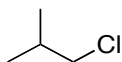


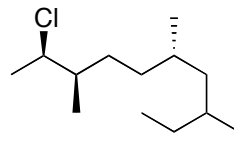
## Problem Set 9

### Chapter 9, Alkyl Halide, Substitutions

1. Name the following halides according to the IUPAC rules (include stereochemistry when appropriate).

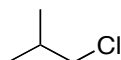


1-chloro, 2-methyl propane

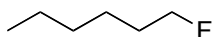


(2R, 3R, 6S) 2-chloro, 8-ethyl, 3,4-dimethyl decane

2. Name the following “simple” halides as “Alkyl Halides”.



isobutyl chloride

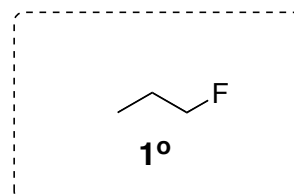
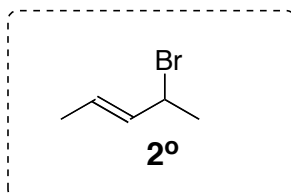
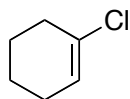
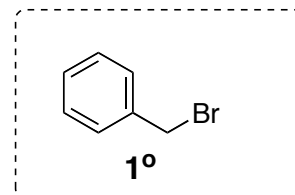
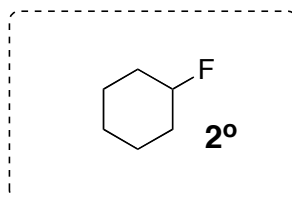
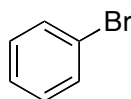
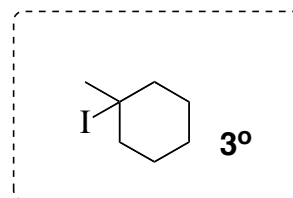
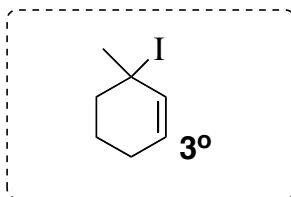
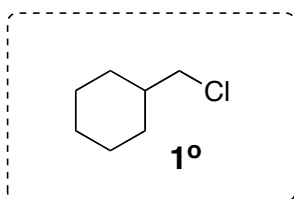


hexyl fluoride

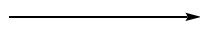
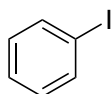
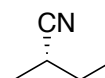
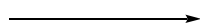
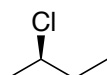
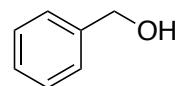
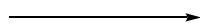
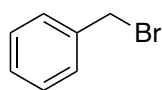


t-butyl bromide

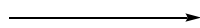
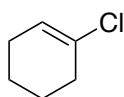
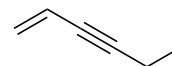
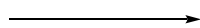
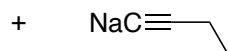
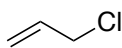
3. Classify each halide as primary ( $1^\circ$ ), secondary ( $2^\circ$ ) or tertiary ( $3^\circ$ ).  
Circle all halides that can undergo an  $S_N1$  or  $S_N2$  type substitution.



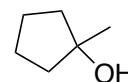
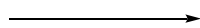
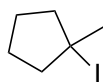
4. Draw the products of the following substitution reactions. If the organic halide shown is not reactive under the conditions shown, simply write N.R. (no reaction).



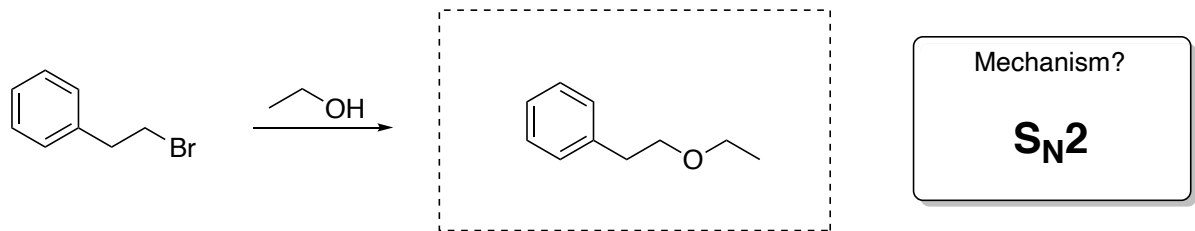
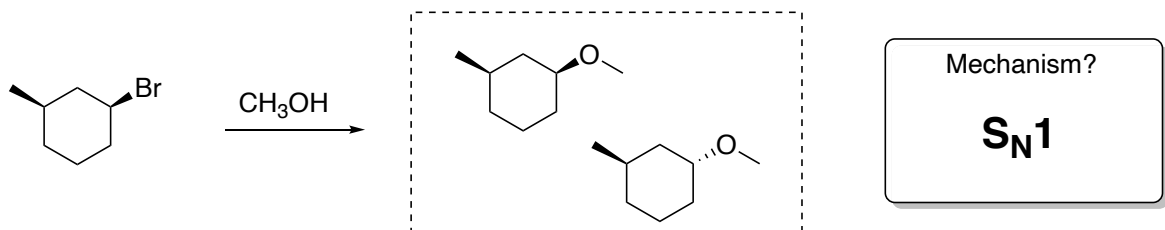
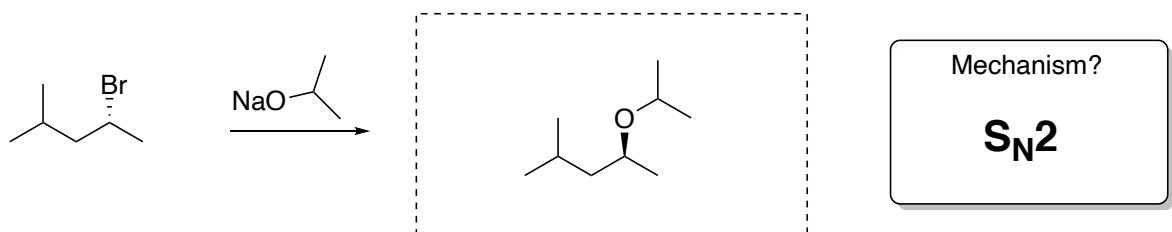
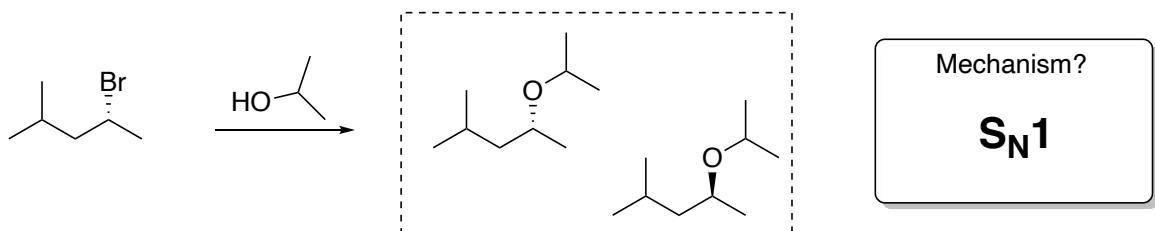
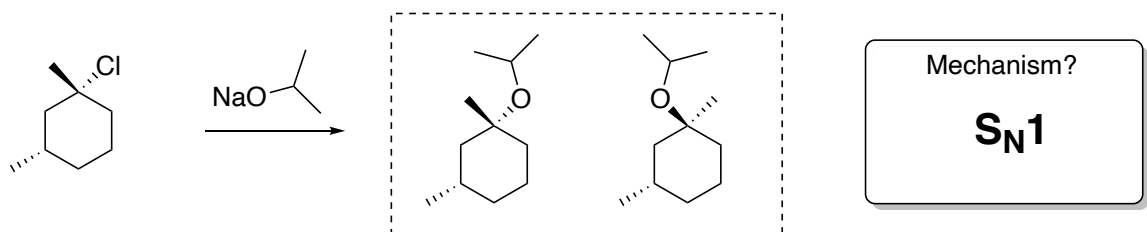
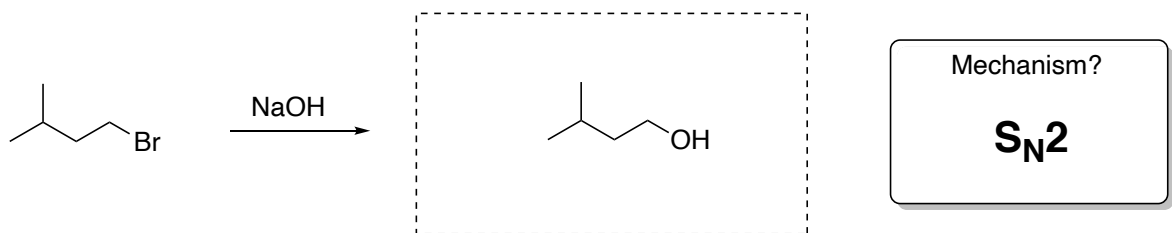
NR



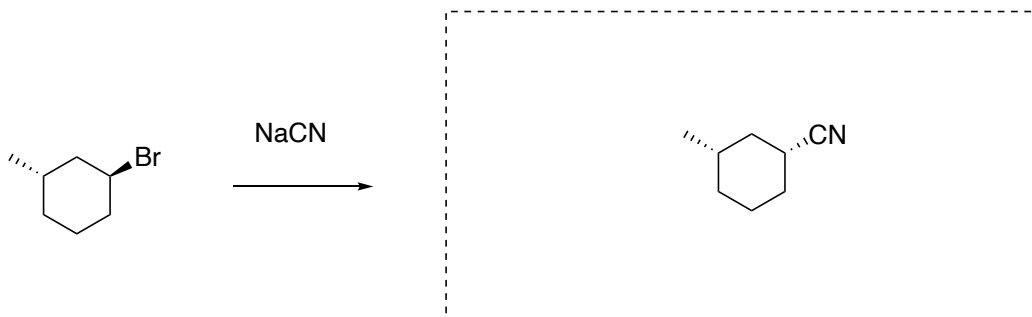
NR



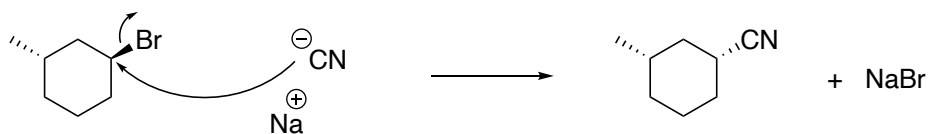
5. Complete the following reactions and determine the mechanism of nucleophilic substitution ( $S_N1$  or  $S_N2$ ). Be sure to depict proper stereochemistry, if appropriate!



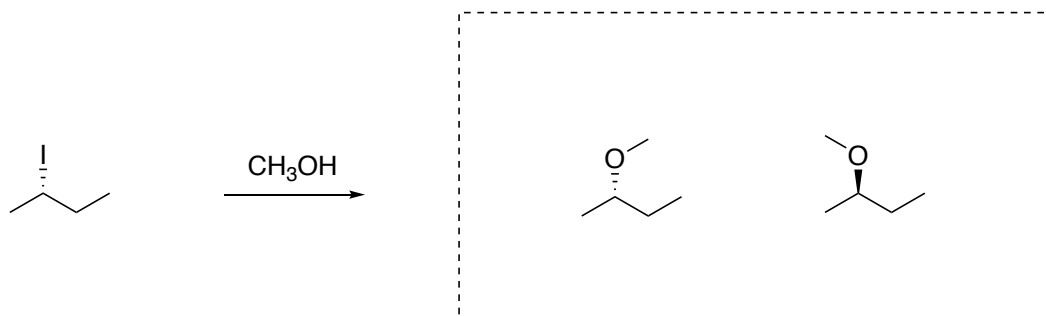
6. a. Draw the product(s) of the following  $S_N2$  reaction.



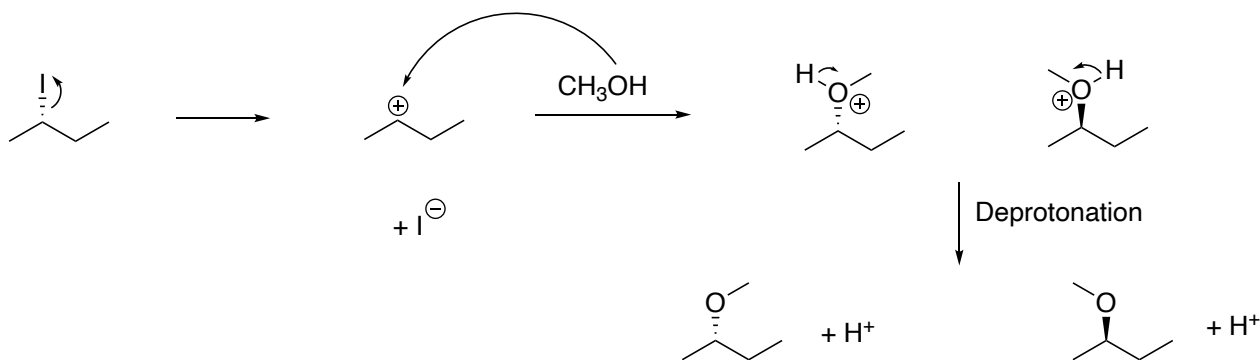
b. Draw a detailed, arrow pushing mechanism for this reaction, showing electron movement as bonds are breaking and forming.



7. a. Draw the product(s) of the following  $S_N1$  reaction.



b. Draw a detailed, arrow pushing mechanism for this reaction, showing electron movement as bonds are breaking and forming.



8. Complete the following reactions by drawing the intermediate **charged substitution product** and the **neutral final organic product**. Be sure to determine the substitution mechanism and draw out the mechanisms for both steps.

