What is an Electrochemical Cell?

Worksheet

An electrochemical cell couples a redox reaction to electron flow through an external circuit. Galvanic cells produce electricity; electrolytic cells consume it.

Questions

1. In a galvanic cell, the anode is the ___ terminal.

A) positive (+)
B) negative ()
C) zero
D) variable

2. Electrolytic cells differ in that they are

A) spontaneous and produce current
B) non-spontaneous and need external power
C) symmetric in both electrodes
D) identical to galvanic cells

3. Which equation represents reduction at the cathode?

A) Zn Zn + 2e
B) Cu + 2e Cu
C) O + 4H + 4e 2HO
D) Mg Mg + 2e

4. The salt bridge in a galvanic cell

A) prevents current flow
B) allows ion flow to maintain charge balance
C) conducts electrons
D) produces the EMF

5. In a Zn-Cu galvanic cell, which electrode is the cathode and what happens there?

6. In electrolysis of water using inert electrodes, name the product at the anode.

7. How do anodes differ between galvanic and electrolytic cells?

8. Define: What is an electrochemical cell?

9. Define: Which process is spontaneous: galvanic or electrolytic?

10. Define: At which electrode does reduction occur?

Answer Key

1. B) negative () - Galvanic cells: anode (oxidation) = negative; cathode (reduction) = positive.

2. B) non-spontaneous and need external power - Electrolytic cells require external DC voltage; they drive non-spontaneous reactions.

3. B) Cu + 2e Cu - Reduction = gaining e. Only Cu + 2e Cu shows electrons being gained.

4. B) allows ion flow to maintain charge balance - Salt bridge permits cations/anions to move between compartments, preventing charge buildup.

5. Cu is less reactive than Zn. Zn is oxidized (anode). Cu is reduced at Cu (cathode) Cu + 2e Cu

6. Non-spontaneous reaction, powered by DC source. Anode is positive. At anode (oxidation): 2HO O + 4H + 4e Product = O gas

7. Galvanic: anode is negative () terminal, where oxidation happens spontaneously. Electrolytic: anode is positive (+) terminal, oxidation is forced by external voltage.

8. A device that converts chemical energy electrical energy via redox reactions.

9. Galvanic is spontaneous; electrolytic requires external power.

10. The cathode (positive in electrolytic, negative in galvanic).