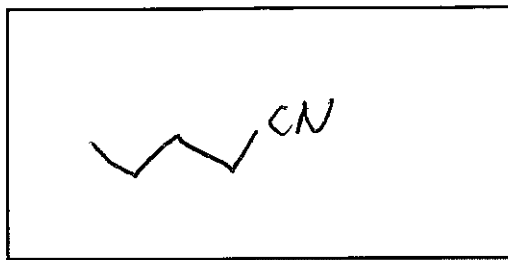
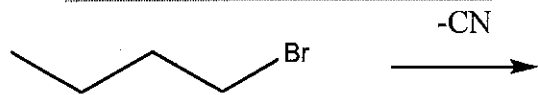


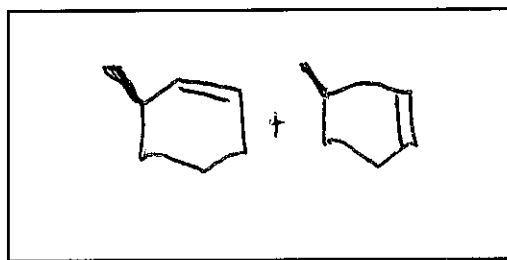
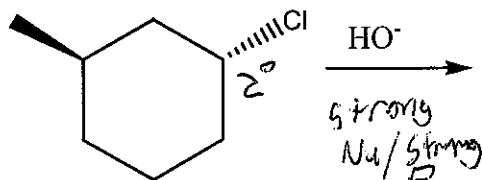
1. For these reactions, predict whether the reaction will go predominately through an S_N1 , S_N2 , $E1$, $E2$, or mix of mechanisms. Draw the structures of the major substitution product(s) in the box and list the product of the reaction as optically active or optically inactive.

A. Type of mechanism: S_N1



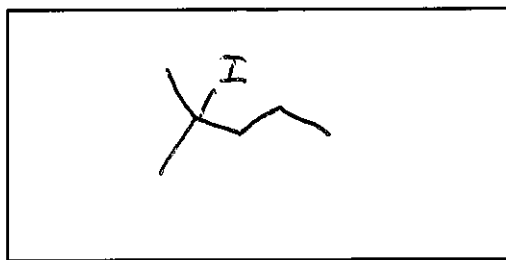
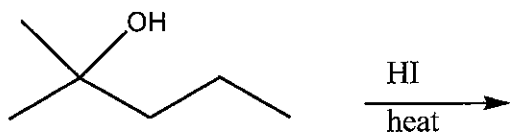
optically active or inactive: inactive

B. Type of mechanism: $E2$



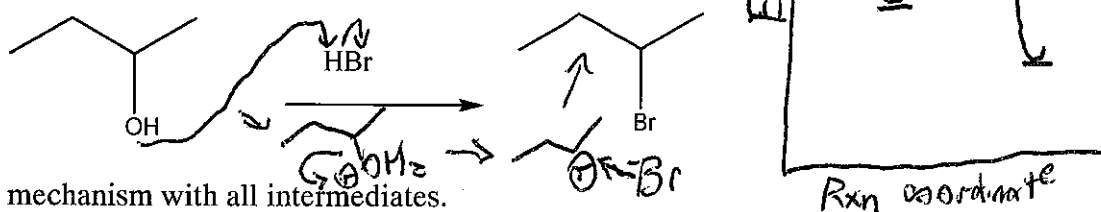
optically active or inactive: active

C. Type of mechanism: S_N1



optically active or inactive: inactive

2. When 2-butanol is treated with HBr, 2-bromobutane is produced



A. Provide an arrow mechanism with all intermediates.

B. Draw an energy diagram for this reaction with appropriate relative energies. (Assume the reaction is exothermic overall.)

C. Based on your mechanism, would the rate go up, down, or remain the same if NaBr were added to the reaction? Explain. *Unchanged - Br⁻ is after the rate determining step.*

D. Based on the mechanism, if the reaction were to start with (S)-2-butanol, would the bromide product be (R), (S), or a racemic mixture? Explain.

Racemic mix - carbocation is attacked from both faces

3. Provide the reagent(s) needed to cause these transformations.

