Week 7
CHE 3331- Organic Chemistry

This week is <u>Week</u> <u>7</u> <u>of class</u>, and typically in this week of the semester, your professors are covering these topics below. If you do not see the topics your particular section of class is learning this week, please take a look at other weekly resources listed on our website for additional topics throughout of the semester.

We also invite you to **look at the group tutoring chart on our website to see if this course has a group tutoring session offered this semester**.

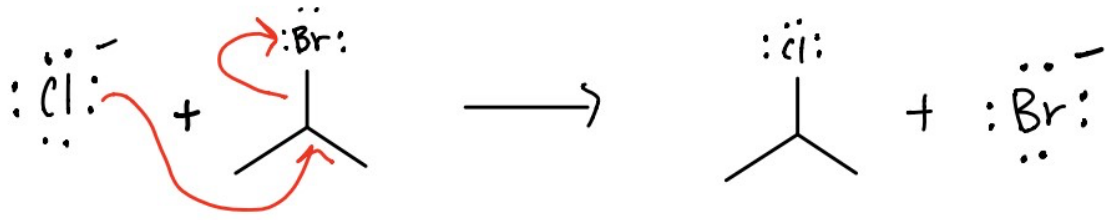
If you have any questions about these study guides, group tutoring sessions, private 30 minute tutoring appointments, the Baylor Tutoring YouTube channel or any tutoring services we offer, please visit our website www.baylor.edu/tutoring or call our drop in center during open business hours. M-Th 9am-8pm on class days 254-710-4135.

Keywords: Nucleophile, Electrophile, Mechanism Steps, Carbocation Stability, Substitution Overview

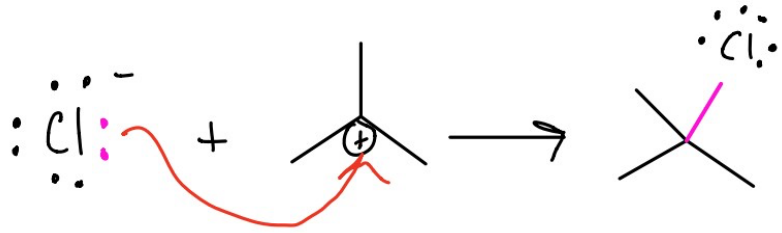
TOPIC OF THE WEEK: MECHANISM STEPS

There are several arrow pushing patterns that will show up as you begin learning mechanisms, so in this section we are going to learn those patterns and you will start applying them with substitution reactions.

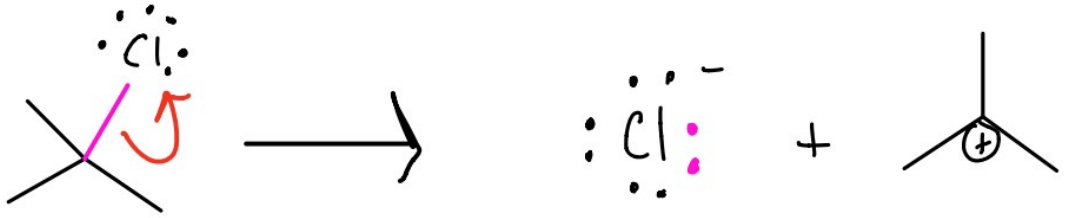
- **Arrow pushing**
  - You learned about arrow pushing with resonance, so this will be a quick review of how to read curved arrows



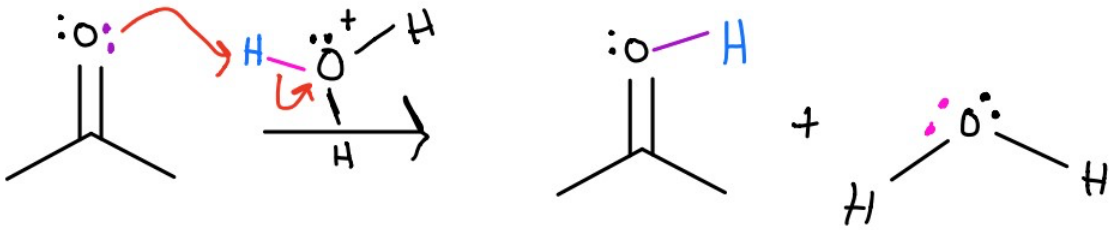
- **Mechanism pattern #1: Nucleophilic attack** ○ This is when the electrons from a nucleophile form a bond with another molecule



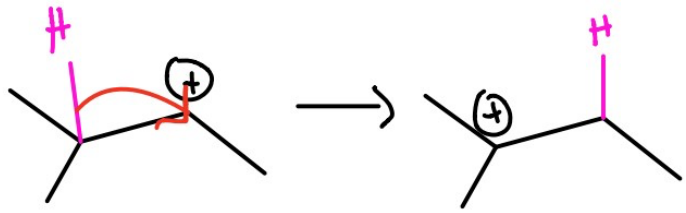
- **Mechanism pattern #2: Loss of leaving group** ○ A leaving group is an electronegative atom that leaves a molecule and takes its electrons from the bond with it. OPPOSITE OF NUCLEOPHILIC ATTACK.



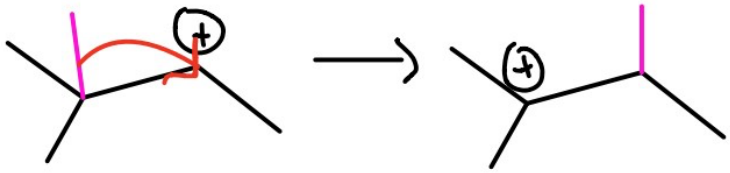
- **Mechanism pattern #3: Proton transfer** ○ A proton transfer is the movement of an H+ from one molecule to another



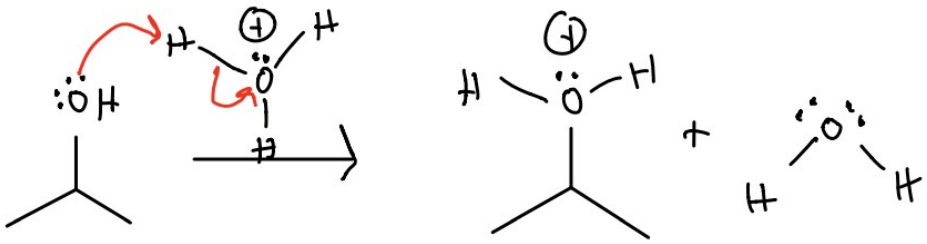
- **Mechanism pattern #4: Rearrangements (2 types)** ○ Rearrangement type 1: Hydride shift (H-)



  - Rearrangement type 2: Methyl shift



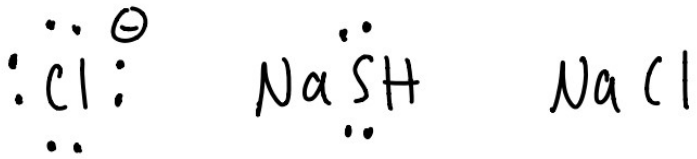
Practice #1: Identify the mechanism steps of the following 1.



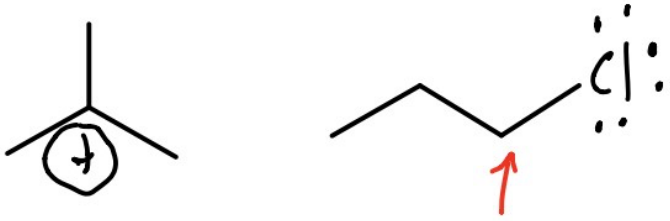
HIGHLIGHT #1: Nucleophiles and Electrophiles

Nucleophilic and electrophilic are terms used to describe electron density for an atom. Mechanisms are simply movements of electrons, so understanding whether an atom will give or donate electrons is vital to understanding how mechanisms work.

- Nucleophile: Electron rich (has electrons to donate) ○ Examples: Anything with lone pairs, halogens, oxygen

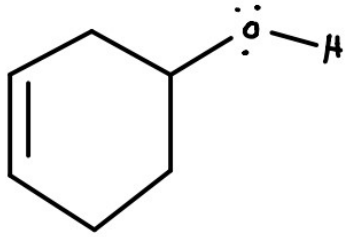


- Electrophile: Electron poor (can accept electrons) ○ Examples: Carbon with an electronegative atom attached, positive charges



Practice #2: Identify the mechanism steps of the following

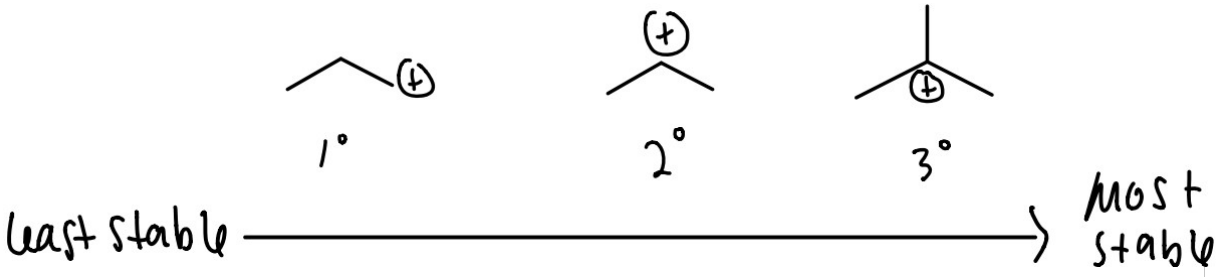
1.



HIGHLIGHT #2: Carbocation Stability

As you are going into mechanisms, it is important to understand the relationship of carbocations and their stability.

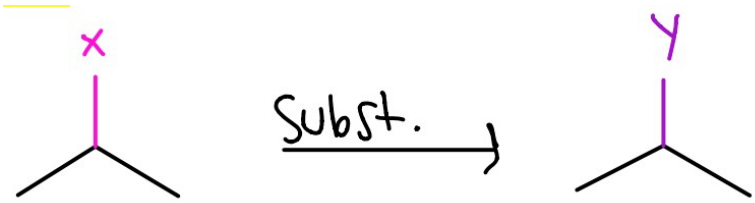
- Tertiary carbocations are the most stable



HIGHLIGHT #3: Intro to Substitution Reactions

This week we are going to look at a broad overview of substitution reactions and next week we will really get into the weeds of it. Substitution reactions are vital to the rest of your o-chem career, so do lots of practice with these.

- What is a substitution reaction? A substitution reaction is when one group leaves a molecule and is replaced with another



- At least 2 of the 4 mechanisms steps must be present: nucleophilic attack and loss of a

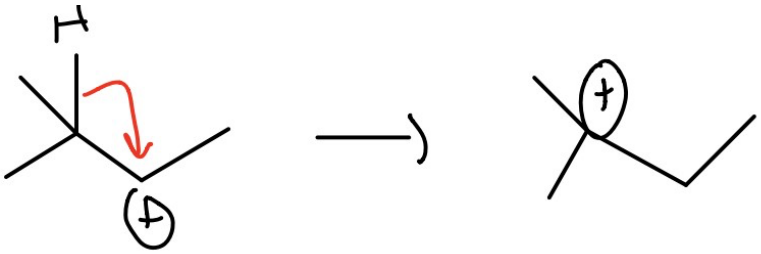
leaving group

- There are 2 ways that a substitution reaction can happen: concerted (SN2) or stepwise (SN1) ○ These happen under different conditions, but we will cover these conditions next week. ○ Concerted Process (SN2)

- ○ Stepwise Process (SN1)

CHECK YOUR LEARNING:

1.



2.

THINGS YOU MAY STRUGGLE WITH:

1. Mechanism steps are vital to being able to do any type of reaction, so learning these well is the first step to your success with mechanisms.

2. Proton transfers are always tricky because the arrow almost looks the opposite of what you think it should be. I always say in my head "the electrons are reaching out and grabbing the proton, and the proton leaves the bond behind" this helps me draw the arrow correctly.

SUMMARY VIDEOS

Khan Academy Link: https://www.youtube.com/watch?v=Z4F88tTx9-8
Baylor Tutoring Videos: https://www.youtube.com/watch?v=rzFWWcooMqo

Thanks for checking out these weekly resources!
Don't forget to check out our website for group tutoring times, video tutorials and lots of other resources: www.baylor.edu/tutoring ! Answers to check your learning questions are below!

ANSWERS TO PRACTICES 1-2:

Question 1: Proton transfer

Question 2:

ANSWERS TO CHECK YOUR LEARNING:

Question 1: Hydride Shift

Question