the Royal Society and the Physical Society, and one wonders whether atomic physics has virtually excluded the matters dealt with in this book from these publications, or whether the latter tend to be overlooked in Germany. The printing and illustration of the volume are, of course, of high standard, and it can be thoroughly recommended to all interested in these branches of physics.

L. F. B.