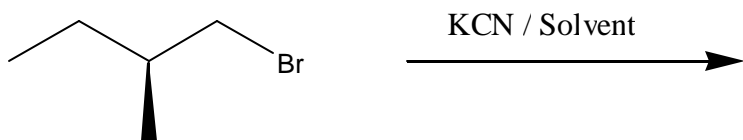


Whittier College
Organic Chemistry: CHEM 231A
Problem Set # 3
 40 Points Total
 Due 12:00 pm on October 30, 2003

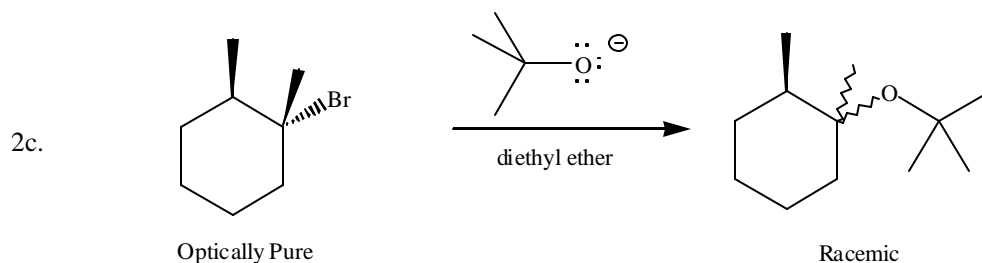
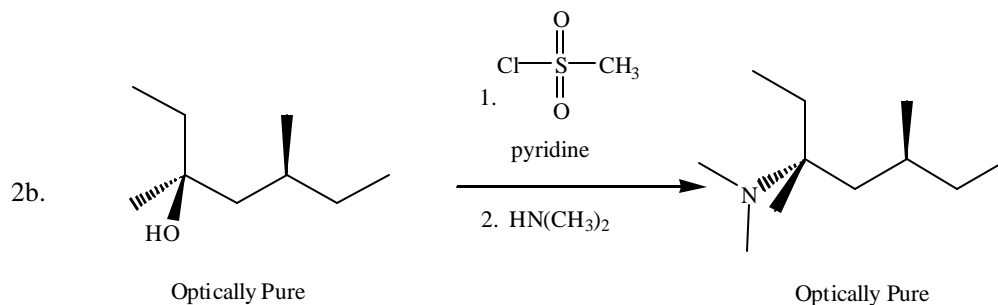
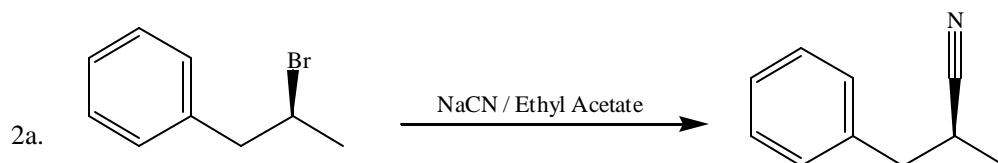
1. Given the following reaction: (8 points)



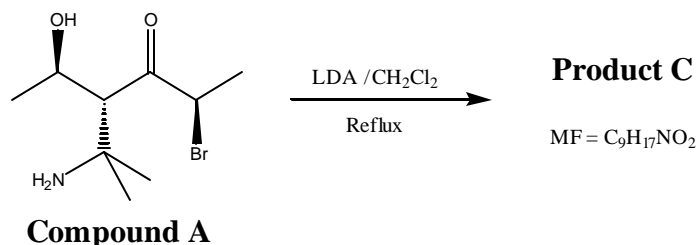
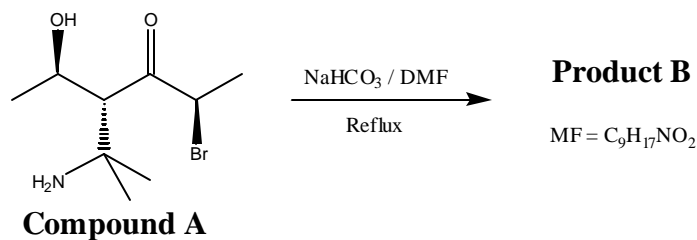
<u>Solvent</u>	<u>Rate</u>
Methanol	60 minutes
DMF	10 minutes

- 1a. What is the product for this reaction? (1 pt)
- 1b. What is the mechanism for this reaction? (2 pts)
- 1c. Provide an explanation for the difference in rate data. (3 pts)
- 1d. If the starting material is optically pure, would the product of the reaction also be optically pure? Explain. (2 pts)

2. Consider the following reactions: Will the reaction occur as drawn? If not, draw the more favorable product? In either case, explain your answer. (12 pts = 4 pts each)



3. Consider the following two reactions: (12 pts)



- 3a. When compound A is heated in the presence of sodium bicarbonate and dimethyl formamide, a single product B is formed. What is the structure of Product B? (2 pt)
- 3b. Write an arrow-pushing mechanism that accounts for the formation of Product B (1 pts)
- 3c. When compound A is heated in the presence of lithium diisopropyl amide and dichloromethane, a single product C is formed, and it is a different compound from product B (even though it has the same molecular formula. What is the structure of Product C? (2 pt)
- 3d. Write an arrow-pushing mechanism that accounts for the formation of Product C (1 pts)
- 3e. Explain why there is a difference between the two reactions (3 pts)
- 3f. How could you use specific NMR data to distinguish between the two products? Show specific chemical shift, coupling and integration data that would help you. (3 pts)
4. When 2-bromo-3-methylbutane is mixed with sodium methoxide in diethyl ether at room temperature, two products are formed: 2-methoxy-3-methyl butane (A) and 2-methyl-2-butene (B). In subsequent reactions and upon addition of increasing amounts of a new reagent, sodium isopropoxide, the amount of product B increases and the amount of product A decreases. In addition, the reaction rate increases as the amount of isopropoxide increases. (8 pts)
- 4a. Draw each of the separate reactions that is occurring. (2 pts)
- 4b. Explain the effect of the added isopropoxide on the reaction, both in terms of rate and product ratios. (3 pts)
- 4c. Draw a mechanism for the reaction(s). (1 pt)
- 4d. Draw an energy diagram for the reaction that helps explain the observed effect. (2 pts)