What Are Electrochemistry and Galvanic Cells?

Worksheet

A galvanic (voltaic) cell is a device where a spontaneous redox reaction produces electrical current. Two half-cells with different electrodes, connected by a salt bridge, create a potential difference (voltage).

Cell voltage: Ecell = Ecathode Eanode

Questions

1. In a galvanic cell, which half-reaction occurs at the cathode?

A) Oxidation
B) Reduction
C) Both
D) Neither

2. In a Zn-Cu cell, which is the positive terminal?

A) Zn electrode
B) Cu electrode
C) Salt bridge
D) Negative electrode

3. If Ecell = 1.5 V and Ecathode = +2.0 V, what is Eanode?

A) +0.5 V
B) +3.5 V
C) 0.5 V
D) +1.0 V

4. Why must Ecell be positive for a galvanic cell?

A) To obey Ohm's law
B) Spontaneous reaction requires Ecell > 0
C) Electrons have positive charge
D) Voltage is always positive

5. In a Zn-Cu galvanic cell, Zn is oxidized and Cu is reduced. If E(Zn|Zn) = 0.76 V and E(Cu|Cu) = +0.34 V, find Ecell.

6. In a Mg-Ni cell, E(Mg|Mg) = 2.37 V, E(Ni|Ni) = 0.23 V. Calculate Ecell.

7. A galvanic cell produces 0.50 V. If the cathode is Cu|Cu (E = +0.34 V), what is Eanode?

8. Define: What is a galvanic cell?

9. Define: Which electrode is the anode in a galvanic cell?

10. Define: What is the salt bridge's role?

Answer Key

1. B) Reduction - Cathode = reduction; electrons are consumed.
2. B) Cu electrode - Cu is the cathode (reduction, higher E), the positive terminal.
3. A) +0.5 V - 1.5 = 2.0 Eanode Eanode = +0.5 V.
4. B) Spontaneous reaction requires Ecell > 0 - Ecell > 0 means spontaneous; Ecathode > Eanode.
5. Anode (Zn): Eanode = 0.76 V Cathode (Cu): Ecathode = +0.34 V Ecell = Ecathode Eanode = 0.34 (0.76) = 1.10 V
6. Mg is more easily oxidized (lower E), so Mg is anode. Anode: E = 2.37 V; Cathode: E = 0.23 V Ecell = 0.23 (2.37) = 2.14 V
7. Ecell = Ecathode Eanode 0.50 = 0.34 Eanode Eanode = 0.34 0.50 = 0.16 V
8. A device using a spontaneous redox reaction to produce electrical current.
9. The anode is where oxidation occurs (negative terminal, electrons leave).
10. It allows ions to flow between half-cells, maintaining electrical neutrality.