

8th - Chemical Effects of Electric Current II

Uses of electrolysis:

The process of electrolysis has many important industrial applications.

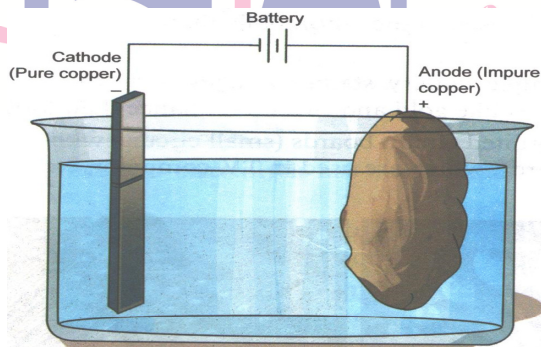
1. Electrolysis is used in industry for the production of many metals and non-metals (e.g., aluminium, magnesium, chlorine, and fluorine).
2. Electrolysis is commonly employed for coating one metal with another. The method of coating one metal with another using an electric current is called **electroplating**.

The method involved in electroplating is as follow:

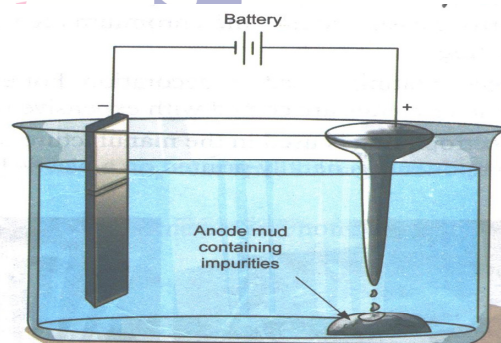
1. The object to be coated is made the cathode.
2. The metal to be deposited on the object is taken in the form of an electrode and made the anode.
3. The electrolyte contains dissolved salts of the metal to be coated.
4. Ions of the metal (which are positively charged) are attracted by the cathode and therefore move towards the object and get deposited on it.

Electroplating is done for many purposes. Here are a few examples:

1. Metals that corrode easily are protected by coating them with a metal that does not corrode easily. Nickel and chromium are widely used in the automobile industry for coating.
2. Electroplating is used for decoration. For example, cutlery, statues, and jewellery made of cheaper metals are coated with expensive metals like gold and silver.
3. Electroplating is used in the manufacture of printed circuit boards. Which are used in T.V, computer, etc.
4. Electrolysis is used in the refining of impure metals. This method, called **electro refining**, can be used to purify metals like copper, gold and silver.



An impure copper rod is taken as the anode and a very thin wire or strip of pure copper is taken as the cathode. The electrolyte is copper sulphate solution.



On passing an electric current, the impure copper dissolves into the solution, and pure copper metal gets deposited at the cathode. The impurities that collect below the anode are collectively called *anode mud*.

Practical applications/need: Electroplating is a very useful process. It is widely used in industry for coating metal objects with a thin layer of different metals.

We list below some practical applications for which objects/articles are electroplated:

1. To improve/alter their appearance: we all have seen the shining handles of bicycles and bath taps which are otherwise made of iron. This is done by

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electroplating them with chromium or nickel. Similarly, articles of base metals are often coated with precious metals to make them look more attractive.

2. To provide a protective/strengthening coating: we often find a chromium plating on bath taps, car bumpers, bicycle handles, towel rails, kitchen gas burners, wheel rims and so on. The chromium deposit not only provides a shiny appearance but also helps to avoid corrosion and scratches.

3. To minimize the cost: we know that some of the metals like gold, silver, platinum, nickel and chromium are very expensive. But artificial jewellery is often made by electroplating gold or silver on less expensive metals.

Had there been no faraday, there would have been no electricity:

We have already studied in class-VII, the magnetic effects of electric currents. These can be viewed as conversion of **electrical energy into magnetic energy**. Faraday's discovery was, in a way, the reverse of these magnetic effects of current. He showed that we can get electricity from magnetism.

Electro-magnetic induction: The phenomenon, in which electric current is generated, by a changing magnetic field, is known as **electro-magnetic induction**. The discovery and understanding of electro- magnetic induction, is based on a series of experiments carried out by Faraday and Henry.

Their **experimental observations** can be summed up as follows:

1. Whenever there is a relative motion between a magnet and a coil, that is, part of an electric circuit, a current flow through the coil.

2. The flow of current stops as soon as the magnet and the coil are at rest with respect to each other.

3. The faster is the relative motion between the magnet and the coil, the more is the current that flows through the coil.

4. The direction of current, obtained by moving the magnet away from the coil, is opposite to its direction when the magnet is moved towards the coil.

The phenomenon of electro-magnetic induction forms the underlying principal of all modern-day generators and transformers.

Today's civilization owes its progress to a great extent to the discovery of this phenomenon of electro- magnetic induction.

