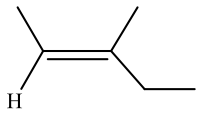
Names of all students (please print) _____

_____

CHEM 243 Organic Chemistry I **Points_____ (10 max)**

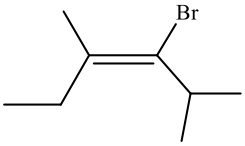
Worksheet #21: November 13, 2024. Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade.

(1) Alkene Geometry. For each alkene below:
(a) CIRCLE the correct geometry (**cis, trans, E or Z)**
(b) Draw the structure of the <u>opposite</u> stereoisomer in the corresponding box. **Do NOT name the alkenes.**



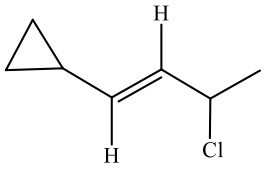
cis trans E Z

opposite stereoisomer:



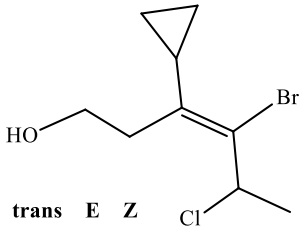
cis trans E Z

opposite stereoisomer:



cis trans E Z

opposite stereoisomer:



cis trans E Z

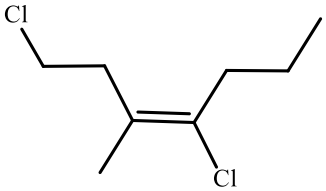
opposite stereoisomer:

(2) Alkene Nomenclature.

- If a name is given draw an accurate zig-zag structure (remember to use wedge and dash bonds for all chiral carbons, and to have the proper cis or trans geometry for double bonds).
- If a structure is drawn, give an accurate IUPAC name (don't forget to assign configurations using the R/S prefix, and/or assign the proper alkene geometry using the cis/trans or E/Z prefix).

(a) trans-(S)-5-chloro-2-hex**ene**

(b)



(you must use an E or Z prefix)

(c) 2-ethyl-3-bromo cyclohexene
(Draw as 2-D structure, with the
double bond being C1 & C2)

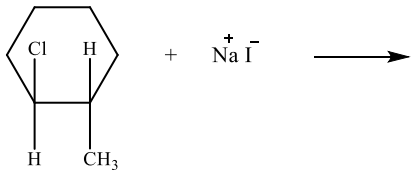
(3) Reactions. The reactions below may produce **ONE** or **TWO** organic products:

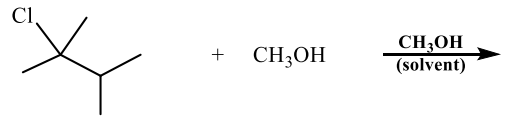
SN1 & E1	**or**	**SN2 & E2**	**or**	**SN2 only**	**or**	**E2 only**

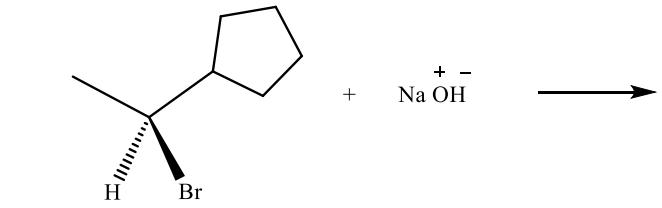
Using your Flow Chart, complete the reactions shown below by drawing the structure of the **major, neutral organic products.** Draw the proper stereochemistry or geometry, if relevant. It is **NOT** necessary to balance these reactions or write the mechanism. Use the following prompts for guidance:

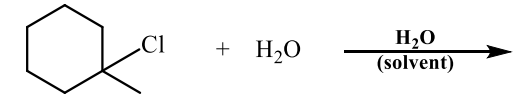
- Is the leaving group bonded to a **1º, 2º, or 3º** carbon?
- Is there a **GOOD** or **POOR** nucleophile?
- If a GOOD nucleophile is it a **WEAK** or **STRONG** base?
- If a STRONG base is it **BULKY** or **SMALL**
- What type of reaction(s) are occurring: **SN1 SN2 E1 E2**
- If relevant, what is/are the stereochemistry or geometry implications of the reactions:

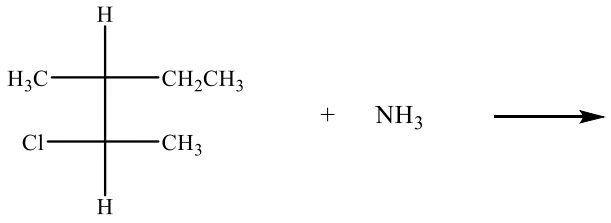
SN1 = racemic mixture	**SN2 – inversion**	**E1 = most stable alkene**	**E2 (small base) = most stable alkene**	**E2 (bulky base) = least stable alkene**

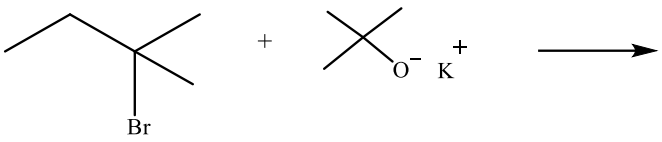
(a) 

(b) 

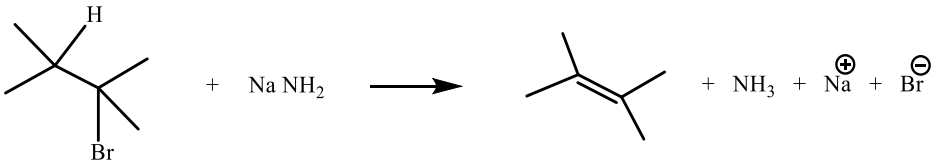
(c) 

(d) 

(e) 

(f) 

(4) E2 Mechanism (1 step). 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.



(5) E2 Reaction Transition State. In the brackets at the right, draw the structure for the transition state of the Rate-Limiting Step from your mechanism above:

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