HW Review-from book- Ch 11 and 12: Liquids, Solids and Solutions
(Chap 11: p.481 #95, 96, 98, 103, 107, 112, 113, 118, 122, 126, 133, 137; SG p. 231 #13)
(**Chap 12**: p. 522 #100, 102, 110, 116, 119) and a chromatography question added into Chap 11.

11.95 Name the kinds of attractive forces that must be overcome in order to:

(a) Boil liquid ammonia:

(b) Melt solid P_4:

(c) Dissolve CsI in liquid HF:

(d) Melt potassium metal:

11.96 Which of the following properties indicates very strong IMFs in a liquid? Why?

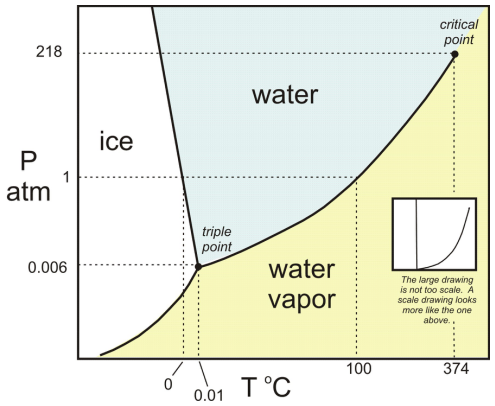
(a) A low surface tension

(b) A low boiling point

(c) A low vapor pressure

11.98 Elemental boron has a high melting point (2300°C), poor electrical and thermal conductivity, is not soluble in water and is very hard. Classify it as one of the types of crystalline solids.

11.103 Explain what happens to water in a vacuum chamber as it first boils, then freezes, then disappears.



11.107 Identify W, X, Y, and Z as gold, lead sulfide, mica (SiO_2) or iodine based on the following tests:
(a) W conducts electricity, X, Y, Z don't;
(b) W flattens with a hammer, X shatters, Y is pulverized, and Z is unaffected;
(c) When heated, Y melts/sublimes, the others remain solid;
(d) X dissolves in 6 M HNO_3, the others have no effect.

- **W:**
- **X:**
- **Y:**
- **Z**:

11.112 Select the substance with the higher BP and identify the IMFs:
(a) K_2S or $(CH_3)_3N$:

(b) Br_2 or $CH_3CH_2CH_2CH_3$:

11.113 A small drop of oil in water assumes a spherical shape. Explain. (Hint: oil is made up of nonpolar molecules, which tend to avoid contact with water.)

11.118 Heat of hydration, that is, the heat change that occurs when ions become hydrated in solution, is largely due to ion-dipole interactions. The heats of hydration for the alkali metal ions are
$Li^+ = -520$ kJ/mol ; $Na^+ = -405$ kJ/mol $K^+ = -321$ kJ/mol
Account for the trend in these heats of hydration values.

11.122 A beaker of water is placed in a closed container. Predict the effect on the vapor pressure of the water when.. .
(a) its temperature is lowered

(b) the volume of container doubles:

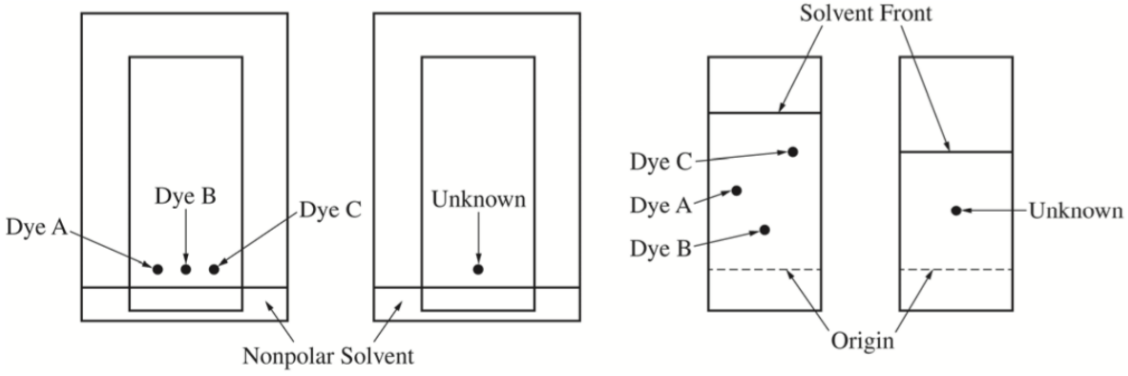
(c) More water is added to the beaker:

11.126 Carbon and silicon belong to Group 4A of the periodic table and have the same valence electron configuration. However, why does SiO_2 have a much higher melting point than CO_2?

11.133 A chemistry instructor performed the following mystery demonstration. Just before the students arrived in class, she heated some water to boiling in an Erlenmeyer flask. She then removed the flask from the flame and closed the flask with a rubber stopper. After the class commenced, she held the flask in front of the students and announced that she could make the water boil simply by rubbing an ice cube on the outside walls of the flask. To the amazement of everyone, it worked. **Why did the hot water boil in the flask when ice was rubbed on the outside?**

11.137 Why do citrus growers spray their trees with water to prevent them from freezing?

A. (AP Exam- 2017 FRQ released) A student investigates various dyes using paper chromatography. The student has samples of three pure dyes labeled A, B and C, and an unknown sample that contains one of the three dyes. The student prepares the chromatography chambers (as shown below on the left) by putting a drop of each dye on the indicated position on the chromatography paper (a polar material) and standing the paper in the nonpolar solvent. The developed chromatograms are shown below on the right.



a) Which dye (A, B or C) is the least polar? _____ Justify your decision in terms of the interactions between the dyes and the solvent or between the dyes and the paper.

b) Which dye is present in the unknown sample? _____Justify your decision.

Study Guide p. 231 #13

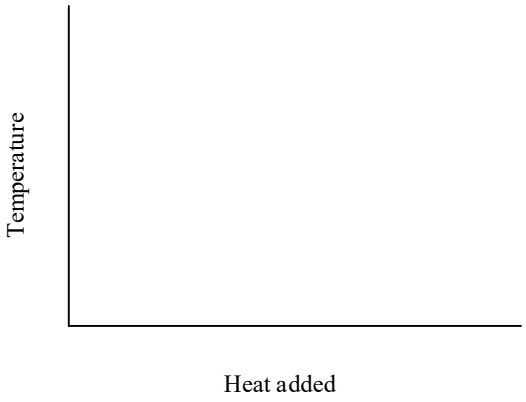
Given the following data for N_2:

Normal melting point: −210°C
Normal boiling point: −196°C

Heat of Fusion: 25 J/g
Heat of vaporization: 200 J/g

Specific heat of liquid: 2.0 J/g °C
Specific heat of gas: 1.0 J/g °C
Specific heat of solid: 1.6 J/g °C

- **On diagram on right, draw a heating curve for nitrogen. Start curve at –206 °C and end at 20 °C**
- **Then, calculate how much energy in kJ is required to convert 1000 g of liquid N_2 at –206 °C to N_2 gas at 20 °C?**



HW Review- Book-Ch 12—Review (Review for Chapter 12: p. 522 #100, 102, 110, 116, 119)

12.100 For each of the substances below, determine which solvent (in chart below) would dissolve that substance the best. Explain each.

a) **I_2**

b) **KBr**:

c) **C_5H_{12}** :

Solvent
CH_3OH (methanol)
CH_3CH_2OH (ethanol)
$CH_3CH_2CH_2OH$ (propanol)
$CH_3CH_2CH_2CH_2OH$ (butanol)
$CH_3CH_2CH_2CH_2CH_2OH$ (pentanol)

12.102 Describe why I_3^- is more soluble in H_2O than I_2. Make sure to identify relevant types of attractions.

12.110 How does each of the following affect solubility of an ionic compound in a solvent? Give reasoning.

(a) Increasing lattice energy of the ionic compound:

(b) increasing polarity of the solvent:

(c) More favorable (more exothermic) enthalpies of hydration of the ions:

12.116 Why is ammonia very soluble in water but not nitrogen trichloride? (EN of N and Cl = 3.0)

12.119 Making mayonnaise involves beating oil into small droplets in water, in the presence of egg yolk. What is the purpose of the egg yolk? *(Hint: Egg yolk contains lecithins, which are molecules with a polar head and a long nonpolar hydrocarbon tail.)*

Lecithin