

any further decomposition while the quantity remains the same.

Electricity produced by mechanical means possesses such great intensity that it bursts all bounds and is exceedingly difficult to insulate; while that produced by chemical means is great in quantity and of such exceeding low tension as to be easily insulated. The *intensity* of force can be increased to any desired extent by adding the requisite No. of battery cells in series, i. e. connecting the elements of the one kind in each additional cell with the contrary element in the next cell. The quantity can be increased by increasing the number of cells, and so connecting them together as that all the elements of the same kind in each cell are connected together, and all the elements of the other kind connected together. They then act as a single cell, and this is called the quantity arrangement; while the former with the alternate connexion is called the intensity arrangement.

ELECTRO-MAGNETISM.—Is magnetism produced by electric induction, which it produces without any diminution of its own original force.

THERMO-ELECTRICITY is produced through a closed circuit of two metals, when heat is applied at their junction without the intervention of any fluid compound whatever.

ELECTRODES.—The general term used when speaking of the anode and cathode together. These terms were first given by Farady, than whom no one had a better right to apply them, as none had so closely and thoroughly investigated their action. The electric force passes from the anode through the liquid, which it decomposes to the cathode on which the metal is deposited as the electricity passes over it on its way to the zinc of the battery cell. The term *electrode* has been substituted for the former ill-adapted word *pole*, which has been and now is entirely applied to the ends of a magnet. The positive pole is now the *anode*

and what was the negative pole is now the *cathode*.

ELECTROLYSIS.—This term has been applied by Farady to the decomposition which is caused by the passage of the electric force through a compound liquid consisting of metal and a metalloid, or an acid—as cyanide of potassium, sulphate of copper, iodide of potassium, &c., by which the compound is decomposed into its proximate, but not ultimate elements. The passage of a current can only take place through a compound fluid, for a fluid containing only one element arrests the passage as effectually as a separation of the electrodes in dry air. Chemical decomposition and decomposition must take place, or no passage can be effected. Whether the one or the other is the first cause is not well understood, but it goes on simultaneously if at all. No electrolysis can take place unless the body is a fluid, for dry ice is considered a very bad conductor, though when it begins to melt the water permits a passage, for the decomposed, and by proper means the oxygen and hydrogen of which it is composed may be collected and examined. Sulphate of copper is decomposed into sulphuric acid and metallic copper, the oxygen of the sulphate combining with the anode and dissolving while the metal is deposited on the cathode. Cyanide of silver is decomposed in the same way, the cyanide combining with the silver anode, while the silver from the solution is deposited in the metallic state on the cathode. It is said the bi-chlorides or dichlorides cannot form electrolytes, at least they are not acted upon by any means which have been hitherto applied to them with this view.

The action on the battery cell is precisely similar to that in the electrolytic cell, the solution acting on and eroding the zinc at the anode, while the metal is deposited on the cathode if solid at the temperature of the battery like copper or liberated as gas at its surface, if volatile at the temperature like hydrogen.