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Editorial Note on Electro Chemistry

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Editorial Note

Electrochemistry is the branch of physical chemistry concerned with the relationship between electrical potential, as a measurable and quantitative phenomenon, and identifiable chemical change, with either electrical potential as an outcome of a particular chemical change, or vice versa. These reactions involve electrons moving between electrodes via an electronically-conducting phase (typically, but not necessarily, an external electrical circuit such as in electrolessplating), separated by an ionically-conducting and electronically insulating electrolyte (or ionic species in a solution).

When a chemical reaction is effected by a potential difference, as in electrolysis, or if electrical potential results from a chemical reaction as in a battery or fuel cell, it is called an electrochemical reaction. Unlike chemical reactions, in electrochemical reactions electrons (and necessarily resulting ions), are not transferred directly between molecules, but via the aforementioned electronically- and ionically-conducting circuits, respectively. This phenomenon is what distinguishes an electrochemical reaction from a chemical reaction.

In 1663, the German physicist Otto von Guericke created the first electric generator, which produced static electricity by applying friction in the machine. The generator was made of a large sulfur ball cast inside a glass globe, mounted on a shaft. The ball was rotated by means of a crank and an electric spark was produced when a pad was rubbed against the ball as it rotated. The globe could be removed and used as source for experiments with electricity.

By the mid-18th century the French chemist Charles François de Cisternay du Fay had discovered two types of static electricity, and that like charges repel each other whilst unlike charges attract. Du Fay announced that electricity consisted of two fluids: "vitreous" (from the Latin for "glass"), or positive, electricity; and "resinous," or negative, electricity. This was the two-fluid theory of electricity, which was to be opposed by Benjamin Franklin's one-fluid theory later in the century.

In his essay Galvani concluded that animal tissue contained a here-to-fore neglected innate, vital force, which he termed "animal electricity," which activated nerves and muscles spanned by metal probes. He believed that this new force was a form of electricity in addition to the "natural" form produced by lightning or by the electric eel and torpedo ray as well as the "artificial" form produced by friction (i.e., static electricity). Galvani's scientific colleagues generally accepted his views, but Alessandro Volta rejected the idea of an "animal electric fluid," replying that the frog's legs responded to differences in metal temper, composition, and bulk. Galvani refuted this by obtaining muscular action with two pieces of the same material.

Electrochemistry is the study of production of electricity from energy released during spontaneous chemical reactions and the use of electrical energy to bring about non-spontaneous chemical transformations. The subject is of importance both for theoretical and practical considerations. A large number of metals, sodium hydroxide, chlorine, fluorine and many other chemicals are produced by electrochemical methods. Batteries and fuel cells convert chemical energy into electrical energy and are used on a large scale in various instruments and devices. The reactions carried out electrochemically can be energy efficient and less polluting. Therefore, study of electrochemistry is important for creating new technologies that are ecofriendly. The transmission of sensory signals through cells to brain and vice versa and communication between the cells are known to have electrochemical origin. Electrochemistry is a very vast and interdisciplinary subject.

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