

Redox and Electrochemistry Multiple Choice Review

CONCEPT REVIEW - Multiple Choice

1. Identify the oxidizing agent in the following reaction:

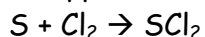


- a. Na
- b. H_2O
- c. NaOH
- d. H_2

2. Nitrogen has the same oxidation number in all of the following except:

- a. NO_3^-
- b. N_2O_5
- c. NH_4Cl
- d. $\text{Ca}(\text{NO}_3)_2$

3. Determine what happens in this reaction:

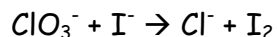


- a. Sulfur is reduced.
- b. Chlorine is reduced.
- c. Chlorine is oxidized.
- d. Sulfur is the oxidizing agent.

4. $\text{Sn}^{4+} \rightarrow \text{Sn}^{2+}$ represents

- a. oxidation
- b. reduction
- c. hydrolysis
- d. none of the above

5. What happens to the chlorine (in ClO_3^-) in the following redox reaction?



- a. It is oxidized.
- b. Its oxidation number changes from +6 to -1.
- c. Its oxidation number change is -6.
- d. Its oxidation number change is +6.

6. Which of the following is an oxidation half-reaction?

- a. $\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn}$
- b. $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$
- c. $\text{H}_2 \rightarrow 2\text{H}^+ + 2\text{e}^-$
- d. $\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}^-$

7. The oxidation number of sulfur in H_2SO_3 is

- a. +1
- b. +2
- c. +3
- d. +4

8. A clean strip of copper is dipped into a solution of magnesium sulfate. Predict what you might observe using the Activity Series Reference Table.

- a. The copper strip becomes magnesium-plated.
- b. Copper dissolves and the solution turns blue.
- c. No reaction occurs.
- d. Bubbles of hydrogen gas appear on the copper.

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9. A clean iron nail is dipped into a solution of silver nitrate. Using your knowledge of the oxidation-reduction reactions and the Activity Series Reference Table, predict which of the following will occur.
- The iron will be reduced.
 - The iron nail will become silver-plated.
 - No reaction occurs.
 - The iron will be oxidized.
10. Which of the following is true for an electrolytic cell?
- It changes electrical energy into chemical energy.
 - It is a type of cell used in electroplating.
 - It uses an electric current to make a nonspontaneous reaction to occur.
 - all of the above.
11. Which half-reaction occurs at the negative electrode in an electrolytic cell in which an object is being plated with silver?
- | | |
|---|---|
| a. $\text{Ag} + \text{e}^- \rightarrow \text{Ag}^+$ | c. $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$ |
| b. $\text{Ag} \rightarrow \text{Ag}^+ + \text{e}^-$ | d. $\text{Ag}^+ \rightarrow \text{Ag} + \text{e}^-$ |
12. Which ion can be most easily reduced?
- | | |
|---------------------|---------------------|
| a. Cu^{2+} | c. Fe^{2+} |
| b. Zn^{2+} | d. Ca^{2+} |
13. In an electrochemical cell (voltaic), the anode is:
- the electrode at which reduction occurs.
 - the electrode at which electrons are produced
 - the positive electrode
 - all of the above
14. Which of the following is true about an electrolytic cell?
- Electrons flow from the cathode to the anode in the external circuit.
 - Oxidation occurs at the cathode.
 - The redox reaction involved in such a cell is spontaneous.
 - None of the above.
15. If Al is above Co in the activity series of metals, which of the following will occur if a strip of Al is dipped into a solution of $\text{Co}(\text{NO}_3)_2$?
- A redox reaction takes place.
 - The Al strip dissolves.
 - The Al strip becomes coated with Co.
 - All of the above.

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REGENTS PRACTICE - Multiple Choice

- 16) In any oxidation-reduction reaction, the total number of electrons gained is
- equal to the total number of electrons lost
 - less than the total number of electrons lost
 - greater than the total number of electrons lost
 - unrelated to the total number of electrons lost
- 17) In which substance does sulfur have a negative oxidation number?
- Na_2S
 - CaSO_4
 - S
 - SO_2
- 18) Which of the following is a redox reaction?
- $2\text{KBr} + \text{F}_2 \rightarrow 2\text{KF} + \text{Br}_2$
 - $2\text{HCl} + \text{Mg}(\text{OH})_2 \rightarrow 2\text{HOH} + \text{MgCl}_2$
 - $2\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{HCl}$
 - $\text{Ca}(\text{OH})_2 + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{Pb}(\text{OH})_2$
- 19) In the reaction $2\text{K} + \text{Cl}_2 \rightarrow 2\text{KCl}$, the species oxidized is
- K
 - Cl_2
 - Cl^-
 - K^+
- 20) In the reaction $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$, the oxidation number of nitrogen changes from
- 3 to +2
 - 3 to -2
 - 2 to +3
 - 2 to -3
- 21) Given the unbalanced equation:
- $$\underline{\hspace{1cm}}\text{Fe} + \underline{\hspace{1cm}}\text{Ag}^+ \rightarrow \underline{\hspace{1cm}}\text{Ag} + \underline{\hspace{1cm}}\text{Fe}^{3+}$$
- When the equation is correctly balanced using smallest whole number, the coefficient of Ag^+ is
- 5
 - 2
 - 3
 - 4
- 22) What is the purpose of the salt bridge in a voltaic cell?
- It allows ion migration.
 - It allows electron flow.
 - It prevents ion migration.
 - It prevents electron flow.
- 23) According to the Activity Series chemistry reference tables, which metal can reduce Mg^{2+} to $\text{Mg}(\text{s})$?
- Ba
 - Fe
 - Pb
 - Ag

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24) Which atom forms an ion that would migrate toward the cathode in an electrolytic cell?

a. Na

c. I

b. F

d. Cl

25) An electrolytic cell differs from a voltaic cell in that the electrolytic cell

a. uses an applied electrical current

b. involves redox reaction

c. is exothermic

d. produces an electric current