

should be inclined at the angle of friction to the horizon instead of being horizontal.

Suppose next that the inquiring reader wishes to put the examples on the motion of pulleys of given mass on pp. 202, 203 to a practical test. He goes to a scientific instrument maker, and orders some expensive pulleys. However well he oils their bearings to make them smooth, it is pretty certain they will never move with the accelerations given by Prof. Jeans's formulæ. The tensions of a string may be equal on both sides of a pulley so long as that pulley remains at rest, but so soon as it begins to rotate differences of tension will be set up, and no amount of lubrication applied to the bearings will affect the result. Of course, if the inertia of the pulley is small, the tension differences will also be small, but the masses of the pulleys are "given" in the questions, and the proper lesson to be learnt is that a solution of the problems which does not take account of rotational as well as translational inertia is incorrect.

There are several good features, however, which well deserve mention. Among these are the treatment of strings, including the early references to Hooke's law, the example on p. 53, with its neat geometrical solution, the example on p. 360, in which accelerations in polar coordinates are deduced from Lagrange's equations, and finally the omission of all references to poundals, slugs, and other abominations of the same nature. It is a pity that some of the examples involve the usual tedious and uninteresting drudgery in the form of multiplication or division by 2240 or 5280 or 1728 or 33,000, or another of the same series of objectionable numbers. We do not blame Prof. Jeans for following the common practice in this respect, as most of us find ourselves forced to do the same, but surely the time has come when examples involving the metric system may figure more freely than they do in treatises on theoretical mechanics, especially when those treatises are particularly adapted for students of physics. G. H. B.

THEORETICAL ELECTROCHEMISTRY.

The Electrolytic Dissociation Theory. By Prof. R. Abegg; translated by Dr. Carl L. von Ende. Pp. 12+180. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd.) Price 5s. 6d. net.

Electrochemistry. Part I., Theoretical Electrochemistry and its Physico-chemical Foundations. By Dr. Heinrich Danneel; translated by Dr. Edmund S. Merriam. Pp. vii+181. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd.) Price 5s. 6d. net.

THE advent of the translation of these two little books into English shows that the subject of electrochemistry, or rather, we should say, physical chemistry, with an electrochemical bias is coming more and more to the front. But while we have had of late a large number of books upon the theoretical side of the subject, there is not very much

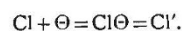
literature dealing with the practice of electrochemistry and its applications to industrial problems.

Prof. Abegg's book is a translation of the author's "Die Theorie der elektrolytischen Dissociation," which appeared in 1903 in the "Sammlung chemischer und chemisch-technischer Vorträge." Prof. Abegg starts off in an elementary manner, and explains the dissociation theory so that the beginner may understand the subject. On several occasions he uses the term osmotic pressure, but throughout the book he does not explain what osmotic pressure is or how it is measured. Although the commencement of the book is quite simple, it is not long before Prof. Abegg revels in mathematics, which, combined with the slavish style of the translation, makes the reading rather uninteresting. The section upon equilibria among several electrolytes is very long, and includes subsections upon hydrolysis, avidity or affinity of acids and bases for each other. The style of the book may perhaps be shown by the following passage:—

"Since in the case of equal concentration the ionic concentrations of pure (unmixed) acids are to each other as the roots of their dissociation constants, we may with Arrhenius also express this equation thus, that both acids divide themselves between the base in the same ratio as their degrees of dissociation would be, if each were present alone in the volume considered."

A section is also devoted to "non-aqueous solutions," and in it the author explains some of the difficulties which occur when one tries to bring the behaviour of solvent and solute into line with a similar substance dissolved in water; for example, the complications arising by the phenomena of the association of the non-ionised portion of the electrolyte. The book is a useful review of the ionic theory written entirely with the view of supporting the theory.

Dr. Danneel's book, although it explains the ionic theory in considerable detail, is an exposition of general theoretical electrochemistry. The book begins with an explanation of the terms work, current, and voltage. The gas laws lead up to osmotic pressure, which is fully and lucidly presented. The theory of electrolytic dissociation and conductivity brings us up to p. 114. The average student who is called upon to study the ionic theory will obtain, we venture to think, a better grip of the subject by a study of Danneel's book than from that of Abegg. The latter book treats the subject more fully, but Danneel's style is more interesting, and he leaves none of the salient facts out. Chapter v. treats of electromotive force and the galvanic current, and chapter vi. of polarisation and electrolysis. The last chapter, which is very short, treats of the electron theory. We find it here stated that "The electron acts chemically like an element. It combines with other elements to form saturated compounds, which are the ions"; thus



It would have been of special interest had Dr. Danneel enlarged upon this subject; he has, however, just given enough to make it suggestive.