

THEORY

When a metal is immersed in a solution of its own ions, an equilibrium is established between the metal and its ions. This is the basis of the Daniell cell. The cell consists of two half-cells. In the first half-cell, a zinc electrode is immersed in a solution of zinc ions. In the second half-cell, a copper electrode is immersed in a solution of copper ions. The two half-cells are connected by a salt bridge, which allows the flow of ions to maintain charge neutrality. The zinc electrode is the anode, where oxidation occurs, and the copper electrode is the cathode, where reduction occurs. The overall cell reaction is:

$$Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$$

PROCEDURE

1. Preparation of solutions: Weigh a precise amount of zinc sulfate and copper sulfate and dissolve them in distilled water in separate beakers. The concentrations should be known and recorded.

2. Setup of the cell: Take two beakers. In the first, place the zinc sulfate solution and a zinc electrode. In the second, place the copper sulfate solution and a copper electrode. Connect the two electrodes through a voltmeter. A salt bridge containing a neutral salt like potassium nitrate should be used to connect the two solutions.

3. Measurement of EMF: Read the voltmeter after the cell has reached equilibrium. Record the EMF. Repeat the experiment for different concentrations of the solutions to study the effect of concentration on the EMF.

RESULTS

Concentration of Zn^{2+} (M): _____

Concentration of Cu^{2+} (M): _____

EMF (V): _____

DISCUSSION

