Names of all students (please print) _____

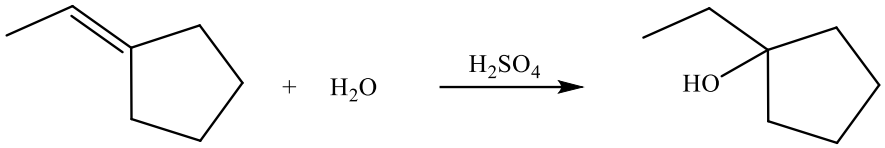
_____

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

Worksheet #26: November 27, 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.

***Questions 1-3 are additional background information on electrophilic addition that follow question 5 on Monday's WS-25.

(1) Electrophilic Addition Reactions: General Mechanism Questions based on video 8-2. Answer the following questions based on the reaction drawn at the right:

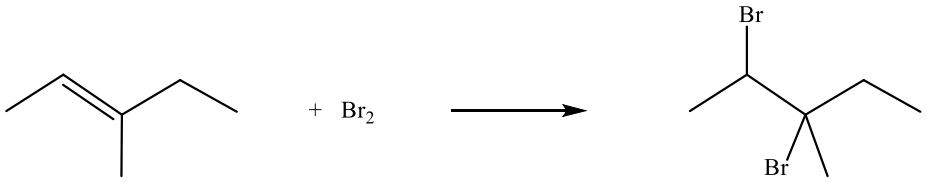


(a) Label the sp2 carbons of the alkene double bond with δ^+ and δ^-.

(b) (Circle the correct responses) The **(H_2O, HSO_4^-, H^+)** species becomes bonded to the **δ^+ sp2 carbon**, and this species is referred to as the **(nucleophile, electrophile, acid, base).**

(c) (Circle the correct responses) The **(H_2O, HSO_4^-, H^+)** species becomes bonded to the **δ^- sp2 carbon**, and this species is referred to as the **(nucleophile, electrophile, acid, base).**

(2) Electrophilic Addition of Br_2 and Cl_2: General Mechanism Questions based on video 8-3. Answer the following questions based on the reaction drawn at the right:



(a) Label the alkene double bond with δ^+ and δ^-

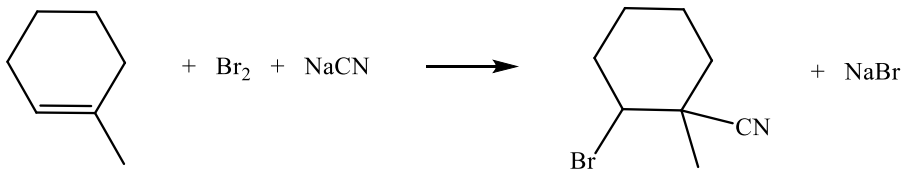
(b) (Fill in the blanks) For the Br_2 reagent, one Br atom has a δ^+ charge, is called the _____, and becomes bonded to the (Circle: δ^+ or δ^-) sp2 carbon of the alkene.

(c) (Fill in the blanks) For the Br_2 reagent, the other Br atom has a δ^- charge, is called the _____, and becomes bonded to the (Circle: δ^+ or δ^-) sp2 carbon of the alkene.

(d) Circle the correct response. The **key intermediate** in this reaction is called the:
(carbocation bromonium ion hydronium ion bromide ion)

(e) Draw the structure of the **key intermediate** in this reaction:

(3) Electrophilic Addition of Br_2 and a nucleophile: General Mechanism Questions based on video 8-3.
Answer the following questions based on the reaction drawn at the right:



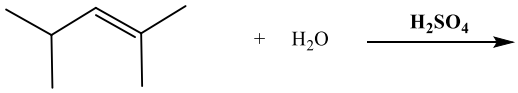
(a) Label the alkene double bond with δ^+ and δ^-

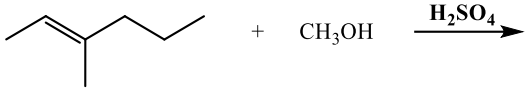
(b) (Circle the correct responses) The (Br, Na, CN) species becomes bonded to the δ^- sp2 carbon, and this species is referred to as the (nucleophile, electrophile, acid, base, spectator).

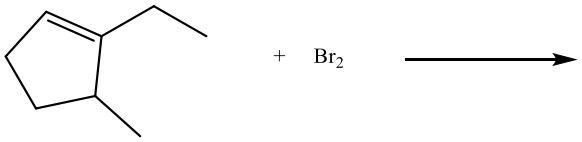
(c) (Circle the correct responses) The (Br, Na, CN) species becomes bonded to the δ^+ sp2 carbon, and this species is referred to as the (nucleophile, electrophile, acid, base, spectator).

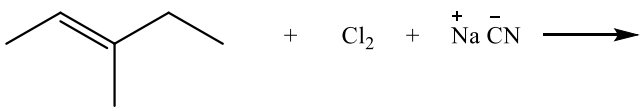
(4) Electrophilic Addition Reactions. Based on the background information, complete the **Electrophilic Addition Reactions** shown below by drawing the structure of the major, neutral organic products. It is NOT necessary to balance these reactions or write the mechanism. There are NO rearrangements and NO intramolecular reactions. **Do Not worry about stereochemistry.**

(a) 

(b) 

(c) 

(d) 

(e) 

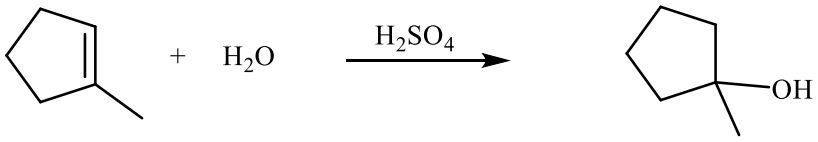
BONUS QUESTION!

Complete the following question to earn up to 5 Bonus Points

You may not ask the PALS for assistance

Bonus Points _____

B-1. Electrophilic Addition Mechanism: Acid Catalyzed Addition of H_2O to an Alkene (3 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.



B-2. Mechanism Theory. In which Step is the H_2SO_4 being used in the mechanism you wrote above, and what is the purpose? Be specific!