Electrolysis and Cell Chemistry

Here are 20 multiple-choice questions (MCQs) based on Faraday's laws of electrolysis, electrode potential, cell emf, Kohlrausch's law, electrolytes, Ostwald's dilution law, oxidation, and reduction:

1. **Faraday's First Law of Electrolysis states:**
     - a) The mass of a substance deposited is directly proportional to the quantity of electricity passed.
     - b) The mass of a substance deposited is inversely proportional to the quantity of electricity passed.
     - c) The mass of a substance deposited is directly proportional to the square of the quantity of electricity passed.
     - d) The mass of a substance deposited is independent of the quantity of electricity passed.
2. **Faraday's Second Law of Electrolysis states:**
     - a) The masses of different substances deposited by the same quantity of electricity are directly proportional to their equivalent weights.
     - b) The masses of different substances deposited by the same quantity of electricity are inversely proportional to their equivalent weights.
     - c) The masses of different substances deposited by the same quantity of electricity are directly proportional to the atomic weights.
     - d) The masses of different substances deposited by the same quantity of electricity are inversely proportional to the atomic weights.
3. **The unit of electrode potential is:**
     - a) Volt
     - b) Ampere
     - c) Ohm
     - d) Joule
4. **The standard electrode potential of a half-cell is measured under which condition?**
     - a) 0°C, 1M concentration, and 1 atm pressure
     - b) 25°C, 1M concentration, and 1 atm pressure
     - c) 100°C, 1M concentration, and 1 atm pressure
     - d) 25°C, 0.1M concentration, and 1 atm pressure
5. **In an electrochemical cell, the electrode at which reduction occurs is called:**
     - a) Anode
     - b) Cathode
     - c) Salt bridge
     - d) Electrolyte
6. **Which of the following represents the Nernst equation for a single electrode potential?**
     - a) $E = E^\circ - \frac{0.0591}{n} \log Q$
     - b) $E = E^\circ + \frac{0.0591}{n} \log Q$
     - c) $E = E^\circ - \frac{0.0591}{n} \log \left(\frac{1}{Q} \right)$
     - d) $E = E^\circ + \frac{0.0591}{n} \log \left(\frac{1}{Q} \right)$
7. **The EMF of a galvanic cell is given by:**
     - a) $E_{\text{cell}} = E_{\text{cathode}} - E_{\text{anode}}$

- b) $E_{\text{cell}} = E_{\text{anode}} - E_{\text{cathode}}$
- c) $E_{\text{cell}} = E_{\text{cathode}} + E_{\text{anode}}$
- d) $E_{\text{cell}} = E_{\text{anode}} + E_{\text{cathode}}$

8. **Kohlrausch's law is applicable for:**
   - a) Weak electrolytes only
   - b) Strong electrolytes only
   - c) Both weak and strong electrolytes
   - d) None of the above

9. **Ostwald's dilution law is used to calculate:**
   - a) Degree of ionization of weak electrolytes
   - b) Degree of ionization of strong electrolytes
   - c) Degree of ionization of non-electrolytes
   - d) None of the above

10. **The unit of molar conductivity is:**
    - a) S cm
    - b) S cm^2 mol^{-1}
    - c) S cm^{-1}
    - d) S cm^{-2} mol^{-1}

11. **When an electrolyte is dissolved in water, it dissociates into:**
    - a) Atoms
    - b) Ions
    - c) Molecules
    - d) Electrons

12. **Oxidation is defined as:**
    - a) Gain of electrons
    - b) Loss of electrons
    - c) Gain of protons
    - d) Loss of protons

13. **Reduction is defined as:**
    - a) Gain of electrons
    - b) Loss of electrons
    - c) Gain of protons
    - d) Loss of protons

14. **In a redox reaction, the substance that gets oxidized is known as:**
    - a) Oxidizing agent
    - b) Reducing agent
    - c) Catalyst
    - d) Inert electrode

15. **In a redox reaction, the substance that gets reduced is known as:**
    - a) Oxidizing agent
    - b) Reducing agent
    - c) Catalyst
    - d) Inert electrode

16. **The equilibrium constant for the dissociation of a weak electrolyte is given by:**
    - a) $K = \frac{[\text{products}]}{[\text{reactants}]}$
    - b) $K = \frac{[\text{reactants}]}{[\text{products}]}$
    - c) $K = \frac{[\text{cations}][\text{anions}]}{[\text{electrolyte}]}$
    - d) $K = \frac{[\text{electrolyte}]}{[\text{cations}][\text{anions}]}$

17. **The EMF of a cell can be affected by:**
    - a) Temperature
    - b) Pressure
    - c) Concentration
    - d) All of the above
18. **In the electrolysis of water, the gas liberated at the cathode is:**
    - a) Oxygen
    - b) Hydrogen
    - c) Chlorine
    - d) Nitrogen
19. **During electrolysis, the amount of substance deposited at an electrode is proportional to:**
    - a) The current passed
    - b) The time for which current is passed
    - c) Both a and b
    - d) Neither a nor b
20. **The standard cell potential (E° cell) is positive for:**
    - a) Spontaneous reactions
    - b) Non-spontaneous reactions
    - c) Equilibrium reactions
    - d) None of the above

Answer Key

1. a
2. a
3. a
4. b
5. b
6. a
7. a
8. c
9. a
10. b
11. b
12. b
13. a
14. b
15. a
16. c
17. d
18. b
19. c
20. a