account of the various positions in which the resonator was placed; of the results obtained with an ordinary Hertzian field between two wires, and round a single wire. The author next considers the *interference* field, which is obtained between two wires whose ends are connected to plates placed on opposite sides of the *same* plate of an oscillator. The effects on an ordinary 2-wire field of bending one of the wires so as to lengthen it by $\frac{1}{4}$, $\frac{1}{2}$ and a whole wave-length are next investigated. The author shows that all the effects obtained may be deduced from the results obtained with a single-wire field. An account of some experiments with 3, 4 and 6 wires concludes this chapter.

Chapter iv. deals with the action of the resonator. The effects of varying the position and direction of the micrometer-gap, the disturbance due to the presence of the resonator in the field, and the effect of varying the length of the resonator are studied in detail. The form of resonator with a gap bridged over by a cell and telephone receives careful attention, the effect of altering the position of the gap relatively to the micrometer spark-gap being fully investigated.

Chapter v. is concerned with the important problem of the propagation of waves in dielectrics other than air. Oil and water were the two dielectrics studied by the author, and the effects obtained clear up some rather obscure and apparently contradictory results obtained by other experimenters in this field.

Chapter vi. contains a useful *résumé* of the more important results obtained by the author.

In Chapter vii. the author describes a system of multiplex Hertzian wave telegraphy (*not* wireless), regarding whose practical value we may well be pardoned for feeling somewhat sceptical.

The book forms a valuable storehouse of facts, and the author is to be congratulated on the extremely lucid and well-arranged account of his important researches. They were all carried out on a large scale (in the experiments on oil and water, 230 to 260 litres of the liquid were used), and must have required an unusual amount of skill, care and patience.

A striking feature of the work is the entire absence of mathematical reasoning, not a single symbol of differentiation or integration occurring throughout the whole of the book. The author has carefully avoided all theoretical discussions, and confined himself to an accurate description of experimental facts. The clearness and elegance of the language in which this description is given render it a pleasure to read the book, which will prove a source of delight to every true experimentalist.

OUR BOOK SHELF.

Indicators and Test Papers. By Alfred I. Cohn, Ph.G. Pp. ix + 249. (New York: John Wiley and Sons. London: Chapman and Hall, Ltd., 1899.)

THIS book contains an account of the source, preparation, application and tests for some scores of indicators and test papers which have been proposed for use chiefly in determining the end-point in volumetric chemical analyses. The book opens with a general discussion of the action, use, and theory of indicators, and ends with four useful tables and a good index. The first table is Trommsdorff's showing the sensitiveness of indicators to acids and alkalis, the second is R. T. Thomson's (hitherto the chief English guide), the third is Dieterich's table showing the sensitiveness of various test-papers, and the fourth is a tabular summary of the principal indicators by the author.

The compilation of this book must have demanded much patient labour, and acknowledgments are due to the author for the care and pains he has bestowed upon the work. It will prove a useful addition to analytical literature. Whilst saying this, some points of criticism cannot be withheld. In the first place it must be said that the author has not dealt in a very clear way with the theory of indicators. The subject is not an easy one, and the average operator has not hitherto troubled himself much about it. Litmus has been to him a substance provided by Nature for the discrimination between acids and alkalis rather than the means of furnishing blue alkaline salts from which a weakly acidic substance of red tint is "displaced" by the action of nearly all other acids. Again, the reasons why methyl orange is good for the titration of bases and not of acids is not usually inquired into. Such considerations make it the more desirable that the principles underlying the use of indicators should be stated very clearly. Mr. Cohn has given explanations, including the application of the ionic theory, and of the speculative mechanical theory (somewhat antiquated and unfruitful) of F. Mohr, but he has not set forth the matter with the desirable clearness and coherence.

Next with regard to the substance of the book, it is worth considering whether, in any future edition, type of two sizes might not be employed. Many of the indicators described are of extremely doubtful value, and the worker really wants to know definitely which indicators have been found meritorious by other people than those who have suggested their use. In this connection also a protest must be raised against naming indicators after their inventors. It is useful to know the composition and nine synonyms of Tropæolin OO, but there is surely no call to add to these the term "Von Müller's Indicator."

The book would have been improved by references to original papers. For example, the reflecting galvanometer is scheduled as an indicator, but there is neither a full description of its use nor a reference to Küster's paper on the subject. References would have been valuable throughout the book. A. S.

Optical Activity and Chemical Composition. By Dr. H. Landolt; translated by Dr. J. McCrae. Pp. xi + 158. (London: Whittaker and Co., 1899.)

THIS small book is a remarkably clear exposition of what is a somewhat recondite and difficult branch of chemical physics. It is well known to students of optical science that there are liquids and solid substances in solution which have the strange power of rotating the plane of vibration of a polarised ray of light that is passing through them. Familiar examples are turpentine and other essential oils, sugars, tartaric acid, quinine and albumen. But Dr. Landolt says that more than seven hundred substances, all carbon compounds, are known to exhibit this molecular rotation.

Of course the fruitful discoveries of Pasteur—the right and left-handed tartaric acids, racemic acid, molecular asymmetry, &c., are briefly described; and the more recent simultaneous discoveries of van 't Hoff and Le Bel receive fuller attention. It is shown how this property is met with only where one at least of the carbon atoms of an organic compound is united with four different atoms or radicles; and the results flowing from this kind of structure are explained and illustrated—results which form what is now called stereochemistry.

But the principal object of Prof. Landolt's book, as expressed in its title, is the connection that may be found

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