

NAME _____

Laboratory Exam
Techniques and Reactions
Organic Chemistry II, CHEM 332.003
Dr. Sweeting
April 29, 2002
FULL CREDIT 100 points; possible 115.

1.
 - a. Write a chemical equation describing the formation of the Grignard reagent you made. (5 points) Write the equation for the formation of the desired final product. (5 points)
 - b. During the synthesis of the Grignard reagent, you needed to gradually add halide while keeping the solution dry. Please sketch the apparatus you used for that reaction, including both glass and non-glass apparatus (15 points)
 - c. One of the problems you had during the experiment was that the solution boiled and some of the ether evaporated. What change in the composition of the product mixture would you expect from the evaporation of a significant fraction of the ether? (5 points)
 - d. Sketch an improvement you could make to the apparatus that would minimize the loss of ether. (10 points)

2. a. Write the equations for the two steps in the formation of lidocaine from α -chloroacetylchloride. (10 points)

3. a. Write the equation for the reduction of vanillin with sodium borohydride and determine the molecular weights of all reagents (to the nearest whole number of grams per mole). (10 points) You may purchase the structure of vanillin for 5 points.

b. To 350 mg vanillin was added 1.00 mL of a 2.00M solution of sodium borohydride. Determine the limiting reagent, showing your work. (10 points)

4. Define or otherwise explain the following terms:

a. Fluorescence (5 points, plus 5 point bonus for basic theory)

b. Hydrogen bond (5 points)

5. In several experiments this semester you did extractions to remove inorganic (and organic) impurities from your product. In addition you did solubility tests which gave an indication of acidic and basic functional groups. Based on these experiments, briefly describe how you conduct the following separations. You don't need to describe how many times you would extract, just what the solvents would be. You also don't need to describe the final isolation of the product after the extraction.

a. Removal of neutral reagents and side products from a carboxylic acid made from carbon dioxide and a Grignard reagent. (10 points)

b. Removal of aluminum chloride from the products of alkylation of *p*-xylene. (10 points)

6. Bonus: What were the two major products of the reaction of *p*-xylene with 1-chloropropane? (10 points)

Note that spectroscopy exam questions cannot be readily converted to pdf's. Use class problems and your text to prepare for them.