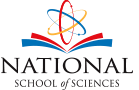
**Electrolysis and Its Application**



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**CERTIFICATE OF APPROVAL**

This project work entitled, “**Electrolysis Its Application**” by Mr. John Timalsina under the supervision of, is here submitted for the partial fulfillment of project work of chemistry of grade 11 has been accepted.

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**ABSTRACT**

This paper looks at the future of electrolysis, a process that’s key to many industries, including hydrogen production, metal refining, and making chemicals. It highlights areas where more research could make electrolysis more efficient and sustainable. For example, developing better electrode materials could improve performance by making them more durable and reducing energy waste. Optimizing electrolytes and exploring eco-friendly options like ionic liquids could also make the process more effective. Additionally, reducing energy losses from overvoltage and using renewable energy sources for electrolysis could help make these processes more sustainable. The paper also looks into how electrolysis could be used for new chemical production and better metal recovery, offering opportunities to create greener solutions. Finally, scaling up electrolysis systems for large industrial applications, while improving their cost-effectiveness and automation, could open the door to even more widespread use. Overall, the paper shows how advancing electrolysis technology could play a key role in building a more sustainable future.

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**INTRODUCTION**

Electrolysis may be defined as a chemical process in which electricity is applied to force a chemical reaction to occur. The terminology might be complex for laymen, but it simply means that an electric current is passed through an electrolyte to transform it into a chemically changed substance which usually cannot take place automatically without the application of some energy. Electrolytes which are the substances used in this process are usually dissolved in a solution or are molten compounds containing ions capable of conducting current. The process is crucial in different industries for various purposes including metal recovery and production of chemicals and is also important in research and industrial operations.

Electrolysis has two electrodes: an anode which is a positively charged electrode, and a cathode which is a negatively charged electrode. With application of voltage, ions in the electrolyte will migrate to the electrodes – the cat ions to the cathode and the anions to the anode. The ions reach the cathode and undergo a reduction reaction, which means that electrons are gained by the ions and this process leads to solid or gas products. On the other hand, the anode undergoes oxidation reactions where electrons get lost from ions and different types of chemical compounds or gas are formed. This movement and interaction of ions at the electrodes is the basis of the process of electrolysis.

The best-known use of electrolysis is the extraction of metals from their ores. aluminum, for example, is extracted from its ore called bauxite through the platinum of the electrolyte. During this electrolytic process, aluminum oxide Al₂O₃ is dissolved in molten cryolite, and the electric current is directed through the solution. The aluminum ions' movement to the cathode is then caused by the electric current and the gaining of electrons, they form into aluminum metal on the cathode whereas the oxygen ions move to the anode and release oxygen gas. This is the preferred method because aluminum is a highly reactive metal and cannot be extracted by the traditional methods, such as heating with carbon.

Another important way in which this method is used is in electroplating which is a process where a thin layer of metal is coated onto a surface. One of the most common reasons is that the objects look better but if one is applying a metal with high corrosion resistance, it can protect the part below it from being corroded or improved. A few metals that are mostly used for electroplating are gold, silver, chrome, and copper. The use of electroplating is extremely extensive in industries like jewelry, electronics, and automobile manufacturing, where both the aesthetics and durability of the surface of the products are the vitally needed qualities.

Republic of Electrolysis also makes it possible in the treatment of metal extraction and electroplating though the art of chemistry is very much centered around the electrolysis processes. For instance, the chlor-alkali process is a process that involves the use of electrolyzing salt water to produce chlorine gas, sodium hydroxide, and hydrogen gas. As chlorine is a key industrial chemical which is used for the production of plastics, disinfectants, solvents, while sodium hydroxide is used in soap making and the paper industry In the electrolysis of water, a potential other application, water is broken down to form hydrogen gas and oxygen gas Hydrogen is produced through this is fast becoming an