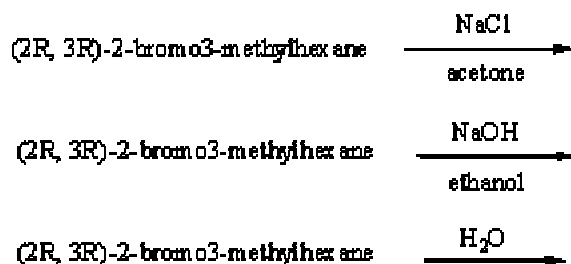


## Practice with Substitution and Elimination

1. Provide a DETAILED evaluation of the following reactions and include the following aspects in your analysis:
  - (a) draw a skeletal structure for the starting material with the correct stereochemistry
  - (b) evaluate the reactant and reaction conditions (using the table handed out in class) -- briefly describe the relevancy of each criterion
  - (c) indicate what type of reaction(s) will occur given the reaction conditions and show the mechanism of the reaction using the curved-arrow formalism
  - (d) summarize any special circumstances pertaining to the mechanism of reaction (e.g. formation of carbocation intermediate, regiochemistry, stereochemistry, etc.)
  - (e) provide an estimate of relative proportions of products (major and minor)
  - (f) assign stereochemical configurations to each stereocenter in the product (R/S for asymmetric carbons and E/Z for geometric alkenes)



2. Given the following incomplete reaction:



- (a) Draw a skeletal structure for the reactant in the reaction showing the correct stereochemistry.
- (b) Draw a CIRCLE around the nucleophile in the reaction.
- (c) Draw a SQUARE around the best leaving group in the reaction.
- (d) Place a CHECK MARK next to the any electrophilic carbons.
- (e) Draw in any missing beta hydrogens on your starting material in part (a).

- (f) Is the leaving group attached to a primary, secondary, or tertiary alpha carbon?
- (g) What type of solvent is used in this reaction? Why this type of solvent?
- (h) Do you have a good nucleophile or a poor nucleophile? Explain.
- (i) Is your nucleophile a strong base or weak base? Explain.
- (j) What type of reaction predominates under these reaction conditions?
- (k) Provide a skeletal structure **and** a Fischer projection of the expected major product and assign the correct stereochemistry.
- (l) Write the kinetic rate equation for the reaction shown above.
- (m) Indicate **how the reaction rate** would be affected (increase or decrease) by each of the following modifications to the reaction shown above. If a change in the type of reaction occurs, indicate the new reaction that will occur.
- 1.) double the concentration of the substrate
  - 2.) half the concentration of the nucleophile
  - 3.) change the leaving group to a tosylate
  - 4.) change the nucleophile to OH<sup>-</sup>
  - 5.) change the solvent to ethanol
  - 6.) change the reactant to (S)-1-chloro-1-phenylpentane
- (n) What sort of reaction(s) would predominate if you altered the reaction conditions so that ethanol was the only reagent in solution with the given starting material.