

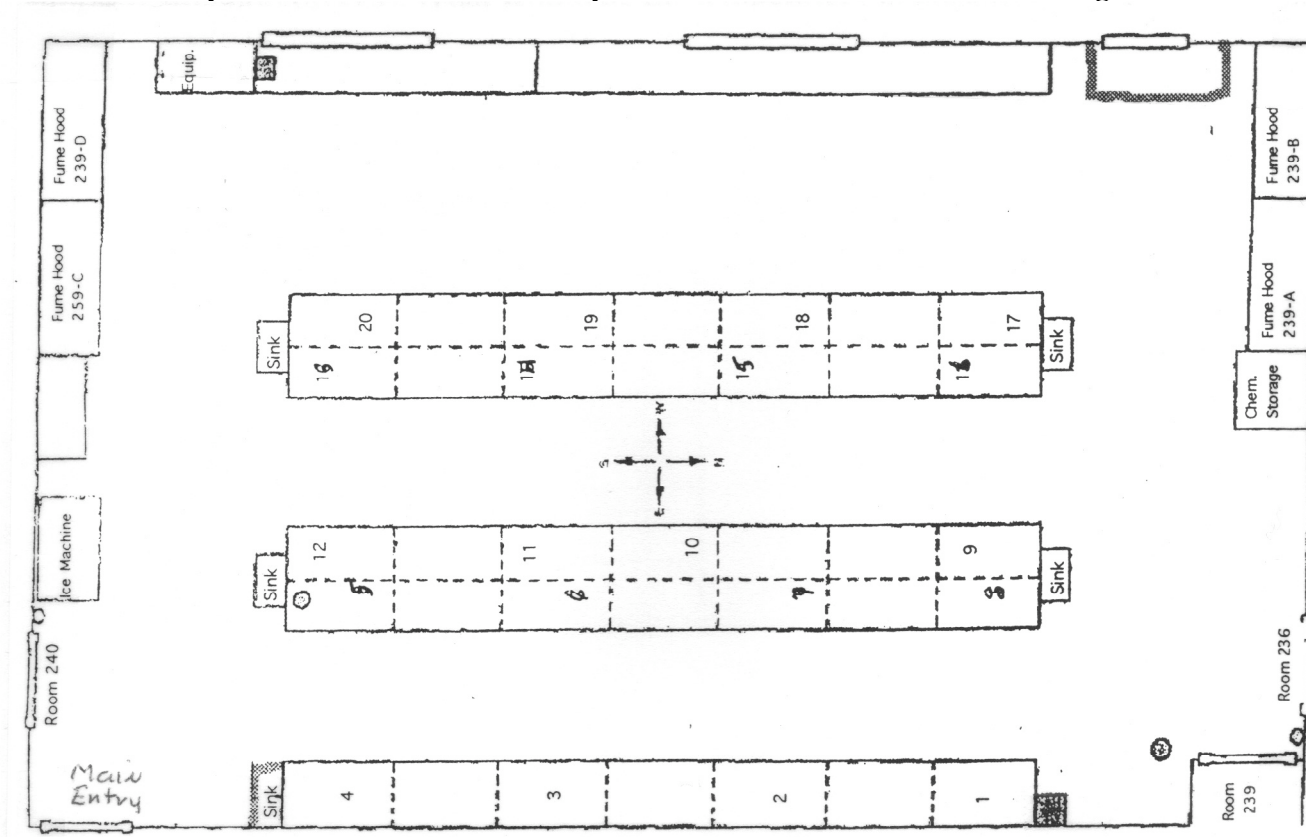
Chem 226 Lab - FS/2006
Midterm Exam

Name _____ Section _____ Stdnt. No. _____

Ask about any questions that are unclear to you.

1. On the lab floor plan, label the location of the following (6 pt)

- A) Safety Shower B) Fire Blanket C) Personal Eye Wash Station
D) Eye Wash Fountain E) Eye Wash Bottles F) Fire Extinguisher



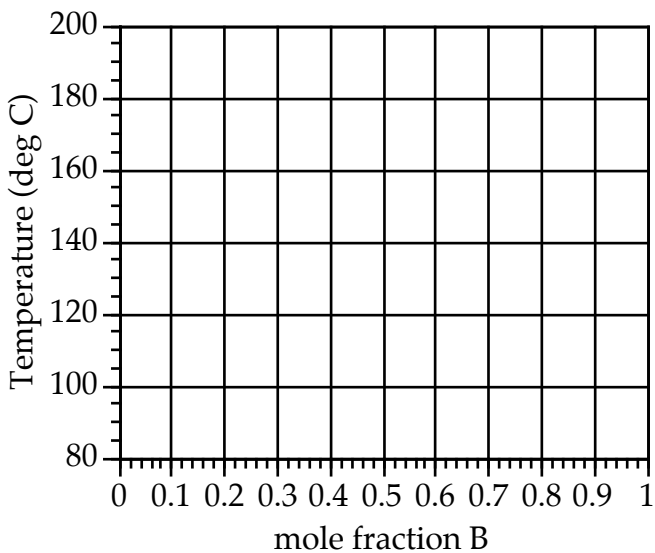
2. Refractive index, n , is commonly found in tables as n_D^{20} . What change in light is being measured? Why is n always greater than 1? (4 pt)

3. What two effects does a soluble impurity have on the MP of a solid? (4 pt)

4. What is a theoretical plate as applied to distillation? What is the advantage of having multiple theoretical plates in a distillation? (4 pt)

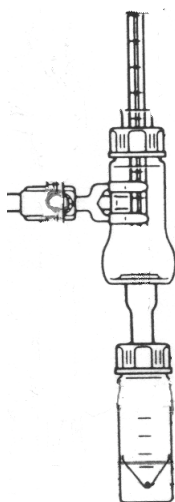
5. Using the following phase composition diagram: (12 pt total)
Show how the following values are obtained by clearly labelling the diagram below.

- Determine the boiling point of a still pot mixture with a 0.1 mole fraction of B.
- What is the still head temperature and mole fraction of B in a simple distillation?
- How many theoretical plates are required to produce the azeotrope from the mix in a.?
- Can pure B be distilled from the mixture in part a? Explain why or why not.



6. Draw a vacuum filtration setup. Label the glassware components. Show the proper orientation of the trap. (6 pt)

7. Give the names for the glassware components pictured below. Show the proper height placement of the thermometer bulb for a distillation. (5 pt)



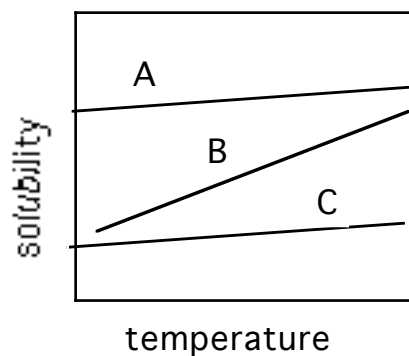
8. The two main types of detectors used in GC (gas chromatography) are TC and FID. What do the abbreviations stand for? Briefly describe how each works. Which one is used in the GC in the organic lab? (7 pt)

9. The two main types of columns used in GC are packed and capillary. Briefly describe their dimensions and placement of the stationary phase. Which one is used in the GC in the organic lab? (5 pt)
10. What approximate volume of sample was injected in your GC analysis? (3 pt)
- a) 1-2 ml b) 0.1-0.2 ml c) 0.1-0.2 μ l d) 1-2 μ l e) 10-20 μ l
11. In a TLC experiment, two compounds showed R_f values of 0.89 and 0.93. How should the experiment be modified to best improve the separation? (4 pt)
- a. use less solvent
b. use more solvent
c. allow the solvent front to move farther up the plate
d. don't allow the solvent front to move so far up the plate
e. use a less polar solvent
f. use a more polar solvent
12. Which will move farther (faster) in TLC, benzhydrol or benzophenone? Why? Explain in terms of the intermolecular forces involved. (4 pt)

13. Arrange the following alphabetic list of solvents from least to most polar. (6 pt)
Acetone, dichloromethane, ethanol , ethyl acetate, petroleum ether, water

14. List three criteria for solvent selection for a recrystallization. (6 pt)

15. In a recrystallization of B, the impurities behave as A. What is the best condition to remove the impurities via filtration, cold or hot? Will the impurities be found in the filtrate or on the filter paper? Explain. (4 pt)



16. Draw structures for the following compounds. (3 pt ea)

a) benzophenone

b) 2-nitroaniline

c) acetanilide

d) ethyl acetate

17. For a compound, the solubility in water is 1 gm in 100 ml at 25 °C and 1 gm in 20 ml at 100 °C. Calculate the maximum percent recovery of the compound in a recrystallization, assuming the minimum volume of water was used to dissolve a 1 gm sample at 100 °C, and crystals were recovered at 25 °C. Show all work. (5 pt)
18. If 40 ml of water was used instead of the minimum volume for the above recrystallization, what would be the maximum percent recovery? Show all work. (3 pt)

Extra credit (2 pt ea)

What is the most likely cause(s) of tailing spots in TLC?

What is the meaning of the term reflux?

What effect will a soluble nonvolatile solute have on the boiling point of a volatile solvent?