

Please read all the questions VERY carefully before answering. No outside paper is allowed.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) When a solution of MgCl_2 and one of AgNO_3 are mixed, the net ionic equation is 1) _____
- A) $\text{Mg}^{2+}(\text{aq}) + 2\text{Cl}^{-}(\text{aq}) + 2\text{Ag}^{+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) \rightarrow \text{Mg}(\text{NO}_3)_2(\text{aq}) + 2\text{AgCl}(\text{s})$
B) $\text{Cl}^{-}(\text{aq}) + \text{Ag}^{+}(\text{aq}) \rightarrow \text{AgCl}(\text{s})$
C) $\text{Mg}^{2+}(\text{aq}) + 2\text{Cl}^{-}(\text{aq}) + 2\text{Ag}^{+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) + 2\text{AgCl}(\text{s})$
D) $\text{Mg}^{2+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) \rightarrow \text{Mg}(\text{NO}_3)_2(\text{aq})$
E) none of the above
- 2) What type of a reaction occurs when a hydrochloric acid solution is mixed with a sodium bicarbonate solution? 2) _____
- A) acid-base neutralization
B) gas evolution
C) oxidation-reduction
D) precipitation
E) no reaction
- 3) What type of a reaction occurs when potassium metal reacts with fluorine gas? 3) _____
- A) precipitation
B) acid-base neutralization
C) gas evolution
D) oxidation-reduction
E) no reaction
- 4) Identify the oxidation-reduction reactions among the following: 4) _____
1. $\text{Zn}(\text{s}) + \text{Cu}^{2+}(\text{aq}) \rightarrow \text{Zn}^{2+}(\text{aq}) + \text{Cu}(\text{s})$
2. $2\text{Na}(\text{s}) + \text{Cl}_2(\text{aq}) \rightarrow 2\text{NaCl}(\text{s})$
3. $2\text{Mg}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{MgO}$
A) 2 and 3 only
B) 1 and 3 only
C) 1 and 2 only
D) All of 1, 2, and 3
E) None of 1, 2, and 3
- 5) Which of the following statements about redox reactions is FALSE? 5) _____
- A) A reaction involving elemental oxygen is a redox reaction.
B) Oxidation is the loss of electrons.
C) A reaction can undergo either oxidation or reduction, not both.
D) Reduction is the gain of electrons.
E) All of the above statement are true.

- 6) Identify the double displacement reactions among the following: 6) _____
1. $\text{KCl(aq)} + \text{AgNO}_3\text{(aq)} \rightarrow \text{AgCl(s)} + \text{KNO}_3\text{(aq)}$
 2. $\text{Na}_2\text{SO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)} + 2\text{NaCl(aq)}$
 3. $\text{H}_2\text{SO}_4\text{(aq)} + 2\text{NaOH(aq)} \rightarrow \text{Na}_2\text{SO}_4\text{(aq)} + 2\text{H}_2\text{O(l)}$
- A) 2 and 3 only
B) 1 and 3 only
C) 1 and 2 only
D) All of 1, 2, and 3
E) None of 1, 2, and 3
- 7) Which of the following changes will increase reaction rate? 7) _____
1. An increase in the concentration of reactants
 2. An increase in temperature
 3. Higher-energy collisions between reacting molecules
- A) 1 and 2 only
B) 2 and 3 only
C) 1 and 3 only
D) All of 1, 2, and 3
E) Neither 1, 2, or 3
- 8) Which of the following is true about a chemical system in equilibrium? 8) _____
- A) Temperature changes have no effect on reaction rate.
B) Reaction rate remains stable as long as temperature and pressure are stable.
C) Addition of more reactants have no effect on reaction rate.
D) No reaction takes place.
E) none of the above
- 9) A system is said to be in dynamic equilibrium when: 9) _____
- A) you have let the reaction proceed for approximately 30 minutes and can assume there will be no more changes.
B) the forward and reverse reactions come to a halt.
C) there is no longer any net change in the concentrations of products or reactants.
D) the sum of the concentrations of the reactants is equal to the sum of the concentrations of the products.
E) none of the above
- 10) Consider the reaction: $2\text{N}_2\text{O(g)} \rightleftharpoons \text{O}_2\text{(g)} + 2\text{N}_2\text{(g)}$. Which of the following will cause a shift in the equilibrium to the left? 10) _____
1. Remove N_2O
 2. Remove O_2
 3. Add N_2
- A) 2 and 3 only
B) 1 and 3 only
C) 1 and 2 only
D) All of 1, 2, and 3
E) Neither 1, 2, or 3

- 11) For the reaction $2\text{N}_2\text{O}(\text{g}) \rightleftharpoons \text{O}_2(\text{g}) + 2\text{N}_2(\text{g})$, what happens to the equilibrium position if the volume increases? 11) _____
- A) shifts to the left
 - B) halves
 - C) shifts to the right
 - D) does nothing
 - E) doubles
- 12) What happens to the equilibrium position of an endothermic reaction when you remove heat? 12) _____
- A) shifts to the left
 - B) halves
 - C) does nothing
 - D) doubles
 - E) shifts to the right
- 13) Which statement about activation energy is FALSE? 13) _____
- A) The lower the activation energy, the faster the reaction rate.
 - B) Activation energy is an energy hump that normally exists between reactants and products.
 - C) Increasing the temperature lowers the activation energy.
 - D) The higher the activation energy, the slower the reaction rate.
 - E) All of the above are true.
- 14) How many moles of water are made from the reaction of 1.4 moles of hydrogen gas? 14) _____
- Given the reaction: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- A) 0.7
 - B) 1.4
 - C) 2.1
 - D) 2.8
 - E) not enough information
- 15) How many grams of sodium metal are needed to make 29.3 grams of sodium chloride? 15) _____
- Given the reaction: $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$
- A) 11.5
 - B) 46.0
 - C) 5.75
 - D) 23.0
 - E) not enough information
- 16) Which of the following statements is false? 16) _____
- A) The percent yield = $\frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$
 - B) The actual yield is the amount of product actually produced by a chemical reaction.
 - C) The theoretical yield is the amount of product that can be made based on the amount of limiting reagent.
 - D) The limiting reagent is completely consumed in a chemical reaction.
 - E) All of the above are true statements.

- 17) What is the limiting reagent for the following reaction given we have 3.4 moles of $\text{Ca}(\text{NO}_3)_2$ and 2.4 moles of Li_3PO_4 ? 17) _____
Reaction: $3\text{Ca}(\text{NO}_3)_2 + 2\text{Li}_3\text{PO}_4 \rightarrow 6\text{LiNO}_3 + \text{Ca}_3(\text{PO}_4)_2$
A) $\text{Ca}_3(\text{PO}_4)_2$
B) $\text{Ca}(\text{NO}_3)_2$
C) Li_3PO_4
D) LiNO_3
E) not enough information
- 18) How many grams of water are theoretically produced for the following reaction given we have 2.6 moles of HCl and 1.4 moles of $\text{Ca}(\text{OH})_2$? 18) _____
Reaction: $2\text{HCl} + \text{Ca}(\text{OH})_2 \rightarrow 2\text{H}_2\text{O} + \text{CaCl}_2$
A) 103.6
B) 50.4
C) 46.8
D) 25.2
E) not enough information
- 19) What is the excess reagent for the reaction below given that you start with 10.0 g of Al and 19.0 grams of O_2 ? 19) _____
Reaction: $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$
A) Al_2O_3
B) Al
C) O_2
D) both Al and O_2
E) not enough information
- 20) What is the percent yield of CuS for the following reaction given that you start with 15.5 g of Na_2S and 12.1 g CuSO_4 ? The actual amount of CuS produced was 3.05 g. 20) _____
Reaction: $\text{Na}_2\text{S} + \text{CuSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{CuS}$
A) 16.1%
B) 18.93%
C) 42.1%
D) 7.25%
E) not enough information
- 21) All of the following statements are consistent with the kinetic molecular theory of gases EXCEPT 21) _____
A) The size of the gas molecules is negligible compared to the total volume of the gas.
B) The average kinetic energy of the molecules of a gas is proportional to the temperature of the gas in kelvins.
C) none of the above
D) Strong attractive forces hold the gas molecules together.
E) The gas molecules collide with each other and with the surfaces around them.

- 22) Which of the following statements is TRUE for gases? 22) _____
1. The temperature of a gas is inversely proportional to its pressure.
 2. The volume of a gas is directly proportional to the pressure in torr.
 3. The pressure of a gas is due to collisions of the gas molecules.
- A) 2 only
B) 1 only
C) 3 only
D) 1 and 2 only
E) 1 and 3 only
- 23) A sample of helium gas initially at 37.0°C, 785 torr and 2.00 L was heated to 58.0°C while the volume expanded to 3.24 L. What is the final pressure in atm? 23) _____
- A) 3.21
B) 517
C) 0.681
D) 1.79
E) none of the above
- 24) What happens to the volume of a gas when you double the number of moles of gas while keeping the temperature and pressure constant? 24) _____
- A) The volume increases, but more information is needed.
B) The volume doubles.
C) The volume is halved.
D) The volume decreases, but more information is needed.
E) none of the above
- 25) What is the temperature (°C) of a 2.48 moles of gas stored in a 30.0 L container at 1559 mm Hg? 25) _____
- A) -84
B) 302
C) 189
D) 29
E) none of the above
- 26) At STP, 12.69 g of a noble gas occupies 14.09 L. What is the identity of the noble gas? 26) _____
- A) Ne
B) He
C) Ar
D) Kr
E) not enough information

27) Ammonia gas decomposes according to the equation:



If 15.0 L of nitrogen is formed at STP, how many liters of hydrogen will be produced (also measured at STP)?

- A) 15.0 L
- B) 45.0 L
- C) 90.0 L
- D) 30.0 L
- E) not enough information

27) _____

TRUE/FALSE. Choose "A" for a true answer and "B" for wrong answer.

28) A precipitation reaction will occur when sodium chloride is mixed with potassium nitrate.

28) _____

29) A spectator ion is one that does not actively participate in a chemical reaction.

29) _____

30) The net ionic equation for the reaction of sodium hydroxide plus hydrochloric acid is $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$.

30) _____

31) Evidence of a redox reaction is when one substance transfers protons to another substance.

31) _____

32) Collisions between reactant molecules do not always lead to the formation of product molecules.

32) _____

33) The rate of a chemical reaction is inversely proportional to the temperature.

33) _____

34) When dynamic equilibrium is achieved, the concentrations of reactants is equal to the concentrations of the products.

34) _____

35) Le Chatelier's principle states that a chemical system must have a shift in direction in order to force the system to reach equilibrium.

35) _____

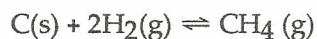
36) Decreasing the amount of carbon dioxide in the reaction below will cause the reaction to proceed to the right so that equilibrium will be restored.

36) _____



37) Increasing the volume of the system below causes the reaction to shift towards the right.

37) _____



38) Given the recipe: 2 cups flour + 1 egg + 3 oz blueberries \rightarrow 4 muffins.
You can make 9 muffins from 3.5 cups of flour.

38) _____

39) The conversion factor for pressure is 1 mm Hg = 1 atm.

39) _____

40) Absolute zero refers to 0°C.

40) _____

Answer Key

Testname: FH_CHEM25_SP08_LECTEST3

- 1) B
- 2) B
- 3) D
- 4) D
- 5) C
- 6) A
- 7) D
- 8) B
- 9) C
- 10) B
- 11) C
- 12) A
- 13) C
- 14) B
- 15) A
- 16) E
- 17) B
- 18) C
- 19) C
- 20) C
- 21) D
- 22) C
- 23) C
- 24) B
- 25) D
- 26) A
- 27) B
- 28) FALSE
- 29) TRUE
- 30) FALSE
- 31) FALSE
- 32) TRUE
- 33) FALSE
- 34) FALSE
- 35) FALSE
- 36) TRUE
- 37) FALSE
- 38) FALSE
- 39) FALSE
- 40) FALSE