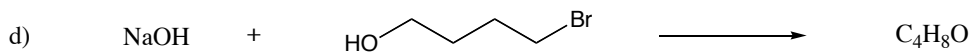
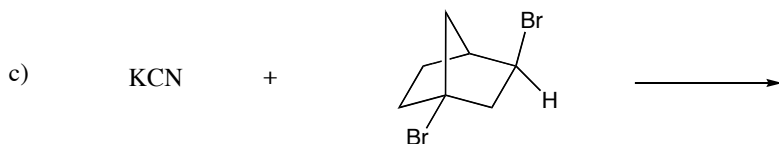
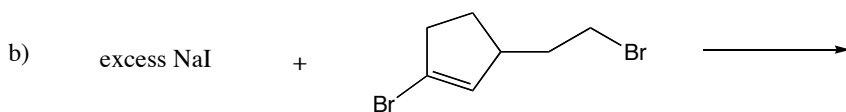
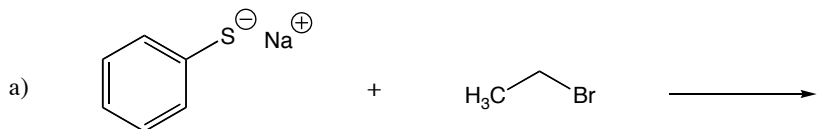
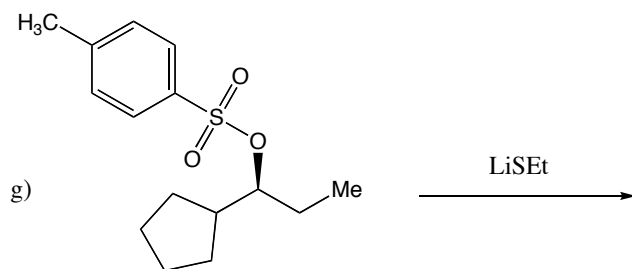
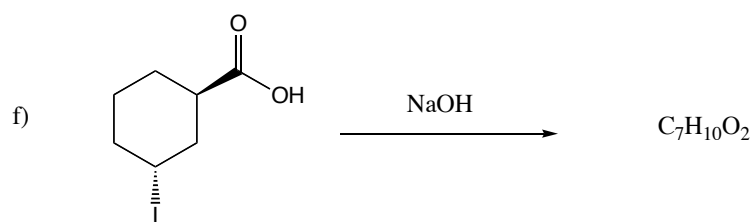
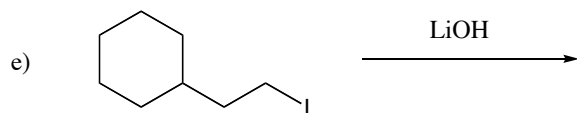


**Problem Set 7a**

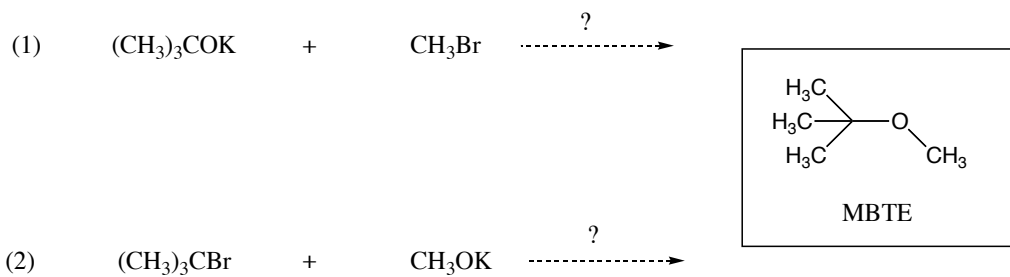
Question 1. A student had carefully prepared pure (*R*)-2-iodopentane, but in his/her haste had left the compound in solution overnight. When that student came back in the morning and took an optical rotation, the compound was racemic. It was also discovered that a small amount of sodium iodide was present in the solution. What happened?

Question 2. For each  $S_N2$  reaction shown below, provide the mechanism (i.e. draw in the curved arrows showing the movement of electrons) and identify the expected major product.

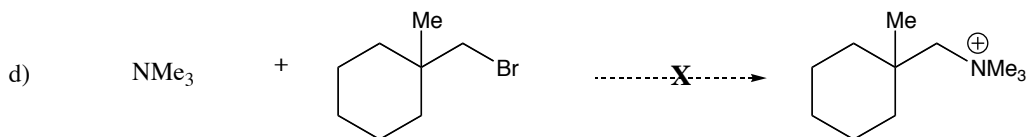
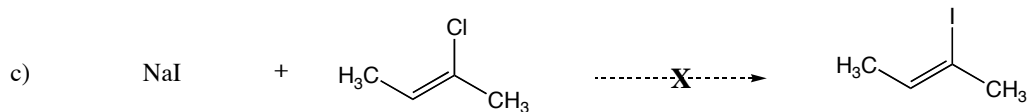
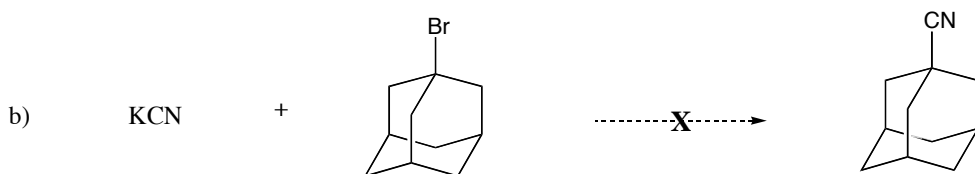
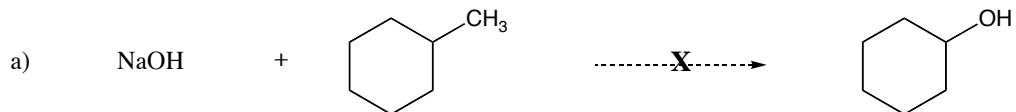




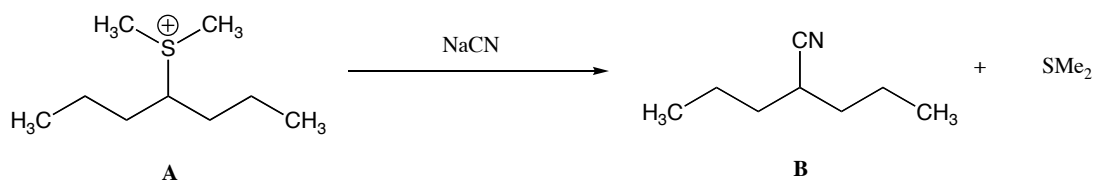
Question 3. Methyl *tert*-butyl ether (MBTE) is a common gasoline additive used to boost octane rating. Below are two reactions that are both attempts to form MBTE. Which reaction will be successful? Which reaction will fail to produce MBTE? Why will it fail?



Question 4. Below are a series of reactions that **fail** to give the indicated  $S_N2$  products. Explain why each reaction fails.



Question 5. The reaction below does **not** proceed as written, but an  $S_N2$  reaction does take place. What is the major product formed?



Question 6. Explain the major difference in reactivity between the following pair of reactions. *i.e.*, Why does the ammonia act as the nucleophile in equation 1 (but not hydroxide), yet bromide acts as the nucleophile in equation 2 (but not ammonia).

