Grove Double Fluid Primary Cell Voltaic Electrolytic Galvanic Chemical

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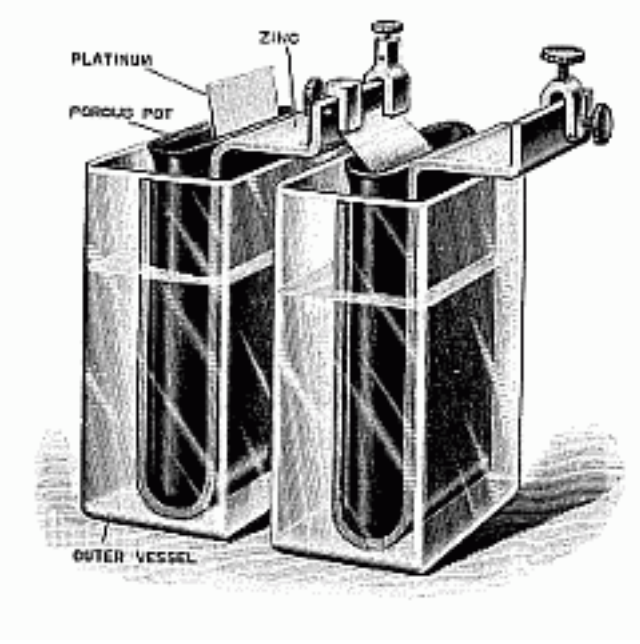

Fig 1. Grove Double Fluid Primary Cell

The **original Volta cell made in an acid version** using sulfuric acid H_2SO_4 and the same cell was also made with an **alkaline version**, using kalium (potassium in the US) KOH hydroxide electrolyte. **None of these cells were practical**, because as soon as current was drawn, the polarization effect reduced this current to near zero. During polarization, free hydrogen and oxygen gas collects on the electrodes and polarizes them. The effect always opposes the flow of current. The generated polarizing gases reduces the cell active surface area and after a short while current no longer able to flow. **In his quest to find the perfect depolarizer, Grove modified the original Volta acid cell** to prevent the gas to collection on the electrodes.

The **Grove cell is a double fluid primary voltaic or galvanic cell - Fig. 1**. This cell and its many variants are made of platinum and zinc electrodes. This cell is somewhat similar of the Bunsen cell, except that it **uses platinum as a positive electrode** instead of carbon and a different catholyte. The Grove cell is a powerful source of strong current. In this cell the flat porous clay pot contains 100% fuming nitric acid HNO_3 anolyte and the platinum plate positive electrode is centered within the clay container. The **negative zink electrode** is formed into a U shape. All cell components are located inside a strong rectangular glass jar. The catholyte is an 8% H_2SO_4 solution. The depolarizer in the Grove cell is copper sulfate NHO_3.

Like all other primary electrolytic cells, **this one is also generating electricity by chemical action**. Chemical action results in the change of substances from their original form to a new substance with new properties. **Voltaic cells produce electrical energy by direct conversion** that is a result of a redox chemical reaction.

The **Grove cell has an open circuit voltage of 1.93 Volt**. Because it is able to supply strong current for a long time, it was used in the past for powering laboratory instruments, for low current, signaling applications and powering small electric motors.

Many different Grove cell variations are known and used. Grove cells were widely used around the early part of the 1900s for laboratory experiments and railroad, telephone and telegraph signaling. Grove cell components should be well washed immediately after use, and the acids stored for future use in

separate bottles. These once popular cells helped to power the rapid development for the newly emerging postal, rail and transportation sectors between the years of the late 1700s to 1920 and beyond.

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