CHM151 Quiz 11 100 Pts Fall 2017 Name: _____

Due at time of final exam. Provide SHORT explanations for your answers then put answers on a SCANTRON form.

1. Which one of the following substances is expected to have the lowest melting point?
   A) BrI
   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
   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 $N_2$
   A) $CH_3OH < He < CH_3Cl < N_2$
   B) $He < N_2 < CH_3OH < CH_3Cl$
   C) $N_2 < He < CH_3OH < CH_3Cl$
   D) $He < N_2 < CH_3Cl < CH_3OH$
   E) $CH_3Cl < He < N_2 < CH_3OH$

4. Which of the following liquids would have the highest viscosity at 25°C?
   A) $CH_3OCH_3$
   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) $C_4H_{10}$
   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
   B) I and III
   C) I, III, and IV
   D) I and II
   E) II and IV

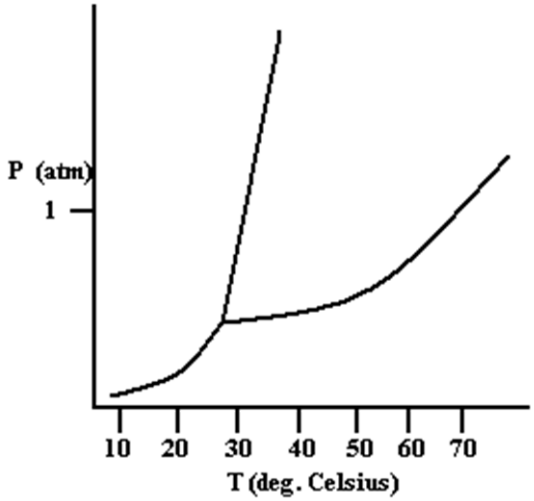
7. The intermolecular forces present in $HSCH_2CH_2SH$ include which of the following?
   I. dipole-dipole
   II. ion-dipole
   III. dispersion
   IV. hydrogen bonding
   A) I, II, III, and IV
   B) I and III
   C) I, III, and IV
   D) I and II
   E) II and IV

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)
   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.

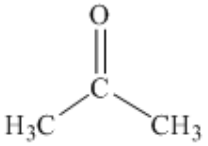
11. Based on the phase diagram shown below, how will the melting point of the substance change if the pressure is increased above 1 atm?

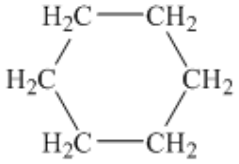


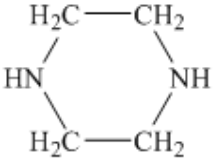

A) The melting point will decrease.
B) The melting point will remain the same.
C) The melting point will increase.
D) The substance will not melt at pressures of 1 atm and above; instead, the solid sublimes to form the gas phase.

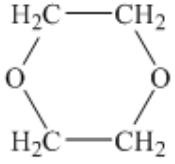
12. Which one of the following would be immiscible with water?

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
    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
    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
    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
    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
    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* $Al(NO_3)_3$
    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
    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
    B) 0 lone pairs, trigonal bipyramidal
    C) 1 lone pair, octahedral
    D) 1 lone pair, square pyramidal
    E) 2 lone pairs, pentagonal