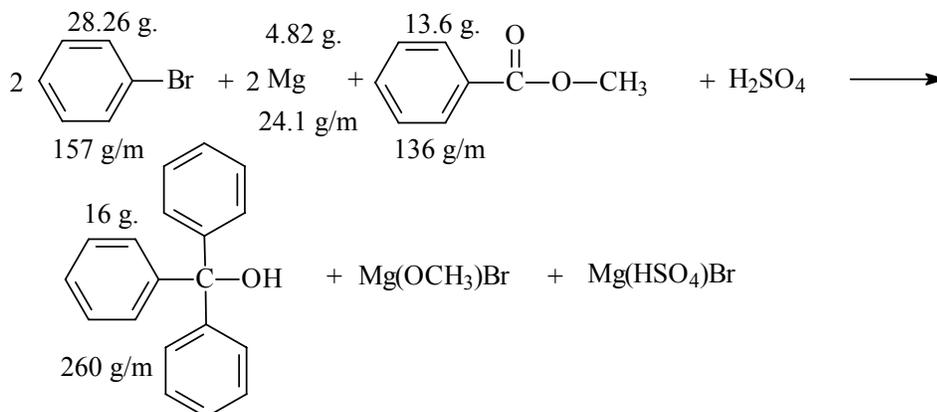


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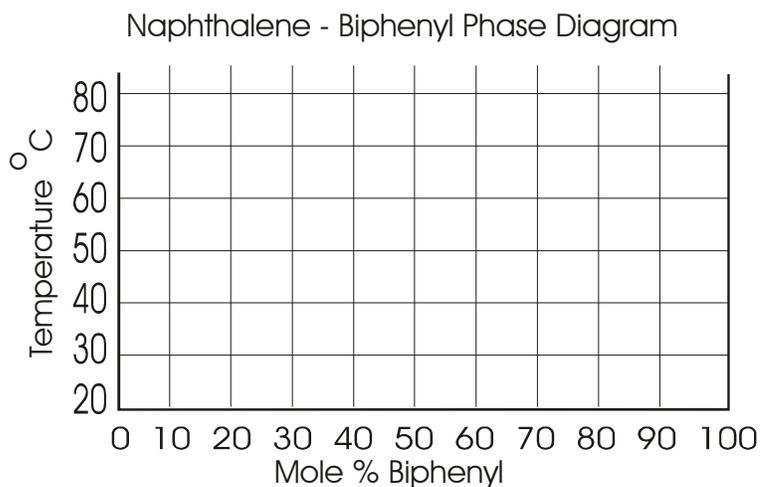
Chem 221 – Organic Chemistry I
Laboratory Final – December 4, 2002

1. Calculate the % yield of the following synthesis of triphenylmethanol. The overall balanced reaction is shown below. The numbers above the compounds are the masses in grams of the reactants used and the mass of triphenylmethanol obtained. The numbers below the compounds are the molecular (or atomic) weights. You may assume sulfuric acid is not the limiting reagent. If you want credit for your answer, *clearly* show your work.



2. (a) Sketch the naphthalene-biphenyl phase diagram on the template to the right. The melting point of naphthalene is 80°C. and that of biphenyl is 71°C. The eutectic point of this mixture occurs at 42°C. and 55% biphenyl.

Be sure to label each region of the diagram in terms of what phases are present.



- (b) As director of a pharmacology lab at a large university you have told three of your ~~slaves~~ graduate students that they must each devise and carry out the synthesis of taxol, an anti-cancer drug that was originally isolated from a tree that grows on the west coast, the Pacific Yew. Each student has been successful and results, including experimental melting points, are reported to you. You wish to employ the purest material in certain tests, but do not know the melting point of 100% pure taxol. Which sample will you use and why?

<u>Student</u>	<u>Melting point range, °C.</u>
L. Pauling	197-204
L. Pasteur	204-208
V. Grignard	194-200

3. Wanting to be sure that the taxol (question #2) you employ in your tests is quite pure you decide to tell the student with the best material to recrystallize it.
- (a) The student will have to select a recrystallization solvent. List two important factors that will be involved in this selection.
- (b) List the steps that the student will employ to recrystallize the taxol. Be complete but concise (you may assume I know something about recrystallization but should not assume that I will fill in blanks for you). You should assume that there are no impurities that are insoluble in the hot solvent.

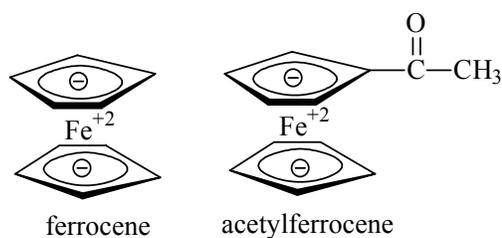
4. You have six grams of a mixture that consists of two grams of benzoic acid (a Bronsted-Lowry acid), two grams of 4-nitroaniline (a Bronsted-Lowry base), and two grams of naphthalene (not appreciably acidic or basic). You are told to isolate as much of the benzoic acid as is reasonably practical from the other components of the mixture. In other words, you must obtain say 1.5 grams of reasonably pure benzoic acid from the mixture. You have at your disposal solutions of hydrochloric acid and sodium hydroxide, diethyl ether, other common chemicals, and the usual organic laboratory glassware and equipment. Describe what you will do.

5. In experiment 8, you separated ferrocene from acetylferrocene using column chromatography.

(a) What material did you use for the stationary phase in the column?

(b) What material did you initially use for the mobile phase, *i.e.* what solvent did you initially use to elute the column?

(c) On what basis was the ferrocene separated from the acetylferrocene? In other words, what molecular property difference caused the ferrocene to move down the column faster than the acetylferrocene and why did the ferrocene move down the column faster?



(d) How did you get the slow moving acetylferrocene to move down the column faster after the ferrocene had been eluted from the column and, on a molecular basis, explain briefly why this worked.