

because such portion is shown by this research to be in the electro-positive position during certain conditions of a tidal stream.

It should be pointed out that similar conditions of galvanic action obtain in all our iron structures in tidal estuaries or rivers, the action of the salt and fresh water in course of diffusion constituting a source of galvanic disintegration independent of any difference in composition of the metals. It should also be observed that in circumstances where the electromotive force arising from causes here pointed out acts in concert with any E.M.F. from differences of composition of the metals employed in structures, a very considerable total electrolytic disintegration is likely to ensue. From data kindly furnished to the author by Dr. H. Clifton Sorby, F.R.S., an indication is afforded of the nature of the changing composition of the waters of tidal estuaries at various places and depths. The Table B of electromotive force, &c., together with the diffusion resistance curve (fig. No. 1), afford some index of the changing E.M.F. arising from such tidal difference of potential.

In approaching the subject in the manner stated in this memoir, the author trusts he has been able to afford some indication of the extent of the electromotive force from the action of tidal streams on the various metals experimented upon.

### III. "On Unequal Electric Conduction-Resistance at Cathodes."

By G. GORE, F.R.S., LL.D. Received April 30, 1884.

During some experiments which I have been making on the unequal resistance to the deposition of a metal upon cathodes of different metals in the same solution by the same current (see "Some New Phenomena of Electrolysis"), I have been led to investigate the resistance of cathodes of different metals to the passage of the current into them.

I have found that by taking a good conducting electrolyte, immersing in it a positive sheet of zinc, and a smaller negative one of another metal, connecting the plates with a galvanometer of low resistance, reducing all the other resistances in the circuit to the minimum except that of the negative plate; then making a series of measurements of strengths of current of different couples formed by the zinc and about twelve other metals, during removal of polarisation by stirring the liquid; also making another series of measurements of the electromotive forces of the same couples during stirring; calculating from these data the total resistance in each case, then deducting the portion of resistance due to the galvanometer, also that due to the liquid itself, and to opposing contact-potential, and

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thermo-electric and voltaic action at the cathode and external junction, very different amounts of resistance, large in some cases, remain, and are exercised by different metals as cathodes, and those differences of resistance are only to a small extent due to heat and current absorbed in liberating hydrogen, and can only in a few cases be partly accounted for by chemical action, films, or absorption of gases at the cathode.

I am now investigating the nature of this resistance, and the relations of the resistance to various circumstances.

*May 15, 1884.*

THE PRESIDENT in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

The following Papers were read:—

- I. "Some Experiments on Metallic Reflection. No. V. On the Amount of Light reflected by Metallic Surfaces. III." By Sir JOHN CONROY, Bart., M.A. Communicated by Professor G. G. STOKES, Sec. R.S. Received May 6, 1884.

Professor Stokes recently communicated to the Royal Society ("Proc. Roy. Soc.," vol. 36, p. 187) an account of some determinations I had made of the amount of light reflected by steel and speculum metal mirrors when polarised light was incident upon them.

I have repeated these experiments with films of silver chemically deposited on glass, as such films approximate more closely to theoretically perfect metallic surfaces than any metallic mirror, however carefully polished, and also because very different statements have been made as to the reflective power of such films; one observer having said that silvered glass mirrors reflect about 90 per cent. of the light incident upon them, whilst another made their reflective power only equal to that of speculum metal.