

Time: 90 minutes

Chemistry 210  
Lab Final

June 3, 1999

Family Name: \_\_\_\_\_

First Name: \_\_\_\_\_

Student Number: \_\_\_\_\_ Section: \_\_\_\_\_

Question I \_\_\_\_\_ out of 45

II \_\_\_\_\_ out of 15

III \_\_\_\_\_ out of 12

IV \_\_\_\_\_ out of 24

V \_\_\_\_\_ out of 15

VI \_\_\_\_\_ out of 09

Total \_\_\_\_\_ out of 120%

GOOD LUCK

1 (15pts) Complete each of the following statements:

- a- Added acetone \_\_\_\_\_ the boiling point of ethanol and added toluene \_\_\_\_\_ the melting point of solid benzene.
- b- During recrystallization, a minimum amount of boiling solvent is used in order to \_\_\_\_\_.
- c- The decreasing order of the  $R_f$  values of p-nitroaniline, o-nitroaniline and o-nitroacetanilide is  
\_\_\_\_\_ > \_\_\_\_\_ > \_\_\_\_\_.
- d- In the recrystallization process the most important part is \_\_\_\_\_.
- e- In the dehydration of t-amyl alcohol, a possible alkene by-product is \_\_\_\_\_.
- f- Which of the following is more soluble in water, malonic acid or diethylmalonate? \_\_\_\_\_ glycerol or di-n-butylphthalate? \_\_\_\_\_.
- g- Two good irreversible drying agents used to dry ethyl ether are \_\_\_\_\_ and \_\_\_\_\_.
- h- In the preparation of acetanilide, the advantage of using acetic anhydride is \_\_\_\_\_ and the disadvantage is \_\_\_\_\_.

- i- As an extraction solvent toluene has the following advantages over benzene and ether: \_\_\_\_\_ and \_\_\_\_\_.
- j- In collecting crystals by suction filtration, it is advisable to break the suction before turning off the water bump in order to \_\_\_\_\_.
- k- In the preparation of n-butyl bromide, the effect of using concentrated  $H_2SO_4$  on the synthesis would be \_\_\_\_\_. A possible by-product in the same synthesis is \_\_\_\_\_.
- l- Which of the following compounds gives (s) the haloform reaction?  
 $\phi CH(OH) \phi$ ,  $\phi CH(OH)CH_3$ ,  $\phi - \overset{\text{O}}{\parallel}{C} - CBr_3$ ,  $CH_3CH_2OH$   
 \_\_\_\_\_.
- m- Given an organic substance that is more soluble in ether than in benzene. The extraction of this substance from benzene by ether is not possible because \_\_\_\_\_.
- n- Among the following compounds: ethylphenylether, ethylbenzoate, phenol and acetophenone, \_\_\_\_\_ will be eluted first and \_\_\_\_\_ will be eluted last from a silica gel column with benzene as eluent.
- o- In the preparation of t-butylacetate from acetylchloride and t-butylalcohol, the purpose of using a 3° amine like N,N-dimethylaniline is to \_\_\_\_\_.

II (15pts) The distribution coefficient,  $K_D \left( \frac{C_{CCl_4}}{C_{H_2O}} \right)$  for compound A is 6.

a) What weight of A would be removed from a solution of 9g of A in 100ml of water by two extractions with 50-ml portions of carbon tetrachloride?



b) What relative volume of carbon tetrachloride to water would be required to remove 99 percent of A from any water solution in a single extraction?

**III (12pts)** In a synthesis of acetanilide a student used 16g of aniline and 15ml of acetic anhydride (d: 1.082g/ml) to obtain 18.2g of product.

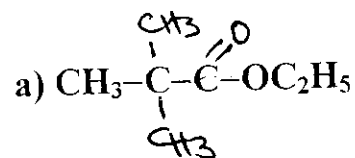
a) What is the limiting reagent in that reaction?

b) Calculate the percentage yield of aniline?

V (15pts) Compare the usefulness of the melting point and the boiling point for the identification of a pure substance. Be Brief.

VI (09pts) Thin layer chromatography is guide to column chromatography. Explain briefly.

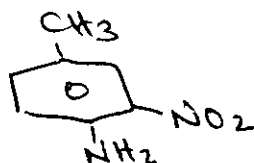
IV (24pts) Write chemical equations to illustrate the synthesis of each of the following from the indicated starting material.



from

3,3-dimethyl-1-butene

b)



from

toluene

c) Three methods to prepare n-butylbromide.