

1. Which substance can be decomposed chemically?

- A. CaO and Ca
- B. MgO and Mg
- C. CO and Co
- D. CaO and MgO

2. The particles of a substance are arranged in a definite shape geometric pattern and are constantly vibrating. This substance can be in

- A. The solid phase, only
- B. The liquid phase, only
- C. Either the liquid or the solid phase
- D. Neither the liquid or the solid phase

3. Given the balanced equation: $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$

At STP, what is the total number of liters of hydrogen gas produced when 3.00 moles of hydrochloric acid solution is completely consumed?

- A. 11.2 L
- B. 22.4 L
- C. 33.6 L
- D. 44.8 L

4. Given the reaction at equilibrium: $2\text{CO}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{CO}_2(\text{g})$

When the reaction is subjected to stress, a change will occur in the concentration of

- A. Reactants, only
- B. Products, only
- C. Both products and reactants
- D. Neither reactants nor products

5. What is the concentration of a solution of 10 moles of copper (II) nitrate in 5.0 liters of solution?

- A. .50 M
- B. 2.0 M
- C. 5.0 M
- D. 10 M

6. What is the oxidation number of chlorine in HClO_4 ?

- A. +1
- B. +5
- C. +3
- D. +7

7. Given the redox reaction: $\text{Fe}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Fe}(\text{s})$

Which species acts as a reducing agent?

- A. Fe(s)
- B. Fe²⁺(aq)
- C. Zn(s)
- D. Zn²⁺(aq)

8. Given the reaction: $\text{Zn(s)} + 2\text{HCl(aq)} \rightarrow \text{ZnCl}_2\text{(aq)} + \text{H}_2\text{(g)}$

Which equation represents the correct oxidation half-reaction?

- A. $\text{Zn(s)} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
- B. $2\text{H} + 2\text{e}^- \rightarrow \text{H}_2\text{(g)}$
- C. $\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn(s)}$
- D. $2\text{Cl}^- \rightarrow \text{Cl}_2\text{(g)} + 2\text{e}^-$

9. Which of the following is the strongest Bronsted acid?

- A. NH₃
- B. HSO₄⁻
- C. H₂O
- D. HNO₃

10. What is the pH of a solution with a hydronium ion concentration of .01 mole per liter?

- A. 1
- B. 2
- C. 10
- D. 14

11. Which terms describe a substance that has a low melting point and poor electrical conductivity?

- A. Covalent and metallic
- B. Covalent and molecular
- C. Ionic and molecular
- D. Ionic and metallic

12. Given the reaction: $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$

What is the maximum number of moles of H_2O that can be produced when 2.0 moles of NH_3 are completely reacted?

- A. 1.0
- B. 2.0
- C. 3.0
- D. 6.0

13. Which compound is a salt?

- A. Na_3PO_4
- B. H_3PO_4

C. CH₃COOH

D. Ca(OH)₂

14. At 1 atm and 298 K, which of the K_a values listed below represents the strongest acid?

A. 1.1×10^{-7}

B. 1.8×10^{-5}

C. 5.6×10^{-11}

D. 4.6×10^{-4}

15. Which compound will conduct an electric current when dissolved in water?

A. NaOH

B. C₂H₅OH

C. C₆H₁₂O₆

D. C₁₂H₂₂O₁₁

16. Which half reaction correctly represents oxidation?

A. $\text{Sn}^{2+} + 2\text{e}^- \rightarrow \text{Sn}^0$

B. $\text{Sn}^{4+} + 2\text{e}^- \rightarrow \text{Sn}^{2+}$

C. $\text{Sn}^2 \rightarrow \text{Sn}^0 + 2\text{e}^-$

D. $\text{Sn}^{2+} \rightarrow \text{Sn}^{4+} + 2\text{e}^-$

17. In a redox reaction the reducing agent will

- A. Lose electrons and be reduced
- B. Lose electrons and be oxidized
- C. Gain electrons and be reduced
- D. Gain electrons and be oxidized

18. A reaction will be spontaneous if it results in product that have

- A. Lower potential energy and less randomness
- B. Lower potential energy and more randomness
- C. Greater potential energy and less randomness
- D. Greater potential energy and more randomness

19. Which of the following does not have a strong K_a value?

- A. Boric Acid
- B. Nitric Acid
- C. Sulfuric Acid
- D. Chloric Acid

20. If the pH is greater than 7 litmus paper will turn _____.

- A. Red
- B. Orange
- C. Neutral

D. Blue

Answer Key

1. D

2. A

3. C

4. C

5. B

6. D

7. C

8. A

9. A

10. B

11. B

12. C

13. A

14. D

15. A

16. D

17. B

18. B

19. A

20. D