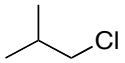
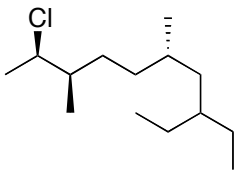
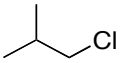
Problem Set 9
Chapter 9, Alkyl Halide, Substitutions

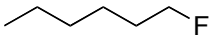
1. Name the following halides according to the IUPAC rules (include stereochemistry when appropriate).



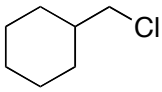


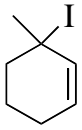
2. Name the following "simple" halides as "Alkyl Halides".

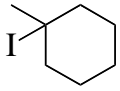


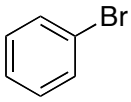


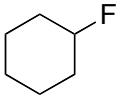
3. Classify each halide as primary (1°), secondary (2°) or tertiary (3°).
Circle all halides that can undergo an S_N1 or S_N2 type substitution.

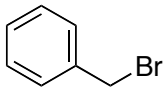


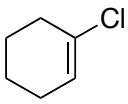


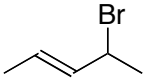


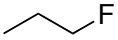




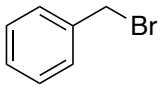




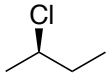




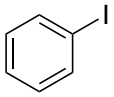
4. Draw the products of the following substitution reactions. If the organic halide shown is not reactive under the conditions shown, simply write N.R. (no reaction).



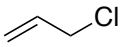
+ NaOH ⟶



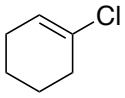
+ NaCN ⟶



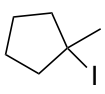
+ NaOH ⟶



+ NaC≡ ⟶

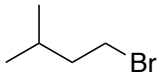


+ NaCN ⟶



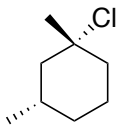
+ NaOH ⟶

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!



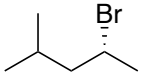
NaOH →

Mechanism?



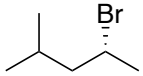
NaO →

Mechanism?



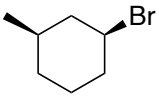
HO →

Mechanism?



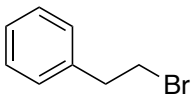
NaO →

Mechanism?



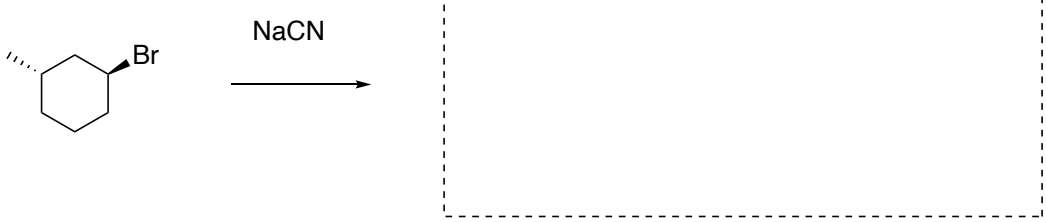
CH_3OH →

Mechanism?



Mechanism?

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 bornds are breaking and forming.

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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 bornds 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.