Names of all students (please print) _____

_____

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

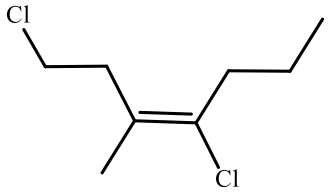
Worksheet #19: November 1, 2021. Complete the following worksheet by collaborating with a group of 3-4 students. You can use a text book or your lecture video notes. You must work together, with the names of all students included on **ONE** sheet and turned in for a group grade.

(1) 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 prefix).

(a) trans-(S)-5-chloro-2-hexene

(b)



(you must use either an E or Z prefix)

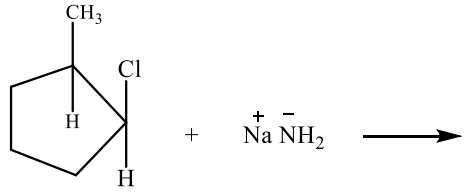
(c) 2-ethyl-3-bromo cyclohexene (Draw as 2-D structure, with the double bond being C1 & C2)

(2) Reactions. The Flow Chart has been updated! Please see the latest version dated **October 29, 2021**. The reactions below may produce **ONE** or **TWO** organic products:

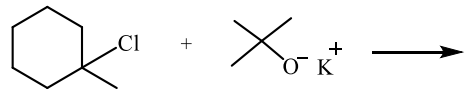
SN1 & E1 **SN2 & E2** **SN2 only** **E2 only**

Complete the reactions shown below by drawing the structure of the **major, neutral organic products.** Draw the proper stereochemistry, if relevant. It is **NOT** necessary to balance these reactions or write the mechanism.

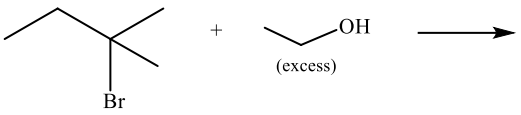
(a)



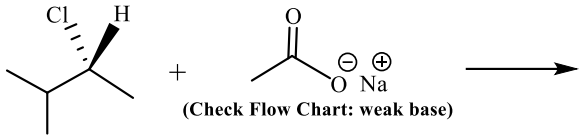
Type of alkyl halide:	Nucleophile:	Type of Reaction(s):

(b) 

Type of alkyl halide:	Nucleophile:	Type of Reaction(s):

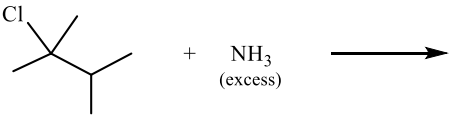
(c) 

Type of alkyl halide:	Nucleophile:	Type of Reaction(s):

(d) 

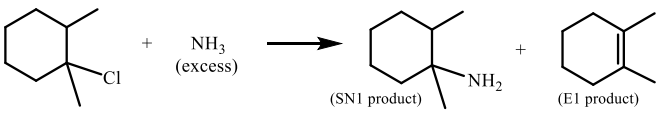
(Check Flow Chart: weak base)

Type of alkyl halide:	Nucleophile:	Type of Reaction(s):

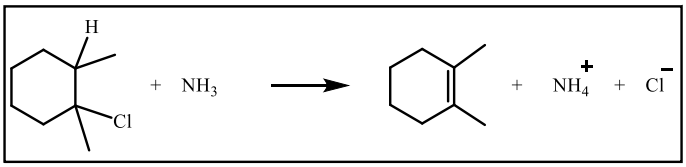
(e) 

Type of alkyl halide:	Nucleophile:	Type of Reaction(s):

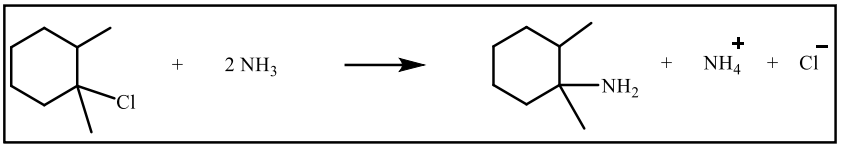
(3) SN1/E1 Theory. The <u>unbalanced</u> reaction at the right gives **BOTH** SN1 and E1 products. Can you explain why? To do so, lets first write the mechanism for each reaction:



(a) E1 Mechanism (2 steps). Write a complete mechanism that explains the formation of all products in the balanced net reaction drawn in the box at the right. Your mechanism must consist of a series of balanced chemical equations, and curved arrows to show electron pair movement.



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



(c) Based on your mechanisms above, why do we get both SN1 and E1 products from the same reactants? To answer this question:

(i) Draw the structure of the **common intermediate** between both mechanisms:

(ii) Each reaction also has the **same Rate Limiting Step**. Draw the structure for the common **transition state** of the Rate-Limiting Step from each mechanism.

Structure of the common transition state for each reaction (E1 and SN1)