2302106 – Basic Organic Chemistry for ISE – Part II

Lecture 1

Introduction - Recap

Instructor: Asst. Prof. Dr. Tanatorn Khotavivattana
E-mail: tanatorn.k@chula.ac.th

Organic Chemistry

Nanoparticles (NPs)

Inorganic NPs

Gold NPs

Qdots

Superparamagnetic Iron Oxide NPs

Paramagnetic Lanthanide Ions

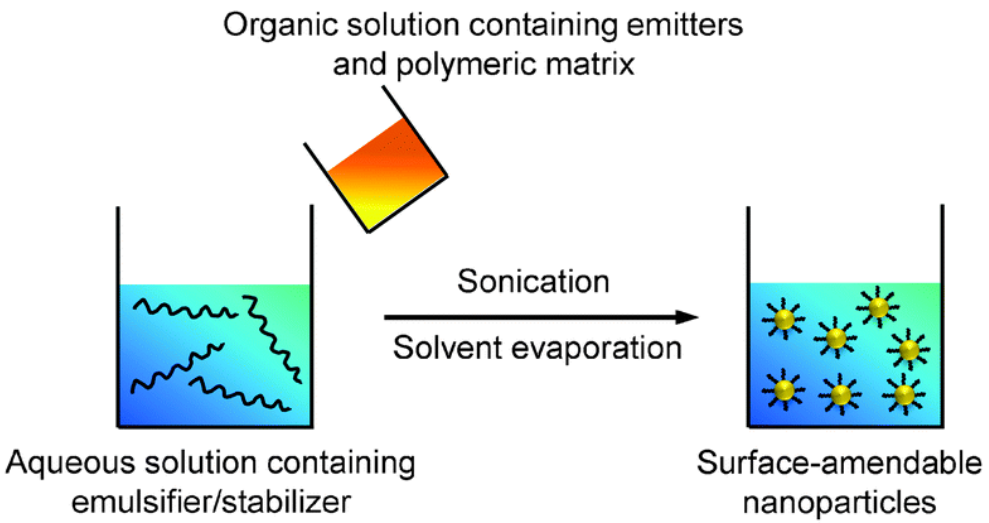
Organic NPs

Dendrimers

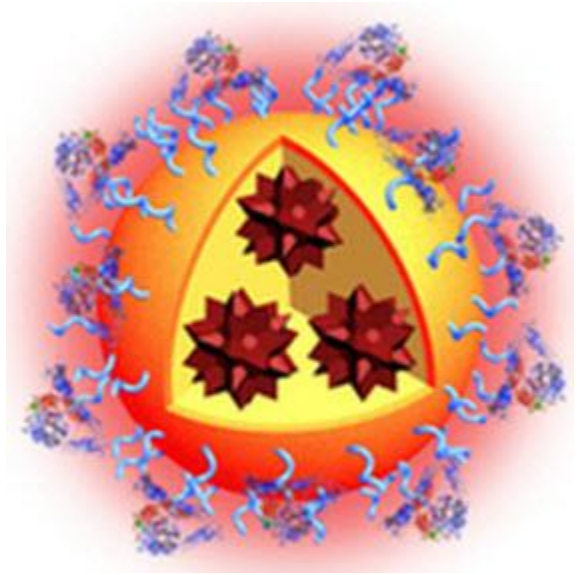
Micelles

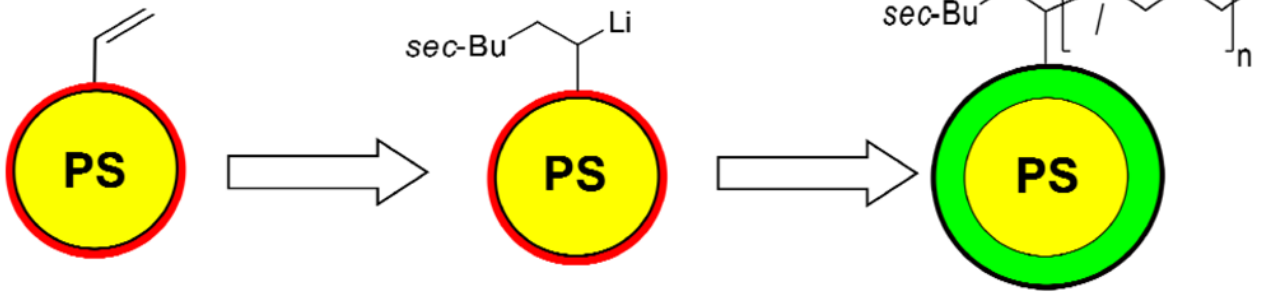
Liposomes

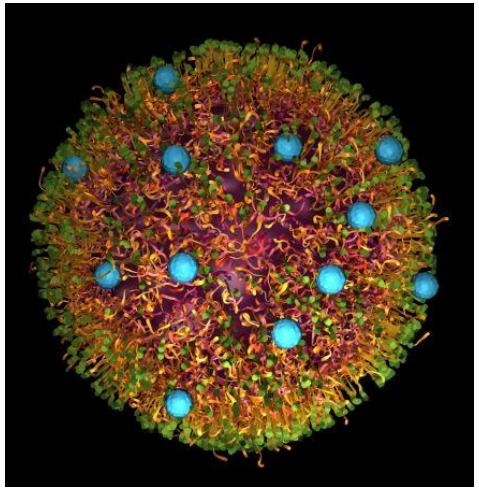
Ferritin

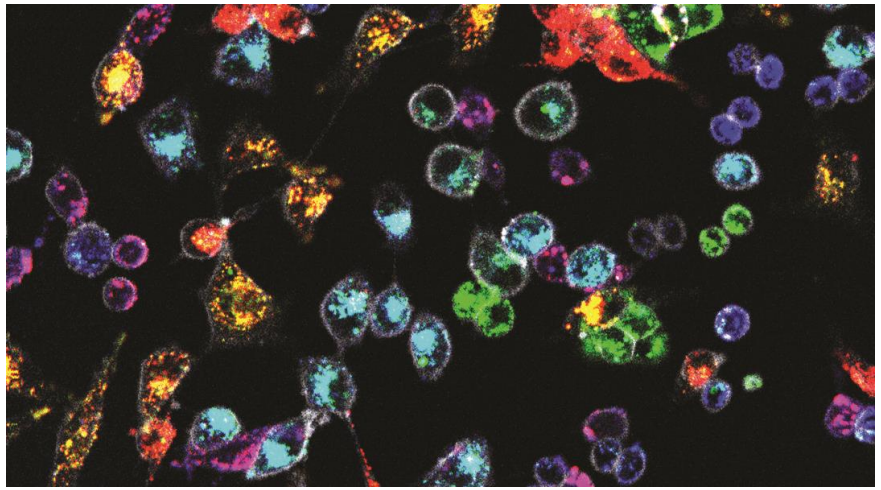


Organic Chemistry for Nano-Engineering Students

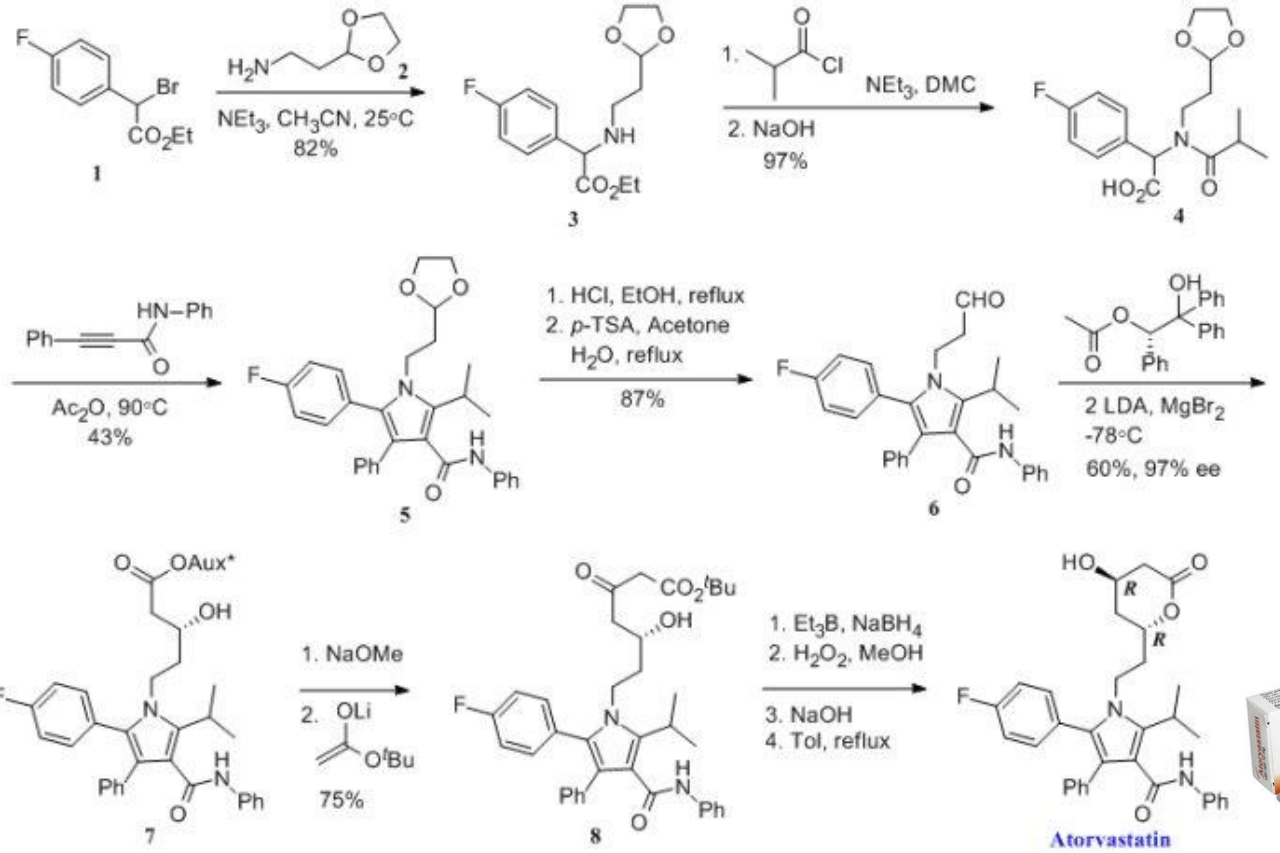




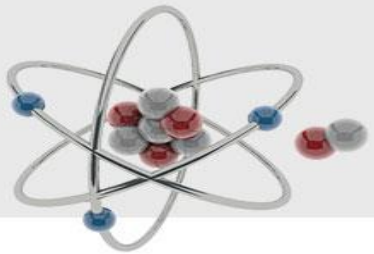




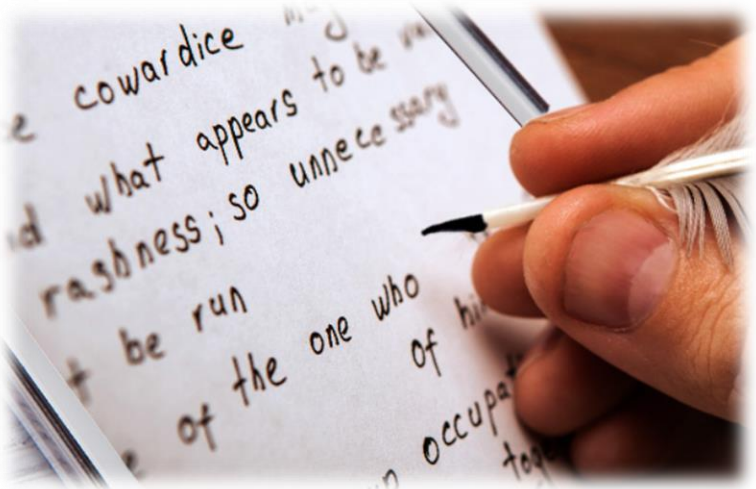
Organic Chemistry in Real Life

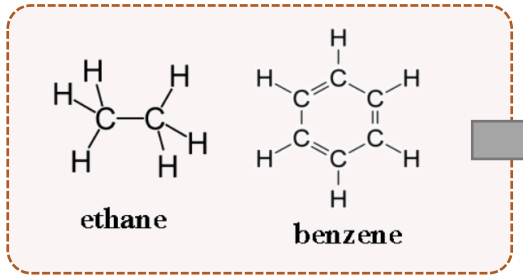


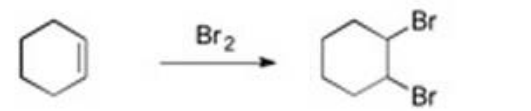
Organic Chemistry Learning Curve

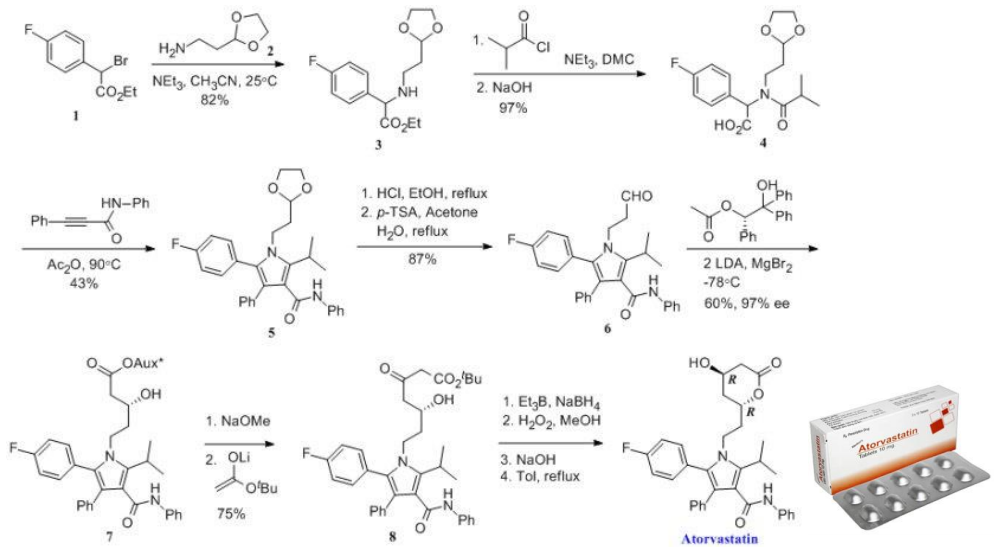


ABC

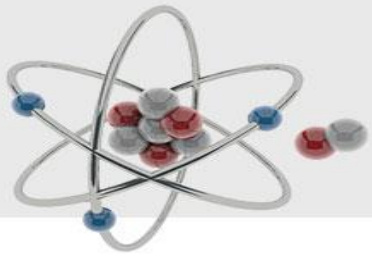








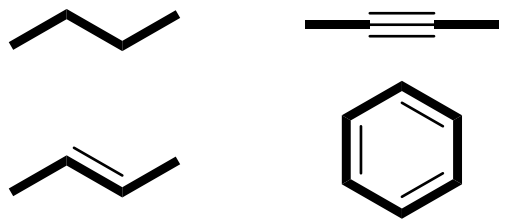
Content for this course



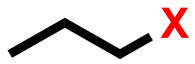
☑ **Fundamentals of Organic Chemistry**

☑☐ **Properties, Reactions, and Synthesis of Organic Compounds**

☑ Hydrocarbons (Alkanes, Alkenes, Alkynes, Aromatics)



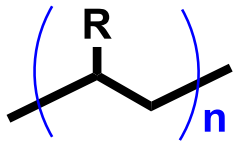
☑ Alkyl Halides



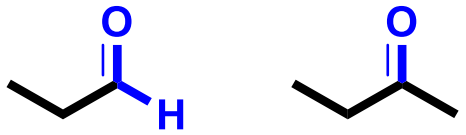
☐ Alcohols (L1+2)

☐ Amines (L3)

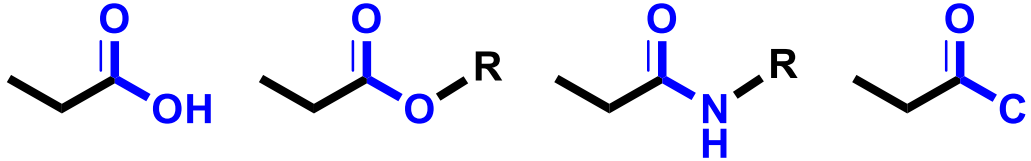
☐ Polymers (L6)



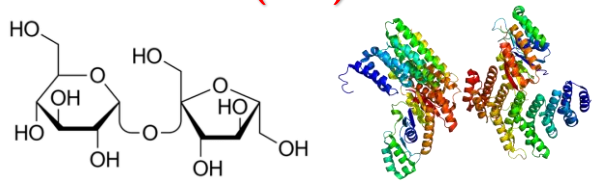
☐ Aldehydes & Ketones (L4)



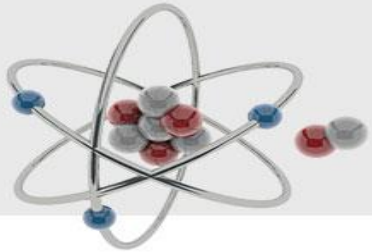
☐ Carboxylic acids & Derivatives (L5)



☐ Biomolecules (L7)

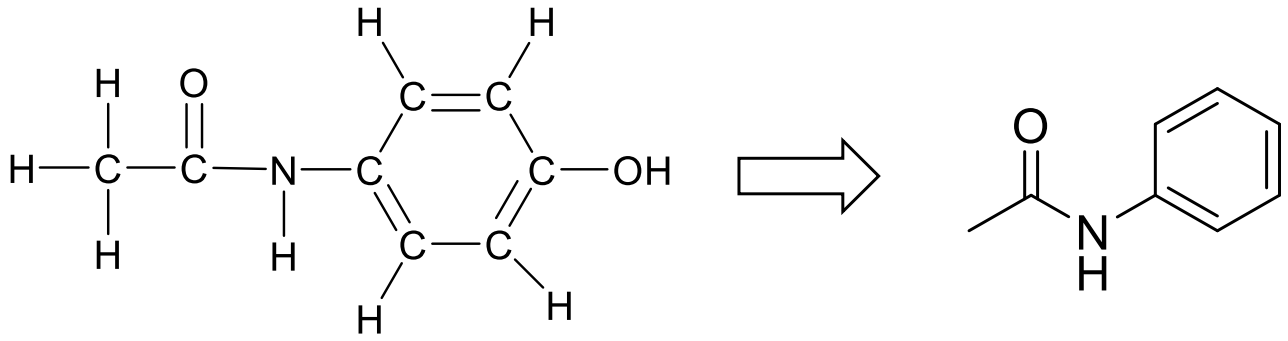


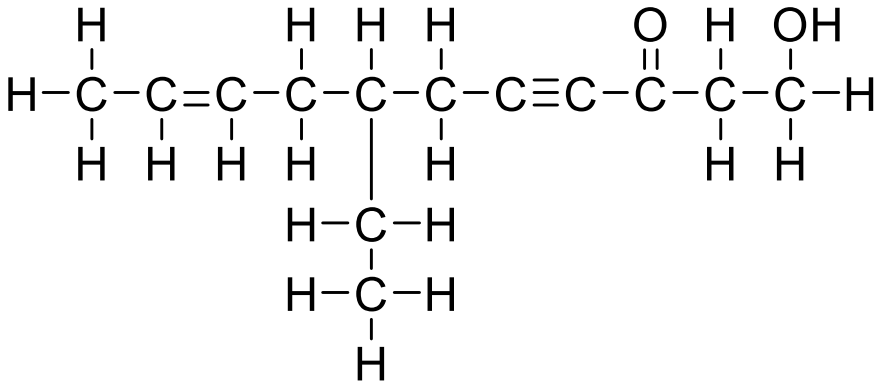
Knowledge Required - Recap



☑ Fundamentals of Organic Chemistry

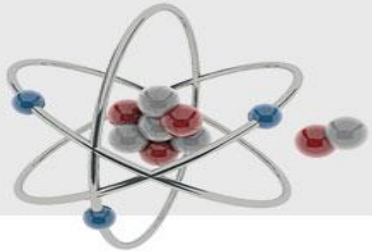
☑ Line-Angle Formulas





?

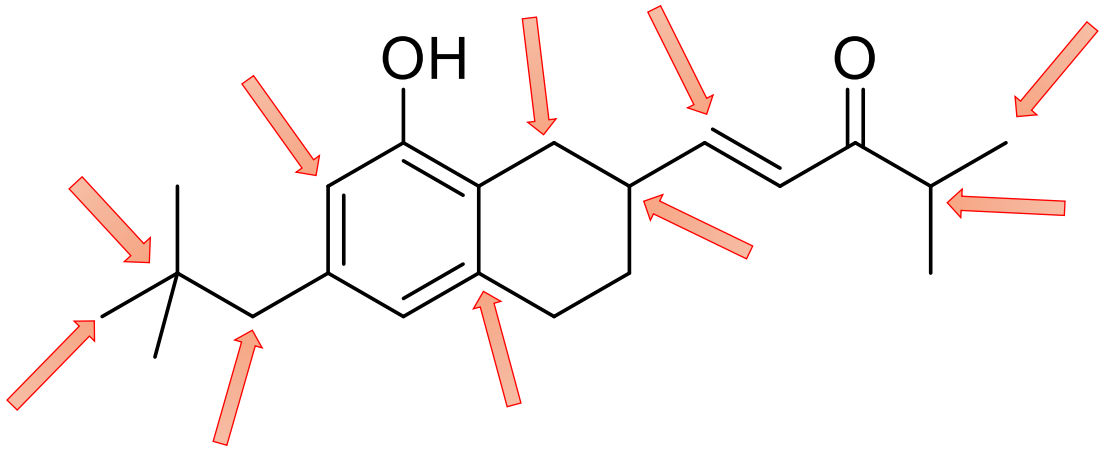
Knowledge Required - Recap



☑ **Fundamentals of Organic Chemistry**

☑ Line-Angle Formulas

How many hydrogen atom is attached to the specified carbons?

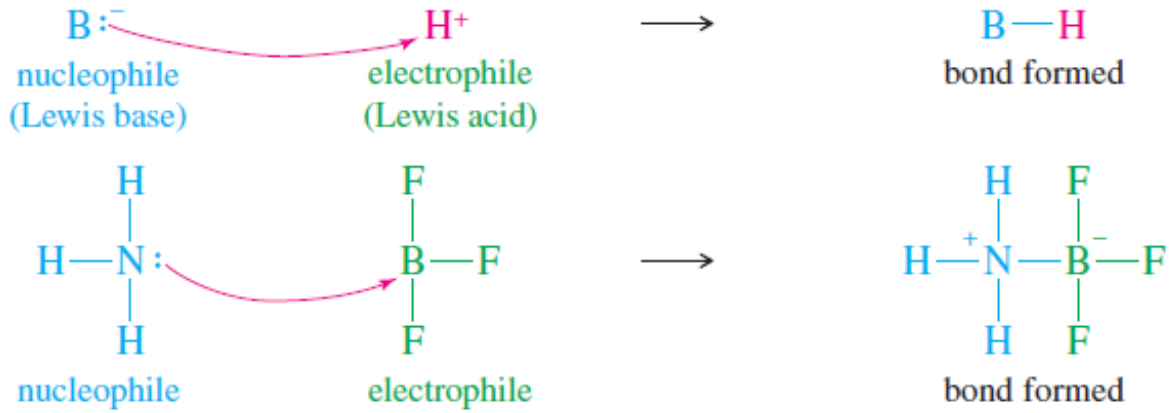


Knowledge Required - Recap

☑ Fundamentals of Organic Chemistry

☑ Drawing reaction mechanism (arrow pushing)

- **Nucleophile** (lover of nuclei) = **Lewis bases** = species with available electrons that can be donated to form new bonds.
- **Electrophile** (lover of electrons) = **Lewis acids** = species that can accept these electron pairs to form new bonds.



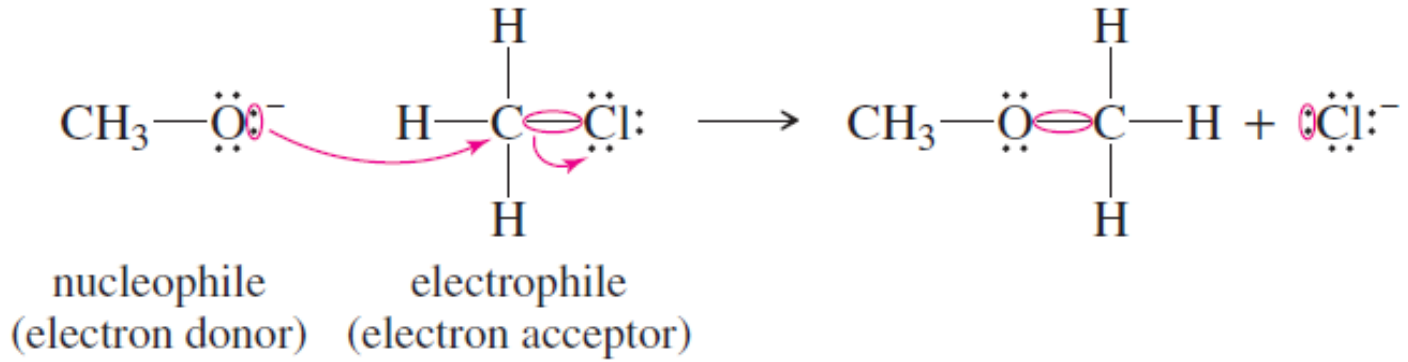
Knowledge Required - Recap

☑ Fundamentals of Organic Chemistry

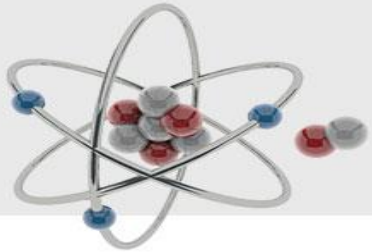
☑ Drawing reaction mechanism (arrow pushing)

The **curved-arrow formalism** is used to show the **flow of an electron pair *from the electron donor to the electron acceptor***.

The **movement** of each pair of electrons involved in making or breaking bonds is indicated by its own separate arrow



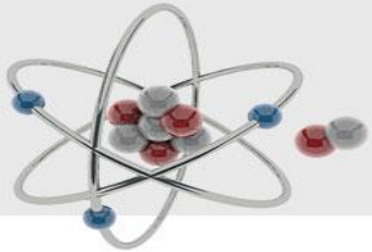
Knowledge Required - Recap



Why do we need to draw a mechanism?

63 x 89 = ?

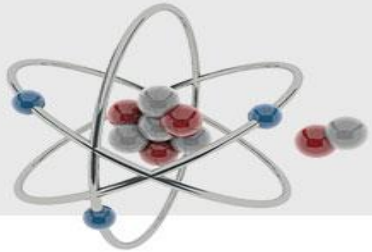
Knowledge Required - Recap



Basic Concept

Nucleophiles **Electrophiles** **Leaving groups**

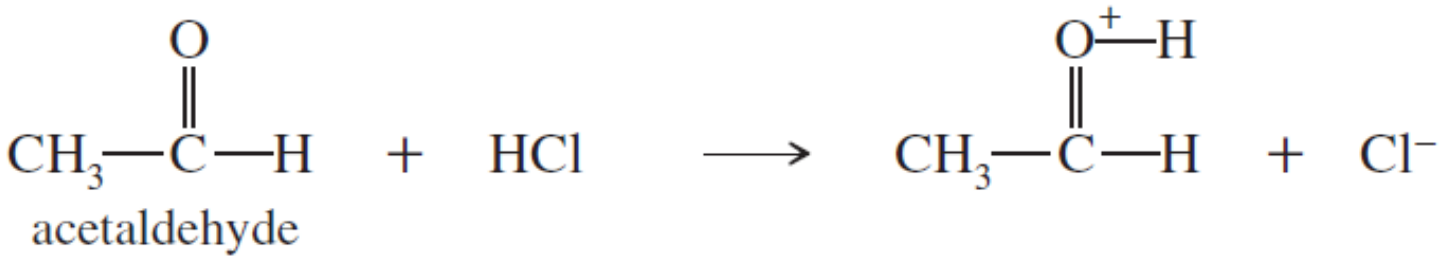
Knowledge Required - Recap



In the following reactions

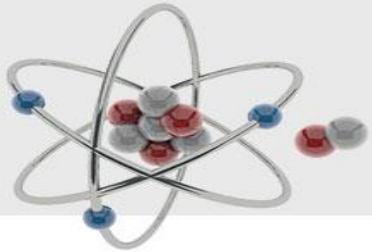
1) Use the **curved-arrow formalism** to show the movement of electron pairs in these reactions
2) Determine which species are acting as **Electrophiles (E)** and which are acting as **Nucleophiles (Nu)**

(a)

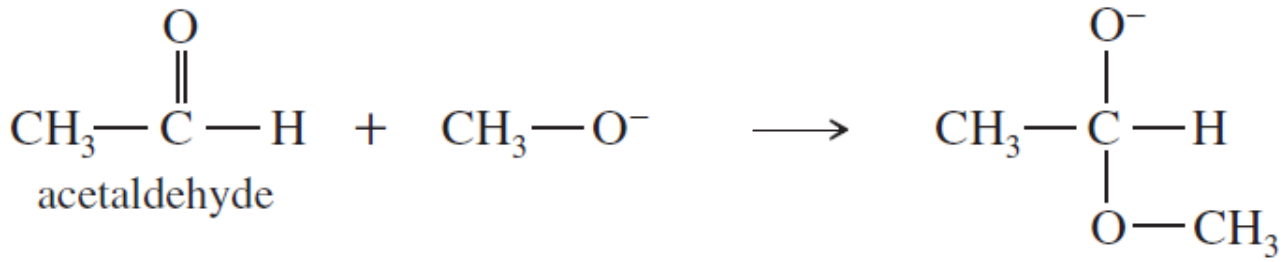


acetaldehyde

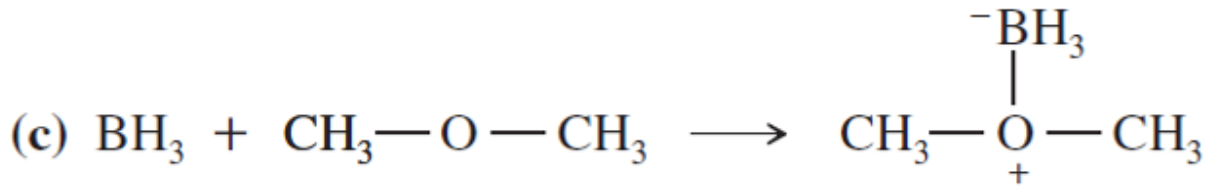
Knowledge Required - Recap



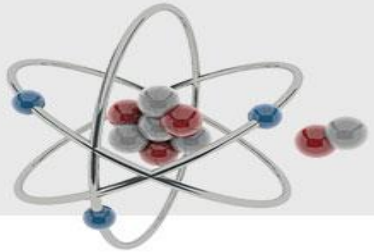
(b)

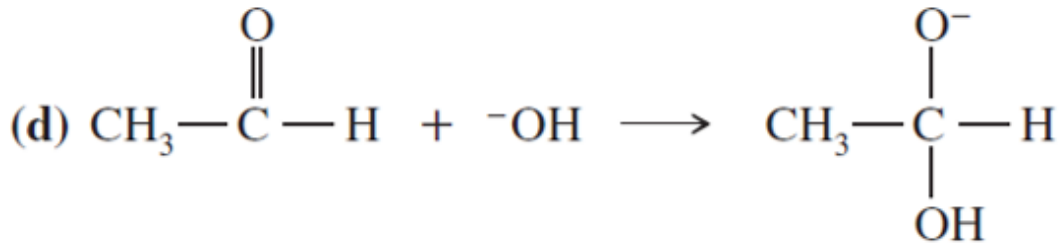


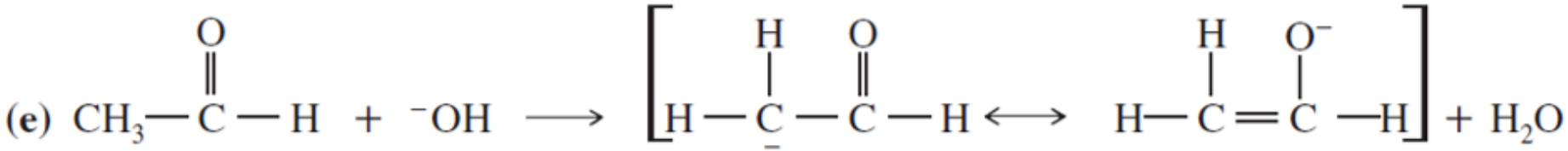
(c)



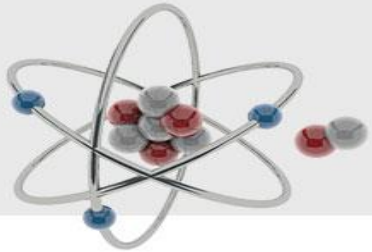
Knowledge Required - Recap







Knowledge Required - Recap

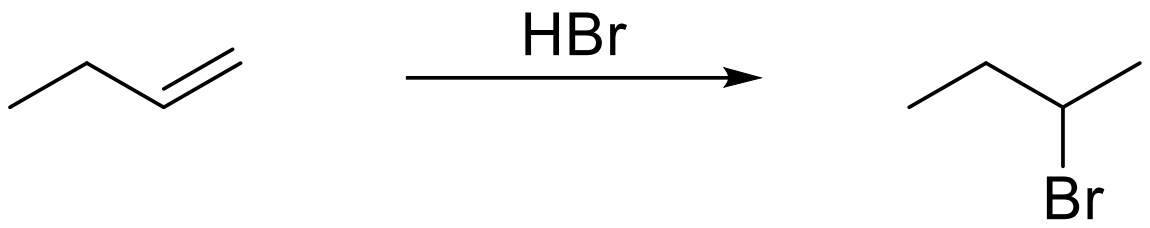


(f) $CH_3—NH_2 + CH_3—Cl \longrightarrow CH_3—\overset{+}{N}H_2—CH_3 + Cl^-$

(g) $CH_3—CH{=}CH_2 + BF_3 \longrightarrow CH_3—\overset{+}{C}H—CH_2—\overset{-}{B}F_3$

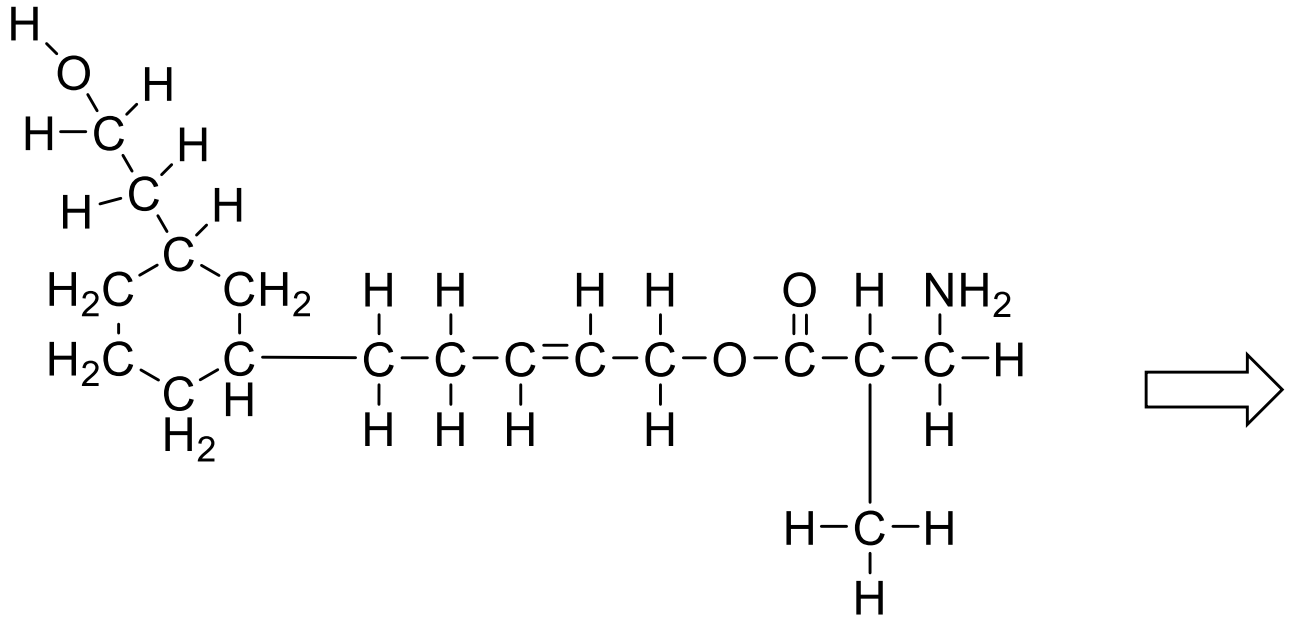
Knowledge Required - Recap

Draw mechanism for this reaction. Specify electrophile (E) and nucleophile (Nu) in each step.



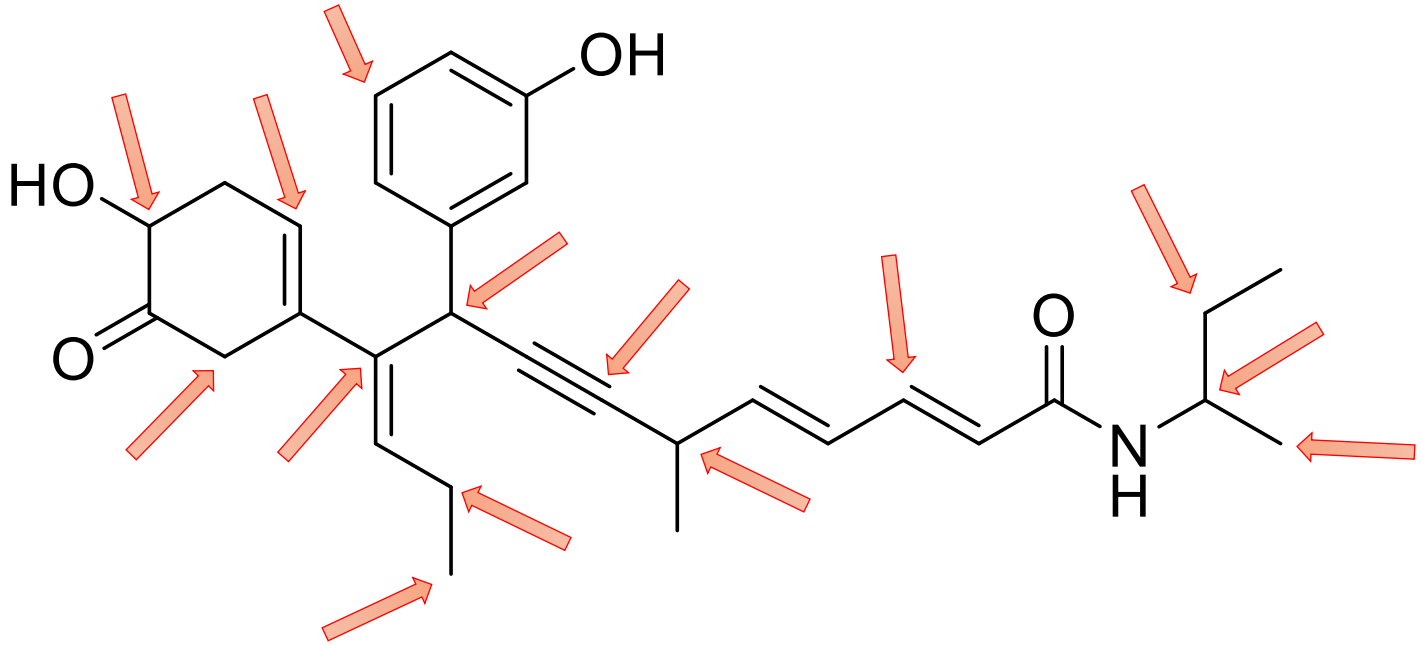
Homework-1

Draw Line-angle formula of the following compound



Homework-2

How many hydrogen atom is attached to the specified carbons?

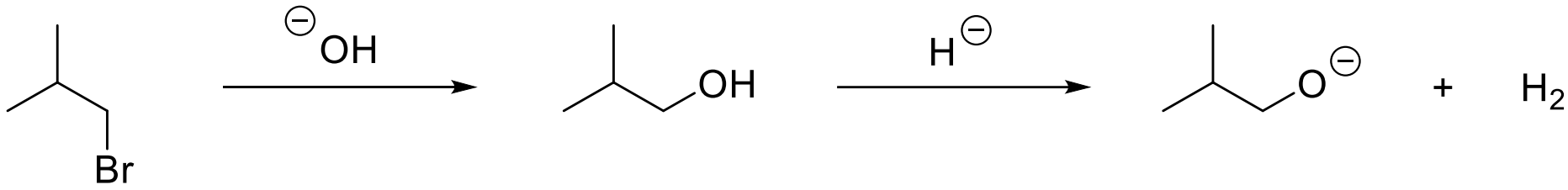


Homework-3

In the following reactions

1) Use the **curved-arrow formalism** to show the movement of electron pairs in these reactions
2) Determine which species are acting as **Electrophiles (E)** and which are acting as **Nucleophiles (Nu)**

a)



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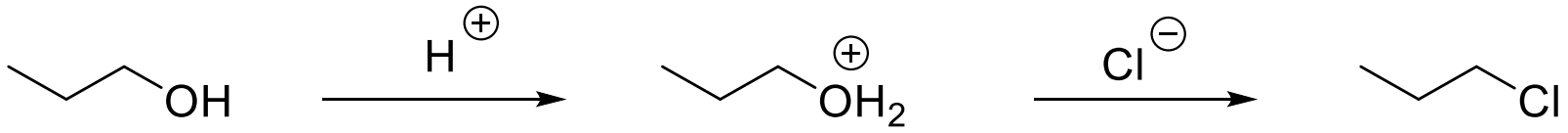

Homework-4

Draw mechanism for this reaction. Specify electrophile (E) and nucleophile (Nu) in each step.