



The Relationship between Electrical Energy and Chemical Energy

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INTRODUCTION

The electrochemistry subfield of chemistry focuses on the investigation of the relationship between chemical changes and electrical energy. Chemical processes known as electrochemical reactions involve the creation or input of electric currents. The two main types of reactions that fall under this category are electrolysis, or the production of chemical change by electrical energy, and chemical energy conversion to electrical energy i.e. the redox reactions that result in the spontaneous generation of electricity.

DESCRIPTION

When electrons transfer from one element to another in specific reactions, such as redox reactions, electricity can be generated. Electrochemistry often deals with the overall reactions when many redox reactions take place concurrently and are coupled by an external electric current and an appropriate electrolyte. Overall, charge partition and other compound characteristics are concerns for electrochemistry (as seen normally in fluids like arrangements). The dissociation of charge typically involves charge transfer between several chemical species, whether homogeneous or heterogeneous. A spontaneous reaction is a chemical process that can happen on its own and reduces the system's Gibbs free energy. Through a spontaneous reaction (redox reaction), chemical energy is converted into electrical energy in electrochemistry. The opposite cycle, in which a non-unconstrained compound response occurs by supplying power, is also conceivable. The tools needed to carry out these interconversions are electrochemical cells. An electrochemical cell is a machine that produces an electric current using the energy produced during a natural redox reaction.

Due to researchers Luigi Galvani and Alessandro Volta, who directed experiments into chemical reactions and electric flow in the late eighteenth century, this type of cell incorporates

the Galvanic or Voltaic cell. Two conducting terminals can be seen on electrochemical cells (the anode and the cathode). Electrodes that are sufficiently conductive can be made from metals, semiconductors, graphite, and even conductive polymers. In between these electrodes is the electrolyte, which is made up of free-moving ions. Two different metal electrodes are used in the galvanic cell, each of which is positioned in an electrolyte containing the positively charged ions of the electrode metal in its oxidised form. Reduction and oxidation will happen to the cathode and anode electrodes, respectively. The metal of the anode will undergo oxidation, changing from its solid state of zero to its positive oxidation state and forming an ion. At the cathode, the metal ion in solution will accept one or more electrons from the anode, bringing its oxidation state to zero. This produces a solid metal electrode on the cathode. The two electrodes must be electrically connected in order for electrons to move from the metal of the anode to the ions on the surface of the cathode *via* this connection. The movement of electrons known as an electric current is what drives a light-bulb or turns a motor [1-4].

CONCLUSION

The commercialization of several battery types is a significant practical application of electrochemistry. The original telephone and telegraph systems were powered by wet cells, which were also the source of current for electroplating. The zinc-manganese dioxide dry cell, the first non-spillable portable battery, made flashlights and other portable gadgets practical. The zinc and mercuric oxide mercury battery offered more power and capacity than the original dry cell for use in early electrical equipment. However, the mercury battery has gradually been phased out of use due to the danger of mercury pollution from discarded cells.

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CONFLICT OF INTEREST

Authors declare no conflict of interest

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