THE FUNDAMENTAL LAWS OF ELECTROLYTIC CONDUCTION

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OF

ELECTROLYTIC CONDUCTION

MEMOIRS BY FARADAY, HITTORF

AND F. KOHLRAUSCH

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GENERAL CONTENTS

PREFACE

In the present volume are collected those papers on electrochemistry which contain the original statement of the fundamental laws and experiments on which the modern theory of electrolytic conduction is based. Of these, Faraday's law of definite electrochemical action and electrochemical equivalents, first stated in 1834, naturally takes precedence. This law is universally recognized as one of the few rigidly exact laws of nature, and lies at the basis of all electrochemical theory and practice. Of the extended series of experiments in electrochemistry, contained in the fifth and seventh series of Faraday's *Experimental Researches*, all of which touch more or less on the law in question, only those sections which have a direct bearing on the establishment of the law are here presented. Faraday's brief paper on the "Relation by Measure of Common and Voltaic Electricity" has been added as an introduction, as it was in this article that he was first led to a statement of the probable existence of the law to which he afterwards devoted so much attention.

Second only to Faraday's law, the classical researches of Hittorf on the concentration changes produced at the electrodes during electrolysis, have proved of fundamental significance in the explanation of electrolytic phenomena. The explanation given by Hittorf in 1853 of this phenomenon is still that generally accepted by physicists at the present time. Of Hittorf's five papers bearing on this subject, all of which are easily accessible in German in Ostwald's *Klassiker der Exakten Wissenschaften*, the first only has been here translated. This, however, is complete in itself, and contains not only a statement of Hittorf's theory, but also a comprehensive and remarkably careful experimental investigation of the phenomenon of transference. The later papers are mainly an exten-

sion of the first, with applications to certain important problems of chemical constitution.

The great importance of the results obtained by Hittorf was not generally recognized at the time of their publication, but only after F. Kolrausch had pointed out their bearing on his investigations on the electrical conductivity of solutions. The elegance of method and accuracy with which these investigations have been, and are still being carried out, place them pre-eminent among investigations of this class. Immediately after sufficient conductivity data had been obtained, Kohlrausch recognized the bearing of Hittorf's investigations upon his results, and was led to the formulation of the law of the independent migration of ions. The paper in which this law was first presented to the Göttingen Academy in 1876 is translated in full. It was not until 1879 that the researches, of which this was the most important conclusion, appeared in complete form in Wiedemann's *Annalen*.

With the establishment of the laws of Faraday, Hittorf, and Kohlrausch the way was prepared for the dissociation theory of Arrhenius, which was announced in 1886, as soon as the theory of solutions had been formulated by Van't Hoff.

H. M. Goodwin.

Massachusetts Institute of Technology.

RELATION BY MEASURE

OF

COMMON AND VOLTAIC ELECTRICITY

BY

MICHAEL FARADAY

Read January 17, 1833, before the Royal Society

(*Philosophical Transactions*, **123**, 48, 1833; Poggendorff's *Annalen*, **29**, 378, 1833; *Experimental Researches in Electricity*, Vol. I., Series III., § 8, p. 102)