CHEM 1
Problem Set Ch.11

1. List the forces which must be overcome in order to melt or boil the following.

a) NH_3

b) CO_2

c) NaBr

d) Ar

e) BN

f) H_3COH

g) Cd

h) MgO

i) C_2H_6

j) $CHCl_3$

k) SiO_2

l) HF

2. Select the highest boiling substance among each of the following groups and explain why.

a) OF_2 CO_2 SiO_2

b) NaCl KBr LiF

c) H_2O H_2S H_2Se

d) HBr HCl HF

3. From question #1 select a different compound that fits each of the following.

a) conducts electricity as liquid, but not as solid _____

b) is a gas at room temperature. _____

c) conducts electricity both as liquid and solid _____

d) contains polar bonds but nonpolar molecules _____

4. Despite the fact that stainless steel is much denser than water, a stainless-steel razor can be made to float on water. Why?

5. Pentanol ($C_5H_{11}OH$; M_m = 88.15 g/mol) has nearly the same molar mass as hexane (C_6H_{14}; M_m = 86.17 g/mol) but is more than 12 times as viscous at 20 ^oC. Explain.

6. Define phase change. Name all possible changes that can occur among the vapor, liquid, and solid states of a substance.

7. How is the molar heat of sublimation related to the molar heats of vaporization and fusion? On what law is this relation based?

8. Which of the following phase transitions gives off more heat?
   a) 1 mole of steam to 1 mole of water at 100 ^{o}C, or
   b) 1 mole of water to 1 mole of ice at 0 ^{o}C.

9. A pressure cooker is a sealed container that allows steam to escape when it exceeds a predetermined pressure. How does this device reduce the time needed for cooking?

10. The boiling point and freezing point of sulfur dioxide are –10 ^{o}C and –72.7 ^{o}C (at 1 atm), respectively. The triple point is 75.5 ^{o}C and 1.65×10^{-3} atm, and its critical point is at 157 ^{o}C and 78 atm. On the basis of this information, draw a rough sketch of the phase diagram of SO_2.

11. For many years, drinking water has been cooled in hot climates by evaporating it for the surfaces of canvas bags or porous clay pots. How many grams of water can be cooled from 35 ^{o}C to 22 ^{o}C by the evaporation of 10 g of water? The heat of vaporization of water in this temperature range is 2.4 kJ/g. The heat capacity of water per gram is 4.18 J/g-^{o}C.