What is Electrochemistry?

Worksheet

Electrochemistry studies redox (oxidation-reduction) reactions that produce or consume electrical energy, using cell potential Ecell = Ecathode Eanode to predict whether a reaction is spontaneous.

$$E_0 = E_0^{cathode} - E_0^{anode}$$

Questions

1. Oxidation occurs at the:

A) cathode
B) anode
C) salt bridge
D) electrolyte

2. A positive Ecell indicates the reaction is:

A) spontaneous
B) non-spontaneous
C) at equilibrium
D) impossible

3. The formula for standard cell potential is:

A) Ecell = Eanode Ecathode
B) Ecell = Ecathode Eanode
C) Ecell = Ecathode + Eanode
D) Ecell = Ecathode Eanode

4. In a galvanic cell, electrons flow through the external circuit from:

A) cathode to anode
B) anode to cathode
C) salt bridge to anode
D) cathode to salt bridge

5. A Zn/Cu cell has E(Cu/Cu) = +0.34 V (cathode) and E(Zn/Zn) = 0.76 V (anode). Find Ecell.

6. An Ag/Zn cell has Ecathode(Ag/Ag) = +0.80 V and Eanode(Zn/Zn) = 0.76 V. Find Ecell.

7. In Cu + 2e Cu, how many moles of Cu deposit when 2 mol of electrons pass through the cell?

8. Define: What is electrochemistry?

9. Define: What happens at the anode?

10. Define: What happens at the cathode?

Answer Key

1. B) anode - By definition, oxidation (loss of electrons) always happens at the anode.
2. A) spontaneous - Ecell > 0 corresponds to a negative G, meaning the reaction is spontaneous.
3. B) Ecell = Ecathode Eanode - Ecell is the cathode's reduction potential minus the anode's reduction potential.
4. B) anode to cathode - Electrons are released by oxidation at the anode and flow externally to the cathode.
5. Ecell = Ecathode Eanode Ecell = 0.34 (0.76) Ecell = 1.10 V
6. Ecell = Ecathode Eanode Ecell = 0.80 (0.76) Ecell = 1.56 V
7. 2 mol e are needed to deposit 1 mol Cu (from the balanced half-reaction) moles Cu = 2 mol e 2 moles Cu = 1 mol
8. The study of chemical reactions (redox reactions) that produce or use electrical energy.
9. Oxidation - loss of electrons.
10. Reduction - gain of electrons. Mnemonic: 'Red Cat, An Ox'.