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AMC/AFNS/NUMS Chemistry-5 Test Preparation

Electrochemistry

1. Electrochemistry is the branch of chemistry that deals with:

- A. Heat changes only
- B. Relationship between chemical reactions and electricity
- C. Study of gases only
- D. Structure of nucleus only

Correct Answer: B. Relationship between chemical reactions and electricity

Explanation: Electrochemistry deals with chemical reactions that involve transfer of electrons and production or use of electrical energy. It includes oxidation-reduction reactions, electrolysis, galvanic cells, electrolytic cells, batteries, and corrosion.

2. A redox reaction involves transfer of:

- A. Protons
- B. Neutrons
- C. Electrons
- D. Molecules only

Correct Answer: C. Electrons

Explanation: Redox reactions involve oxidation and reduction occurring together. In these reactions, electrons are transferred from one substance to another. The substance that loses electrons is oxidized, while the substance that gains electrons is reduced.

3. Oxidation is defined as:

- A. Gain of electrons
- B. Loss of electrons
- C. Gain of protons only
- D. Loss of neutrons only

Correct Answer: B. Loss of electrons

Explanation: Oxidation means loss of electrons by an atom, ion, or molecule. When a substance loses electrons, its oxidation number increases. For example, Zn changes into Zn^{2+} by losing two electrons, so zinc is oxidized.

4. Reduction is defined as:

- A. Loss of electrons
- B. Gain of electrons
- C. Loss of oxygen only
- D. Gain of neutrons

Correct Answer: B. Gain of electrons

Explanation: Reduction means gain of electrons by an atom, ion, or molecule. When a

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substance gains electrons, its oxidation number decreases. For example, Cu^{2+} gains two electrons to form Cu, so copper ions are reduced.

5. The substance that loses electrons is called:

- A. Oxidizing agent
- B. Reducing agent
- C. Catalyst
- D. Solvent

Correct Answer: B. Reducing agent

Explanation: A reducing agent donates electrons to another substance and itself gets oxidized. Since it causes reduction of another species by providing electrons, it is called a reducing agent.

6. The substance that gains electrons is called:

- A. Reducing agent
- B. Oxidizing agent
- C. Electrolyte only
- D. Salt bridge

Correct Answer: B. Oxidizing agent

Explanation: An oxidizing agent accepts electrons from another substance and itself gets reduced. It causes oxidation of another species by removing electrons from it.

7. In the reaction $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$, zinc is:

- A. Reduced
- B. Oxidized
- C. Neutralized
- D. Hydrolyzed

Correct Answer: B. Oxidized

Explanation: Zinc loses two electrons to form Zn^{2+} . Loss of electrons is oxidation. Therefore, zinc is oxidized in this half-reaction.

8. In the reaction $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$, copper ion is:

- A. Oxidized
- B. Reduced
- C. Dehydrated
- D. Sublimed

Correct Answer: B. Reduced

Explanation: Copper ion gains two electrons to form neutral copper metal. Gain of electrons is reduction. Therefore, Cu^{2+} is reduced to Cu.

9. An electrolyte is a substance that:

- A. Does not conduct electricity in solution
- B. Conducts electricity in molten or aqueous state
- C. Conducts only as a solid metal

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D. Contains no ions

Correct Answer: B. Conducts electricity in molten or aqueous state

Explanation: An electrolyte conducts electricity when dissolved in water or melted because it produces mobile ions. These ions move toward electrodes and carry electric current. Acids, bases, and salts are common electrolytes.

10. A non-electrolyte is a substance that:

A. Produces ions in water

B. Conducts electricity strongly

C. Does not produce ions in solution

D. Always forms metals

Correct Answer: C. Does not produce ions in solution

Explanation: Non-electrolytes do not ionize in water and therefore do not conduct electricity. Examples include sugar, urea, and alcohol. Their molecules remain neutral in solution.

11. Strong electrolytes:

A. Ionize completely in solution

B. Do not ionize at all

C. Ionize partially only

D. Conduct only in solid state

Correct Answer: A. Ionize completely in solution

Explanation: Strong electrolytes dissociate almost completely into ions in aqueous solution. Because many ions are present, they conduct electricity strongly. Examples include HCl, NaOH, and NaCl.

12. Weak electrolytes:

A. Ionize completely

B. Ionize partially

C. Never dissolve in water

D. Conduct better than metals

Correct Answer: B. Ionize partially

Explanation: Weak electrolytes ionize only partially in water. They produce fewer ions, so their electrical conductivity is weaker than strong electrolytes. Examples include acetic acid and ammonium hydroxide.

13. Electrolysis is the process in which electricity is used to:

A. Stop a reaction permanently

B. Bring about a non-spontaneous chemical reaction

C. Produce sound waves

D. Remove heat only

Correct Answer: B. Bring about a non-spontaneous chemical reaction

Explanation: Electrolysis uses electrical energy to drive a chemical reaction that does not occur

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spontaneously. It is carried out in an electrolytic cell using electrodes and an electrolyte. Electrolysis is used in electroplating, extraction of metals, and purification of metals.

14. The electrode connected to the positive terminal in electrolysis is called:

- A. Cathode
- B. Anode
- C. Salt bridge
- D. Electrolyte

Correct Answer: B. Anode

Explanation: In an electrolytic cell, the anode is connected to the positive terminal of the battery. Negative ions move toward the anode and lose electrons there. Oxidation occurs at the anode.

15. The electrode connected to the negative terminal in electrolysis is called:

- A. Cathode
- B. Anode
- C. Salt bridge
- D. Voltmeter

Correct Answer: A. Cathode

Explanation: In an electrolytic cell, the cathode is connected to the negative terminal of the battery. Positive ions move toward the cathode and gain electrons there. Reduction occurs at the cathode.

16. Oxidation always occurs at the:

- A. Cathode
- B. Anode
- C. Salt bridge
- D. Electrolyte only

Correct Answer: B. Anode

Explanation: Oxidation occurs at the anode in both electrolytic and galvanic cells. The sign of the anode may differ in different cells, but the process at the anode is always oxidation.

17. Reduction always occurs at the:

- A. Anode
- B. Cathode
- C. Salt bridge
- D. External wire

Correct Answer: B. Cathode

Explanation: Reduction occurs at the cathode in both electrolytic and galvanic cells. Cations usually move toward the cathode because they gain electrons there and become neutral atoms or molecules.

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18. During electrolysis, cations move toward the:

- A. Anode
- B. Cathode
- C. Salt bridge only
- D. Surface of solution

Correct Answer: B. Cathode

Explanation: Cations are positively charged ions. They move toward the negatively charged cathode in an electrolytic cell, where they gain electrons and are reduced.

19. During electrolysis, anions move toward the:

- A. Cathode
- B. Anode
- C. Negative terminal only
- D. Center of solution

Correct Answer: B. Anode

Explanation: Anions are negatively charged ions. They move toward the positively charged anode in an electrolytic cell, where they lose electrons and are oxidized.

20. In electrolysis of molten NaCl, sodium is deposited at the:

- A. Anode
- B. Cathode
- C. Salt bridge
- D. Both electrodes

Correct Answer: B. Cathode

Explanation: Molten sodium chloride contains Na^+ and Cl^- ions. Na^+ ions move to the cathode, gain electrons, and form sodium metal. The cathode reaction is $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$.

21. In electrolysis of molten NaCl, chlorine gas is produced at the:

- A. Cathode
- B. Anode
- C. Salt bridge
- D. Battery only

Correct Answer: B. Anode

Explanation: Chloride ions move toward the anode and lose electrons to form chlorine gas. The anode reaction is $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$. Therefore, chlorine is produced at the anode.

22. Electroplating is the process of:

- A. Coating one metal with another by electrolysis
- B. Breaking water by heating
- C. Producing electricity from sunlight
- D. Dissolving sugar in water

Correct Answer: A. Coating one metal with another by electrolysis

Explanation: Electroplating is the deposition of a thin layer of one metal over another metal

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using electrolysis. It is used to improve appearance, prevent corrosion, and increase durability. Common examples include silver plating and chromium plating.

23. In electroplating, the object to be plated is made:

- A. Anode
- B. Cathode
- C. Electrolyte
- D. Salt bridge

Correct Answer: B. Cathode

Explanation: In electroplating, the object that needs coating is connected as the cathode. Metal ions from the electrolyte gain electrons at the cathode and deposit as a thin metal layer on the object.

24. A galvanic cell converts:

- A. Electrical energy into chemical energy
- B. Chemical energy into electrical energy
- C. Heat energy into sound energy
- D. Light energy into nuclear energy

Correct Answer: B. Chemical energy into electrical energy

Explanation: A galvanic or voltaic cell produces electrical energy from a spontaneous redox reaction. Electrons flow through the external circuit from anode to cathode, producing electric current.

25. In a galvanic cell, the anode is:

- A. Positive electrode
- B. Negative electrode
- C. Neutral electrode
- D. Insulator

Correct Answer: B. Negative electrode

Explanation: In a galvanic cell, oxidation occurs at the anode and electrons are released there. Because electrons accumulate at the anode, it acts as the negative electrode.

26. In a galvanic cell, the cathode is:

- A. Negative electrode
- B. Positive electrode
- C. Electrolyte
- D. Salt bridge

Correct Answer: B. Positive electrode

Explanation: In a galvanic cell, reduction occurs at the cathode. Electrons flow toward the cathode through the external circuit, so it behaves as the positive electrode.

27. The function of a salt bridge is to:

- A. Stop ion movement

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- B. Complete the circuit and maintain electrical neutrality
- C. Produce heat only
- D. Remove electrodes

Correct Answer: B. Complete the circuit and maintain electrical neutrality

Explanation: A salt bridge allows ions to move between the two half-cells. This prevents charge buildup and maintains electrical neutrality. Without a salt bridge, electron flow would stop and the cell would not continue working.

28. In a Daniell cell, zinc acts as the:

- A. Cathode
- B. Anode
- C. Salt bridge
- D. Electrolyte

Correct Answer: B. Anode

Explanation: In a Daniell cell, zinc is oxidized to Zn^{2+} at the anode. The oxidation half-reaction is $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$. Electrons released by zinc flow through the external circuit toward the copper electrode.

29. In a Daniell cell, copper acts as the:

- A. Anode
- B. Cathode
- C. Electrolyte
- D. Salt bridge

Correct Answer: B. Cathode

Explanation: In a Daniell cell, Cu^{2+} ions gain electrons at the copper electrode and are reduced to copper metal. Therefore, copper acts as the cathode, where reduction takes place.

30. Corrosion of iron is commonly called:

- A. Electrolysis
- B. Rusting
- C. Electroplating
- D. Neutralization

Correct Answer: B. Rusting

Explanation: Corrosion of iron is called rusting. It occurs when iron reacts with oxygen and moisture to form hydrated iron oxide. Rusting is an electrochemical process and causes damage to iron objects, bridges, vehicles, and machinery.



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