

found to have the same charge in the two cases.

In connection with Professor Kimball's remarks it is of interest to consider also the behavior of two electrometers E and E' , one of them, E , fixed within the condenser with its terminals rigidly connected to the armatures A and B , and the other, E' , fixed to the magnet, with terminals sliding on A and B . In Case II. E' indicates a voltage equal to the motional electromotive force in the wire C , and E gives no deflection—not because the condenser is uncharged, but because the motional electromotive force in the electrometer and its leads just balances the voltage in the electric field produced between A and B by the motional electromotive force in the wire C . In Case I. E again gives no deflection, there being now no electric field between the armatures and no charge at all on the armatures; and E' gives the same deflection as before—but whether for the same reason or not is still an open question. It is apparently because Professor Kimball was considering these ambiguous electrometer indications instead of the actual charges on the cylinders that he was led to his conclusion. S. J. BARNETT

THE OHIO STATE UNIVERSITY,
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A LABELING SURFACE FOR LABORATORY GLASSWARE

The ground-glass circular spot now generally furnished on flasks and beakers made of Jena glass suggested to the writer the desirability of a similar labeling surface for microscopic slides, test tubes and other laboratory glassware. Attempts to use hydrofluoric acid showed that the acid in solution would dissolve the glass but would not etch it. "Diamond Ink" made by Merck and obtained from Eimer and Amend was found to give satisfactory results. "White Acid," obtained from the same firm, produces a less heavily frosted surface, but has been used to dilute the diamond ink when the latter has become unduly thickened. Diamond ink comes in gutta-percha bottles and etches glass immediately upon coming in contact with it. The

hydrofluoric acid, which is apparently one of the constituents, is volatile. When a bottle has been opened, the fluid tends to creep out by capillarity along the salts that have been deposited by evaporation. The bottles, in consequence, should be kept sealed with paraffine when not in use.

In using, a small amount only of the creamy diâmond ink is poured into a stender dish which has been previously coated with paraffine. A rubber stopper has been found to be the best means of applying the ink. One end is dipped into the ink and then pressed against the glass to be etched. If the right edge of the stopper is first touched to the glass and the pressure shifted from right to left and reversed, the fluid is evenly distributed and a small amount only is necessary for the even-edged circular spot which results. The etching takes place at once. The surface, however, is covered by a thick deposit of deliquescent salts which must be washed off before the ground-glass surface is ready to receive pencil marks. Ordinary glassware is easily marked by the method outlined, but the Jena glass tested is etched with more or less difficulty and has been ground on an emery wheel.

Adhesive paper labels are impracticable for test tubes or flasks that have to be sterilized with steam or that are kept in a moist atmosphere where they are liable to the attacks of moulds. Wax pencils, or better, indelible copying pencils moistened with alcohol are useful for temporary labels, but do not withstand steam sterilizing and are not permanent when much handled. Marking diamonds and certain silicate inks have the disadvantage of leaving a written label that can not be removed. A label written with lead pencil on an etched or ground-glass surface, however, has the advantage of permanency so far as ordinary laboratory handling is concerned. It is as permanent as pencil marks on paper and, like these, can be removed with a rubber eraser. The pencil marks are not affected by water nor by steam, but may be readily removed by scouring soaps. In cleaning test tubes, it has been found convenient to remove

the labels by rubbing the surface in a moistened groove in a cake of sapollo.

A. F. BLAKESLEE

CARNEGIE STATION FOR
EXPERIMENTAL EVOLUTION,
COLD SPRING HARBOR, N. Y.

MOST IS—WHAT?

TO THE EDITOR OF SCIENCE: Since the natural sciences came into their inheritance, about thirty years ago, it has been quite the orthodox thing with the "humanists" to demonstrate the inherent disability of these subjects to impart "culture" by satirically deriding the English of embryonic doctoral dissertations. Judge, therefore, of the shock to my esthetic sensibilities occasioned by this sentence, which stands on page 61 in the issue of SCIENCE for January 10: "*most of the brotherhood of teachers of English is in the same state,*" where the adjective-noun most, having the plural form because clearly referring to number and not quantity, is made the subject of a verb in the singular number. This communication appears to have been written by a professor of English and, presumably, a humanist.

F. W. MARTIN

SCIENTIFIC BOOKS

Methods of Measuring Electrical Resistance.

By EDWIN F. NORTHRUP, Ph.D. New York, McGraw-Hill Book Company. 1912. Pp. xiii + 389. Price \$4.00.

The measurement of electrical resistance is of interest not only to the physicists but to engineers and others engaged in scientific, technical and commercial work. The methods used are described in various technical and scientific papers and in text-books on electrical measurements. But only a few of these are described in any one place, if we except Price's book written about twenty years ago. The author "has selected for presentation all those methods which in his judgment are useful, for commercial tests and measurements, for purposes of instruction in educational institutions and for application in technical and research laboratories." So we have collected

in one book a large number of methods covering practically the entire field of electrical resistance measurements.

The first part of the book is of an introductory character and better than any other shows the wide experience and sound judgment of the author in matters pertaining to electrical measurements. Particularly good are his comments on accuracy and method and few there are, of those who make electrical measurements, who could not read with profit the first six pages. Then follows a discussion of errors and estimation of the accuracy obtainable by deflection methods. The way an error in measurement may affect the result desired is clearly shown, but no effort is made to arrive at the probable accuracy by the means of the theory of probabilities.

Deflection methods are taken up first. Various voltmeter methods and voltmeter and ammeter methods are considered very fully. Then follows a discussion of null methods and of these the differential galvanometer methods are considered first. In this connection no mention is made of the Kohlrausch method, which is generally considered to be by far the best and by some to be the only differential galvanometer method suitable for use in the precise comparison of resistances.

In the discussion of the Wheatstone bridge methods the Carey Foster method receives the fullest consideration. Six kinds of measurements are listed for which it is stated that this method "is especially useful." For one of these measurements deflection methods give all that is usually desired. When a higher accuracy is necessary it is easily obtained by the simplest kind of a bridge. Another is of interest only to the manufacturer in the adjustment of resistance coils. The other four can, provided a substitution method is used, be made much better with a simple bridge costing not more than half as much as the Carey Foster bridge.

In the discussion concerning Wheatstone bridges various arrangements of ratio and rheostat coils, including the author's four-coil decade, are considered; the author's special bridge for reading directly the per cent. error