

Name:

Spring Final PRACTICE Exam

*Even though this is not a grade, it is advantageous and consequential that you take this exam as if it was a REAL EXAM. This practice exam will determine how prepared or unprepared you are for the chemistry final. Please do every question on your OWN. Use notes as needed. KEEP this with you. The answer key will be posted on my website!

Unit 8:

1. A 4.17 gram sample of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ was heated until it reached a constant mass. Only 1.93 grams of the anhydrous salt remained. What is the percentage of water in the original hydrate?

- A) 86.2 %
B) 53.7 %
C) 46.3 %
D) 22.4 %

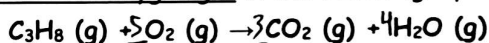
$$\begin{array}{l} 4.17\text{g sample} \\ - 1.93\text{g salt} \\ \hline 2.24\text{g water} \end{array}$$

$$\% = \frac{2.24}{4.17} \cdot 100 = 53.7\%$$

2. Name the following: $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$

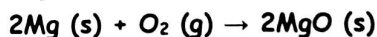
- A) Iron chloride septahydrate
B) Iron (II) chlorite sexahydrate
C) Iron (III) chlorate hexahydrate
D) Iron (III) chloride hexahydrate

3. What is the mole ratio of carbon dioxide to oxygen gas in the following equation? Balance reaction first.



- A) 3 : 4
B) 4 : 5
C) 3 : 5
D) 3 : 1

4. When 25 g of magnesium is burned in 25 g of oxygen, how many grams of magnesium oxide are produced?

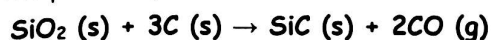


- A) 25 g
B) 31 g
C) 42 g
D) 63 g
E) 130 g

5. What is the limiting reagent in the question above?

- A) Magnesium B) Oxygen C) Both reactants D) There is no limiting reagent

6. When a student heats 50.0 grams of silicon dioxide with excess carbon, 32.2 grams of silicon carbide is produced in the lab. What is the percent yield of this reaction?



Molar Masses: $\text{SiO}_2 = 60 \text{ g/mol}$, $\text{C} = 12 \text{ g/mol}$, $\text{SiC} = 40 \text{ g/mol}$, $\text{CO} = 28 \text{ g/mol}$

- A) 48.3 %
B) 64.4 %
C) 96.7 %
D) 103 %

Unit 9

7. The VSEPR theory refers to _____.
A) valence shell electron pair repulsion theory
B) valence shell electron proton review theory
C) valence shell energy probability repulsion theory
D) valence sublevel electrons precipitate reactants theory
E) very small electron produce resonance theory
8. The molecular geometry of the BF_3 molecule is _____, and this molecule is _____.
A) tetrahedral, non-polar
B) trigonal planar, non-polar
C) trigonal planar, polar
D) trigonal pyramidal, non-polar
E) trigonal pyramidal, polar
9. Which molecule has only ONE lone pair on the central atom?
A) BH_3
B) H_2
C) AsH_3
D) OF_2
E) SiH_4
10. Which of these bonds is nonpolar?
A) $\text{H} \text{---} \text{Br}$
B) $\text{H} \text{---} \text{Cl}$
C) $\text{H} \text{---} \text{F}$
D) $\text{H} \text{---} \text{H}$
E) $\text{H} \text{---} \text{I}$
11. What types of solids will conduct an electrical current in the aqueous or molten phase?
A) polar molecular solids
B) nonpolar molecular solids
C) metallic solid
D) ionic solids
E) covalent network solids
12. Which of the following compounds exhibits covalent bonding?
A) Al_2O_3
B) K_2O
C) MgBr_2
D) KNO_2
E) $\text{C}_6\text{H}_{12}\text{O}_6$

Unit 10

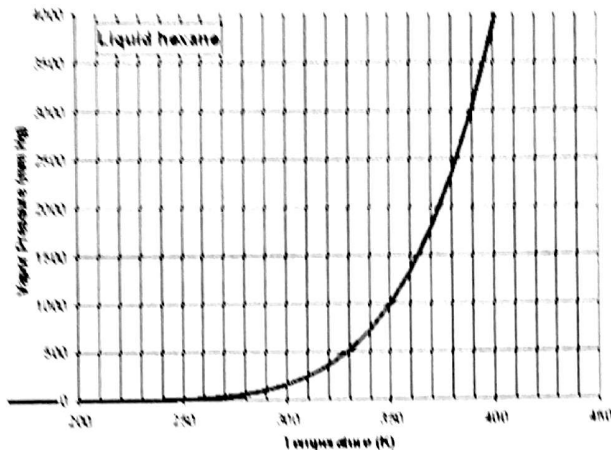
13. According to the kinetic molecular theory, which statement best describes a gas?
A) small particles far apart in constant random motion
B) small particles close together in random motion
C) no empty spaces that allow for compressibility
D) no empty spaces and no compressibility

14. When traveling from sea level to the top of a mountain, you would expect air pressure to _____.
- A) Increase
 - B) Decrease
 - C) Stay the same
 - D) Change depending on the season
15. The volume of a gas at STP is 488 mL. Calculate its volume at 22.5 atm and 150 °C.
- A) 33.6 mL
 - B) 14.0 mL
 - C) 12.6 mL
 - D) 0.07 mL
16. What is the mass, in grams, of 0.125 L of CO₂ at STP?
- A) 4.11 g
 - B) 2.80 g
 - C) 181 g
 - D) 0.246 g
17. A sample of H₂ is collected over water such that the combined H₂-water vapor sample is held at a pressure of 1 standard atmosphere. What is this pressure in kilopascal?
- A) 98.8 kPa
 - B) 2.5 kPa
 - C) 103.8 kPa
 - D) 101.3 kPa
18. At STP, which gas would have the highest rate of effusion?
- A) CO₂
 - B) N₂
 - C) NO₂
 - D) O₂

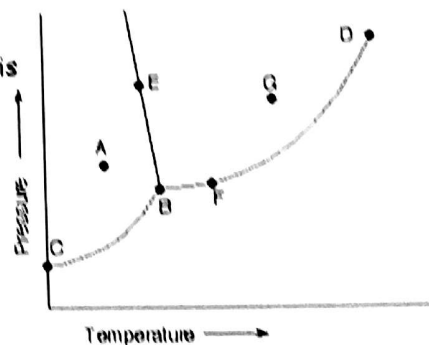
Unit 11

19. Which reaction is correctly matched with its enthalpy value? *Remember, + = endothermic - = exothermic
- (A) $C_2H_6 (l) \rightarrow C_2H_6 (s)$ + ΔH
 - (B) $H_2O_2 (l) \rightarrow H_2O_2 (g)$ - ΔH
 - (C) $CO_2 (s) \rightarrow CO_2 (g)$ + ΔH
 - (D) $Br_2 (s) \rightarrow Br_2 (l)$ - ΔH
20. Which of the following is an example of conduction?
- (A) an electric current moving through a copper wire
 - (B) ocean currents moving across the planet
 - (C) the wind blowing through the atmosphere
 - (D) getting a sunburn from UV rays

21. The graph shows how the vapor pressure of liquid hexane changes with the temperature. What is the boiling point of liquid hexane 3.95 atm?



- (A) 350 K (B) 390 K (C) 342K (D) 400 K
22. Which of the following will increase the rate of a reaction?
- (A) removing a catalyst from the system
 (B) decreasing the surface area of the reactants
 (C) lowering the concentration of one of the reactants
 (D) increasing the temperature of the system
23. Using the phase diagram on the right determine which of the following is correct?



- (A) the solid phase will sink in the liquid phase
 (B) an increase in pressure will cause the substance to freeze
 (C) the solid phase is more dense than the liquid phase
 (D) an increase in pressure will cause the substance to melt
24. Calculate the total amount of energy required to raise 10.0 grams of H_2O from $-5\text{ }^\circ\text{C}$ to $15\text{ }^\circ\text{C}$.
 (Hint: First, draw a stair step diagram for H_2O to determine how to best work this problem.)
- (A) 836 J
 (B) 3540 J
 (C) 4070 J
 (D) 4588 J

Unit 12

25. Using the solubility curve table to the right, determine what temperature would be needed to dissolve 80 g of KNO_3 in 100 g of water.

- A) 60°C
- B) 40°C
- C) 70°C
- D) 50°C

26. Pouring salt, such as magnesium chloride, onto the road of an overpass or bridge during an ice storm in the winter is a safety precaution that best relates to _____.

- A) freezing point elevation
- B) boiling point elevation
- C) freezing point depression
- D) boiling point depression

27. What is the molarity of a solution in which 15.0 g of ammonium hydroxide is dissolved in 750 mL of solution?

- A) 0.700 M
- B) 0.606 M
- C) 0.354 M
- D) 0.571 M

28. Which of the following will dissolve in ammonia? *Remember, "like dissolves like."

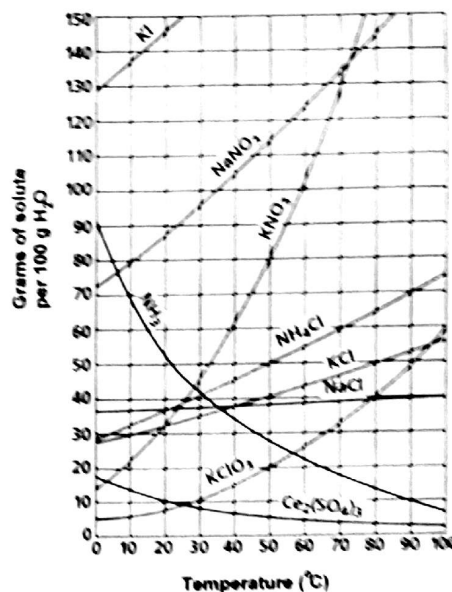
- A) BH_3
- B) Ag
- C) NaCl
- D) CCl_4

29. To how much water should 55.5 mL of 12 M hydrochloric acid be added to produce a 2.0 M solution?

- A) 333.0 mL
- B) 111.0 mL
- C) 277.5 mL
- D) 133.2 mL

30. How many grams of copper (II) sulfate should be added to 1250.0 g of water to prepare a 0.75 m solution?

- A) 0.94 g
- B) 150 g
- C) 96 g
- D) 5.9 g



Unit 13

31. Which of the following statements best characterizes a basic compound?

- A) An Arrhenius base produces H^+ ions in solution
- B) A Lewis base is an electron pair donor
- C) A Lewis base is an electron pair acceptor
- D) A Bronsted-Lowry base is a proton donor

32. What is the correct formula for phosphorous acid?

- A) HP
- B) H_3PO_4
- C) H_3PO_3
- D) H_3P

33. What is the concentration of sulfuric acid if 50 mL of acid is neutralized by 20 mL of 1.0 M sodium hydroxide?

- A) 0.50 M
- B) 0.02 M
- C) 0.2M
- D) 0.005 M

34. As $NH_3(g)$ is dissolved in water, ionization occurs: $NH_3(g) + H_2O(l) \leftrightarrow NH_4^+(aq) + OH^-(aq)$

What is the Bronsted-Lowry base?

- A) H_2O
- B) NH_3
- C) NH_4^+
- D) OH^-

35. Which compound is a non-electrolyte when dissolved in water?

- A) K_3PO_4
- B) $C_6H_{12}O_6$
- C) $CaCO_3$
- D) NH_4OH

36. What is the pOH of a solution with $[H^+] = 5.55 \times 10^{-5} M$?

- A) 9.74
- B) 2.74
- C) 4.26
- D) 11.26