CHM151 Quiz 11 100 Pts Fall 2018 Name: _____

Due Friday Dec. 7th. Provide SHORT explanations for your answers or show calculations when necessary.

1. Which one of the following substances is expected to have the lowest melting point?
   A) BrI Explain your Choice:
   B) CsI
   C) LiI
   D) NaI
   E) RbI

2. Which one of the following substances will have both dispersion forces and dipole-dipole forces?
   A) HCl Explain your choice with the inclusion of a structural drawing.
   B) BCl_3
   C) Br_2
   D) H_2
   E) CO_2

3. Arrange the following substances in order of increasing boiling point: CH_3OH, He, CH_3Cl, and N_2 and state which primary intermolecular for is present in each.

   Lowest B.P_____ Intermolecular force_____
   2nd_____ _____
   3rd _____ _____
   Highest B.P._____ _____

4. Which of the following liquids would have the highest viscosity at 25°C?
   A) CH_3OCH_3 Explain Why:
   B) CH_2Cl_2
   C) C_2H_5OH
   D) CH_3Br
   E) $HOCH_2CH_2OH$

5. For which of the following species are the dispersion forces strongest?
   A) C_4H_{10} Explain Why:
   B) C_5H_{12}
   C) C_6H_{14}
   D) C_7H_{16}
   E) C_8H_{18}

6. The intermolecular forces present in CH_3NH_2 include which of the following?
   I. dipole-dipole
   II. ion-dipole
   III. dispersion
   IV. hydrogen bonding
   A) I, II, III, and IV Draw the structure to show your reasoning.
   B) I and III
   C) I, III, and IV
   D) I and II
   E) II and IV

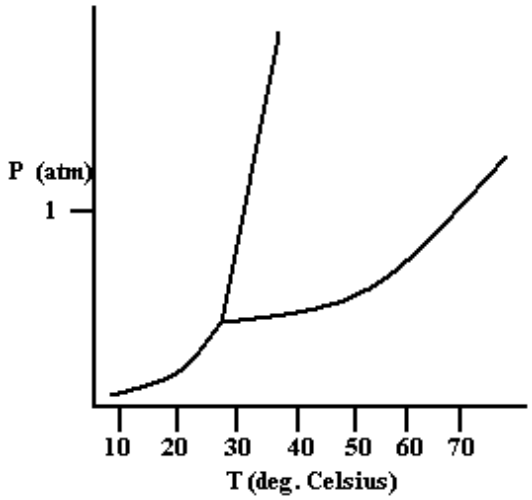
7. The intermolecular forces present in $HSCH_2CH_2SH$ include which of the following?
   I. dipole-dipole
   II. ion-dipole
   III. dispersion
   IV. hydrogen bonding
   A) I, II, III, and IV Draw the structure to show your reasoning.
   B) I and III
   C) I, III, and IV
   D) I and II
   E) II and IV

8. Which of following can form hydrogen bonds with water molecules?
   (1) Na^+ (2) CH_3COOH (3) C_2H_6 (4) CH_3NH_2
   A) (1) and (2)
   B) (1) and (3) Draw structures for each of your choices:
   C) (2) and (3)
   D) (2) and (4)
   E) (3) and (4)

9. An example of a covalent network solid is
   A) diamond.
   B) potassium.
   C) iodine.
   D) sodium chloride.
   E) None of these.

10. $HOCH_2CH_2OH(s)$ is classified as which of the following?
   A) metallic crystal.
   B) covalent solid.
   C) molecular crystal.
   D) amorphous solid.
   E) ionic crystal.

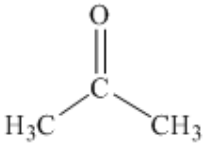
11. Based on the phase diagram shown below, how will the melting point of the substance change if the pressure is increased above 1 atm?

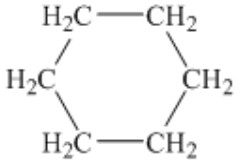


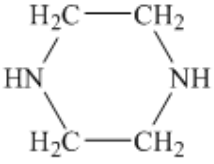
A) The melting point will decrease.
B) The melting point will remain the same.
C) The melting point will increase.
D) The substance will not melt at pressures of 1 atm and above; instead, the solid sublimes to form the gas phase.

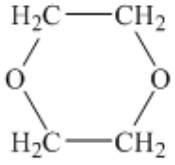
12. Which one of the following would be most immiscible with water?

A. $H_2N-H_2C-H_2C-NH_2$

B. 

C. 

D. 

E. 

A) A
B) B
C) C
D) D
E) E

13. Which response lists all the following pairs that are miscible liquids.

    Pair #1: octane (C_8H_{18}) and water
    Pair #2: acetic acid (CH_3COOH) and water
    Pair #3: octane (C_8H_{18}) and carbon tetrachloride(CCl_4)

    A) 1, 3
    B) 1, 2
    C) 3
    D) 2
    E) 2, 3

14. In which of the following solvents would you expect KBr to be most soluble?
    A) C_6H_{14} (hexane)
    B) CH_3CH_2OH (ethanol)
    C) C_6H_6 (benzene)
    D) CCl_4 (carbon tetrachloride)
    E) C_6H_{12} (cyclohexane)

15. Which of the following compounds should be soluble in CCl_4?
    A) NaCl
    B) H_2O
    C) NaOH
    D) C_8H_{18}
    E) None of these

16. Calculate the mole fraction of KI in a solution made by dissolving 3.4 g of KI in 5.8 g of water.
    A) 0.060 Show calculation.
    B) 0.064
    C) 0.37
    D) 0.59
    E) 6.4

17. A 9.50 % by mass solution of acetone (C_3H_6O) in water has a density of 0.9849 g/mL at 20°C. What is the molarity of this solution?
    A) 0.621 M Show calculation.
    B) 1.61 M
    C) 1.66 M
    D) 1.71 M
    E) 16.9 M

18. In how many grams of water should 25.31 g of potassium nitrate (KNO_3) be dissolved to prepare a 0.1982 m solution?
    A) 250.0 g Show calculation.
    B) 792.0 g
    C) 1,000. g
    D) 1,263 g
    E) 7,917 g

19. Calculate the molality of 6.0 M H_2SO_4 solution. The density of the solution is 1.34 g/mL.
    A) 4.48 m Show calculation.
    B) 7.98 m
    C) 8.10 m
    D) 8.43 m
    E) 10.2 m

20. Consider a solution made from a nonvolatile solute and a volatile solvent. Which statement is true?
    A) The vapor pressure of the solution is always greater than the vapor pressure of the pure solvent.
    B) The boiling point of the solution is always greater than the boiling point of the pure solvent.
    C) The freezing point of the solution is always greater than the freezing point of the pure solvent.

21. What is the freezing point of a solution that contains 10.0 g of glucose ($C_6H_{12}O_6$) in 100.g of H_2O? K_f for water is 1.86°C/m.
    A) +0.10°C Show calculation.
    B) +0.186°C
    C) –0.10°C
    D) –0.186°C
    E) –1.03°C

22. Which of the following aqueous solutions has the highest boiling point (assume 100% dissociation for all soluble ionic compounds)?
    A) 0.10*m* $Al(NO_3)_3$ Explain your choice.
    B) 0.11*m* Na_2SO_4
    C) 0.15*m* K_2CO_3
    D) 0.18*m* NaCl
    E) 0.35*m* $C_6H_{12}O_6$

23. A solution that contains 55.0 g of ascorbic acid (Vitamin C) in 250. g of water freezes at –2.34°C. Calculate the molar mass (in units of g/mol) of the solute. K_f of water is 1.86°C/m.
    A) 1.26 Show calculation.
    B) 10.9
    C) 43.6
    D) 175
    E) 277

24. Arrange the following aqueous solutions in order of increasing boiling points: 0.300*m* $C_6H_{12}O_6$, 0.110*m* K_2CO_3, and 0.050*m* $Al(ClO_4)_3$
    A) $C_6H_{12}O_6 < K_2CO_3 < Al(ClO_4)_3$
    B) $Al(ClO_4)_3 < C_6H_{12}O_6 < K_2CO_3$
    C) $C_6H_{12}O_6 < Al(ClO_4)_3 < K_2CO_3$
    D) $K_2CO_3 < C_6H_{12}O_6 < Al(ClO_4)_3$
    E) $K_2CO_3 < Al(ClO_4)_3 < C_6H_{12}O_6$

25. Give the number of lone pairs around the central atom and the molecular geometry of IF_5.
    A) 0 lone pairs, square pyramidal Show structure.
    B) 0 lone pairs, trigonal bipyramidal
    C) 1 lone pair, octahedral
    D) 1 lone pair, square pyramidal
    E) 2 lone pairs, pentagonal