Names of all students (please print) _____

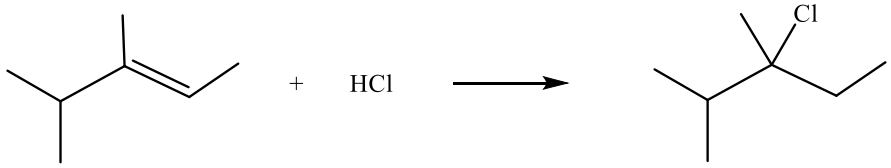
_____

CHEM 243 Organic Chemistry I **Points _____ (10 max)**

Worksheet #25: November 22, 2021. Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade. **All the problems on this worksheet are Review Questions for Exam III.**

NOTE: The problems on Worksheets 24-28, and on the Study Guide for Exam IV, will be representative of the problems that might appear on the optional make-up exam.

(1) Electrophilic Addition Reactions: General Mechanism Questions (video 8-1). Answer the following questions based on the reaction drawn at the right:



(a) Label one <u>reactant</u> sp2 carbon as partial positive (δ^+) and the other as partial negative (δ^-).

(b) **<u>Circle</u>** the correct responses:

i. The **H^+ ion** becomes bonded to the **(δ^- or δ^+)** sp2 carbon

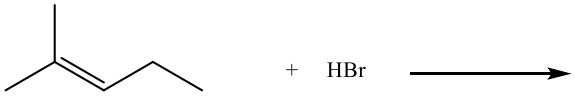
ii. The **H^+ ion** is referred to as the (**nucleophile, electrophile, acid, base**)

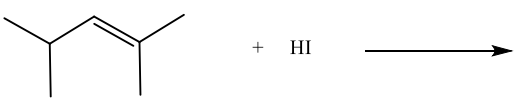
(c) **<u>Circle</u>** the correct responses:

i. The **Cl^-** ion becomes bonded to the **(δ^- or δ^+)** sp2 carbon

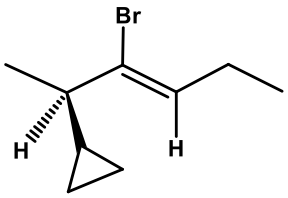
ii. The **Cl^-** ion is referred to as the (**nucleophile, electrophile, acid, base**)

(2) Electrophilic Addition Reactions. Based on the analysis you did in problem (1), complete the **Electrophilic Addition Reactions** shown below by drawing the structure of the <u>major, neutral organic products</u>. It is NOT necessary to balance these reactions or write the mechanism. There are NO rearrangements and NO intramolecular reactions.



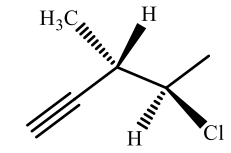


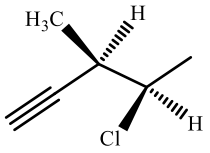
(3) Nomenclature. Write the IUPAC name for the structure drawn below. **Don't forget to include the proper 3D configuration at each chiral carbon (using R/S designations), and proper alkene geometry (cis/trans or E/Z).**

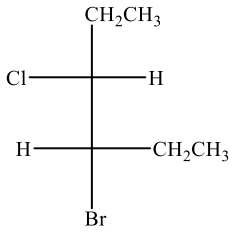


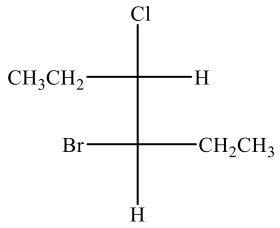
(4) Comparing Organic Structures. How are the following pairs of molecules related?

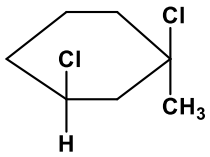
Identical	Constitutional isomers	Enantiomers	Diastereomers

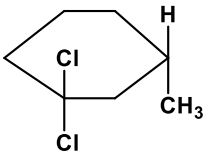




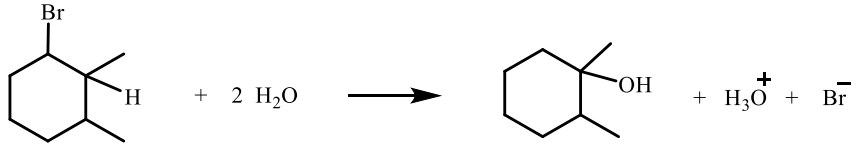








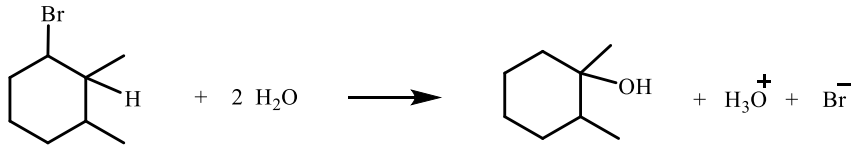
(3) SN1 Mechanism with Rearrangement (4 steps). Write a complete mechanism that explains the formation of all products in the balanced net reaction shown below. Your mechanism must consist of a series of individual, balanced chemical equations, and curved arrows to show electron pair movement.



Keys to Carbocation Rearrangement Mechanisms:

- Carbocation rearrangements can only occur in SN1 and E1 reactions.
- Rearrangements occur when a 2° carbocation forms adjacent to a 3° (or 4°) carbon.
- The "rearrangement" involves an adjacent **3°H** or **3°CH$_3$** (whichever is smaller) "shifting" to the 2° carbocation, forming a more stable 3° carbocation.
- IMPORTANT – The carbocation does not move! When an **3°H** or **3°CH$_3$** shifts, the original 2° carbocation is extinguished, and a new 3° carbocation forms.

(Continued) SN1 Mechanism with Rearrangement (4 steps):



EXPLAIN what is happening in Step #4 of your mechanism. Be specific!