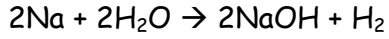
Redox and Electrochemistry Multiple Choice Review

CONCEPT REVIEW – Multiple Choice

1. Identify the oxidizing agent in the following reaction:

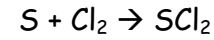


$2Na + 2H_2O \rightarrow 2NaOH + H_2$

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. $Ca(NO_3)_2$

3. Determine what happens in this reaction:



$S + Cl_2 \rightarrow SCl_2$

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

4. $Sn^{4+} \rightarrow Sn^{2+}$ 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?

$ClO_3^- + I^- \rightarrow Cl^- + I_2$

   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. $Zn^{2+} + 2e^- \rightarrow Zn$
   b. $Na^+ + e^- \rightarrow Na$
   c. $H_2 \rightarrow 2H^+ + 2e^-$
   d. $I_2 + 2e^- \rightarrow 2I^-$

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.

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.
    a. The iron will be reduced.
    b. The iron nail will become silver-plated.
    c. No reaction occurs.
    d. The iron will be oxidized.

10. Which of the following is true for an electrolytic cell?
    a. It changes electrical energy into chemical energy.
    b. It is a type of cell used in electroplating.
    c. It uses and electric current to make a nonspontaneous reaction to occur.
    d. 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. $Ag + e^- \rightarrow Ag^+$
    b. $Ag \rightarrow Ag^+ + e^-$
    c. $Ag^+ + e^- \rightarrow Ag$
    d. $Ag^+ \rightarrow Ag + e^-$

12. Which ion can be most easily reduced?
    a. Cu^{2+}
    b. Zn^{2+}
    c. Fe^{2+}
    d. Ca^{2+}

13. In an electrochemical cell (voltaic), the anode is:
    a. the electrode at which reduction occurs.
    b. the electrode at which electrons are produced
    c. the positive electrode
    d. all of the above

14. Which of the following is true about an electrolytic cell?
    a. Electrons flow from the cathode to the anode in the external circuit.
    b. Oxidation occurs at the cathode.
    c. The redox reaction involved in such a cell is spontaneous.
    d. 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 $Co(NO_3)_2$?
    a. A redox reaction takes place.
    b. The Al strip dissolves.
    c. The Al strip becomes coated with Co.
    d. 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
   a. equal to the total number of electrons lost
   b. less than the total number of electrons lost
   c. greater than the total number of electrons lost
   d. unrelated to the total number of electrons lost

17) In which substance does sulfur have a negative oxidation number?
   a. Na_2S
   b. $CaSO_4$
   c. S
   d. SO_2

18) Which of the following is a redox reaction?
   a. $2KBr + F_2 \rightarrow 2KF + Br_2$
   b. $2HCl + Mg(OH)_2 \rightarrow 2HOH + MgCl_2$
   c. $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$
   d. $Ca(OH)_2 + Pb(NO_3)_2 \rightarrow Ca(NO_3)_2 + Pb(OH)_2$

19) In the reaction $2K + Cl_2 \rightarrow 2KCl$, the species oxidized is
   a. K
   b. Cl_2
   c. Cl^-
   d. K^+

20) In the reaction $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$, the oxidation number of nitrogen changes from
   a. -3 to +2
   b. -3 to -2
   c. -2 to +3
   d. -2 to -3

21) Given the unbalanced equation:

   ___Fe + __Ag^+ → ___Ag + ___ Fe^{3+}

   When the equation is correctly balanced using smallest whole number, the coefficient of Ag^+ is
   a. 5
   b. 2
   c. 3
   d. 4

22) What is the purpose of the salt bridge in a voltaic cell?
   a. It allows ion migration.
   b. It allows electron flow.
   c. It prevents ion migration.
   d. It prevents electron flow.

23) According to the Activity Series chemistry reference tables, which metal can reduce Mg^{2+} to Mg (s)?
   a. Ba
   b. Fe
   c. Pb
   d. Ag

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

a. Na
b. F
c. I
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