Hi everyone! This week we are going to be going over the end of chapter 6, as well as in intro to substitution reactions of chapter 7. We are going to start putting together a lot of things you’ve learned so far, so reviewing is key! We hope everyone has a great week.

Don’t forget that group tutoring is every Thursday from 6:30-7:30, and we hope to see everyone there. Here is the link to sign up. https://www.baylor.edu/support_programs/index.php?id=40917

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

  ![Arrow pushing diagram](image)

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

  ![Nucleophilic attack diagram](image)

- **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 NUC ATTACK

  ![Loss of leaving group diagram](image)
- **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**

a. 

b. 

**BOTH OF THESE ARE INTRAMOLECULAR!!!**
**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

![Cl, Na, S, H, NaCl](image)

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

![Electrophile examples](image)

**Practice #2: Identify the nucleophilic and electrophilic centers**

https://www.youtube.com/watch?v=Z4F88tTx9-8

a.

![Nucleophilic center](image)

b.

![Electrophilic center](image)
**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**

![Carbocation Stability Diagram]

**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.

![Substitution Reaction Diagram]

- 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)

![SN2 Mechanism Diagram]

- Stepwise Process (SN1)

![SN1 Mechanism Diagram]
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.

Answers to practice:

1. a. Proton transfer
   
   b. Hydride Shift

2. a. 
   
   b. 
   
   (Pl bonds are nucleophilic!)

   $\square = \text{Nucleophile}$
   $\square = \text{Electrophile}$
   $\ell = \text{Li}$