GENERAL ORGANIC CHEMISTRY

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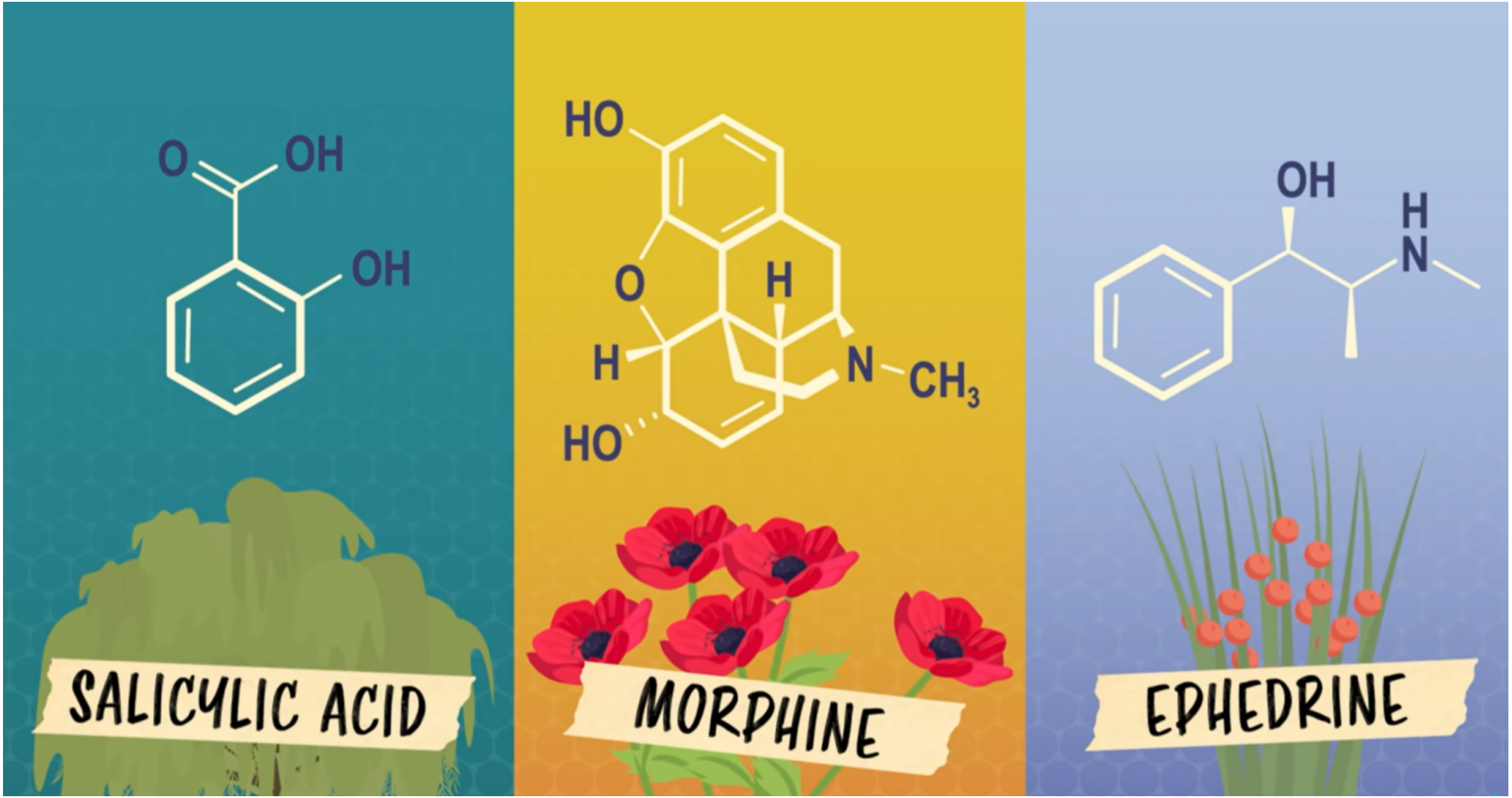
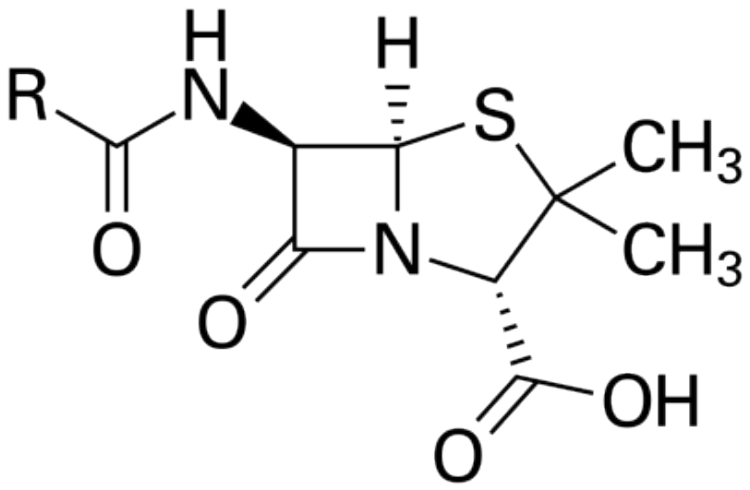
WHAT IS ORGANIC CHEMISTRY?

- Organic chemistry is the chemistry of compounds that contain the element carbon.

- It is defined as the study of structure, properties, composition, reaction & preparation of carbon containing compounds.

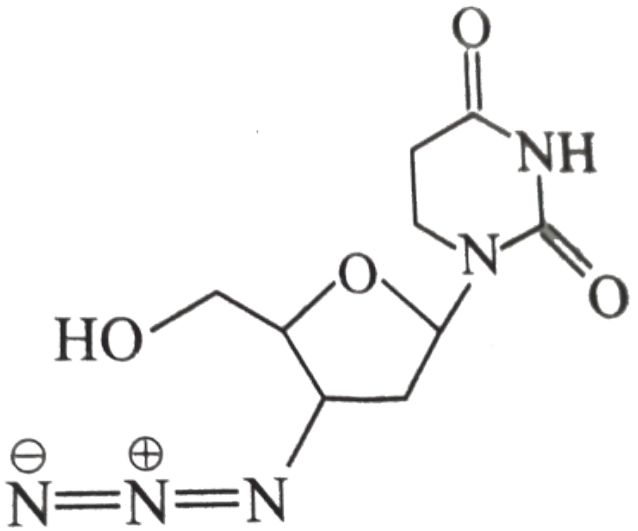
EXAMPLES OF ORGANIC COMPOUND


O
OH
OH
HO
O
H
H
N
CH3
HO
OH
H
N
SALICYLIC ACID
MORPHINE
EPHEDRINE



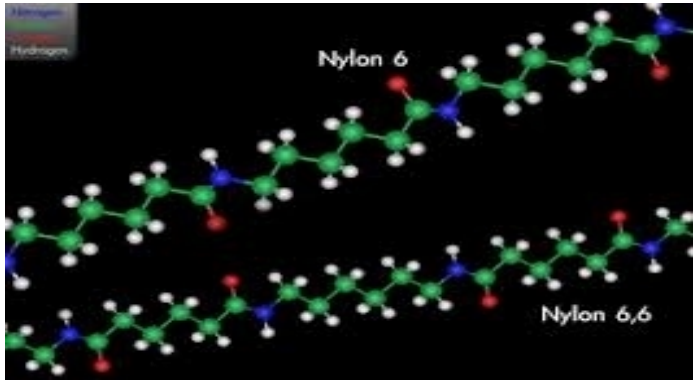
PANICILLIN

Penicillin's are a group of antibacterial drugs that attack a wide range of bacteria.



AZT -Drug that treats HIV

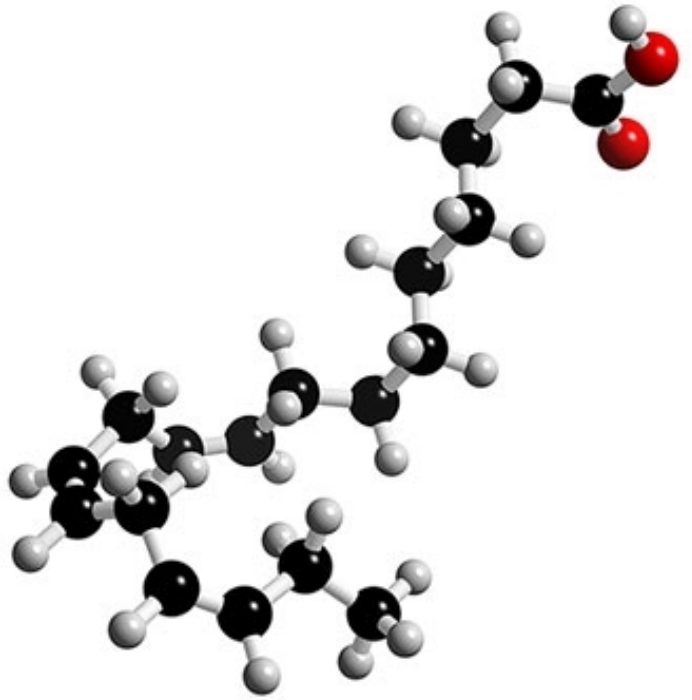
They slow down or prevent damage to the immune system, and reduce the risk of developing AIDS-related illnesses.



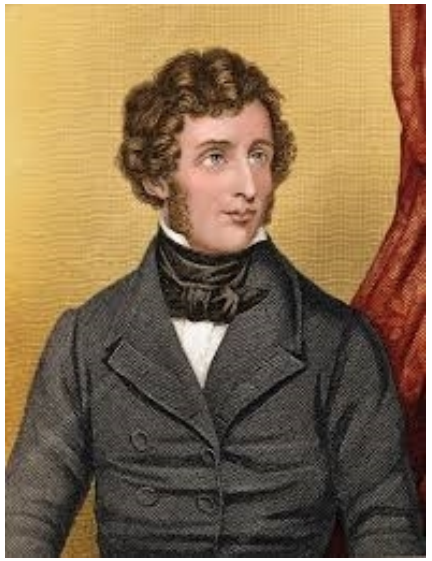
NYLON

CATENATION PROPERTY OF CARBON

- **Catenation** is the bonding of atoms of the same element into a series, called a chain.
- Catenation occurs most readily with carbon, which forms covalent bonds with other carbon atoms to form longer chains and structures.
- This is the reason for the presence of the vast number of organic compounds in nature.

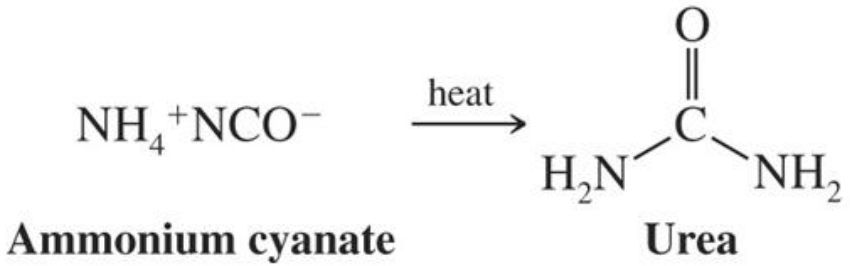


ORIGIN OF MODERN ORGANIC CHEMISTRY



- Initially we thought that organic compound can only be harvested from living things but not made.

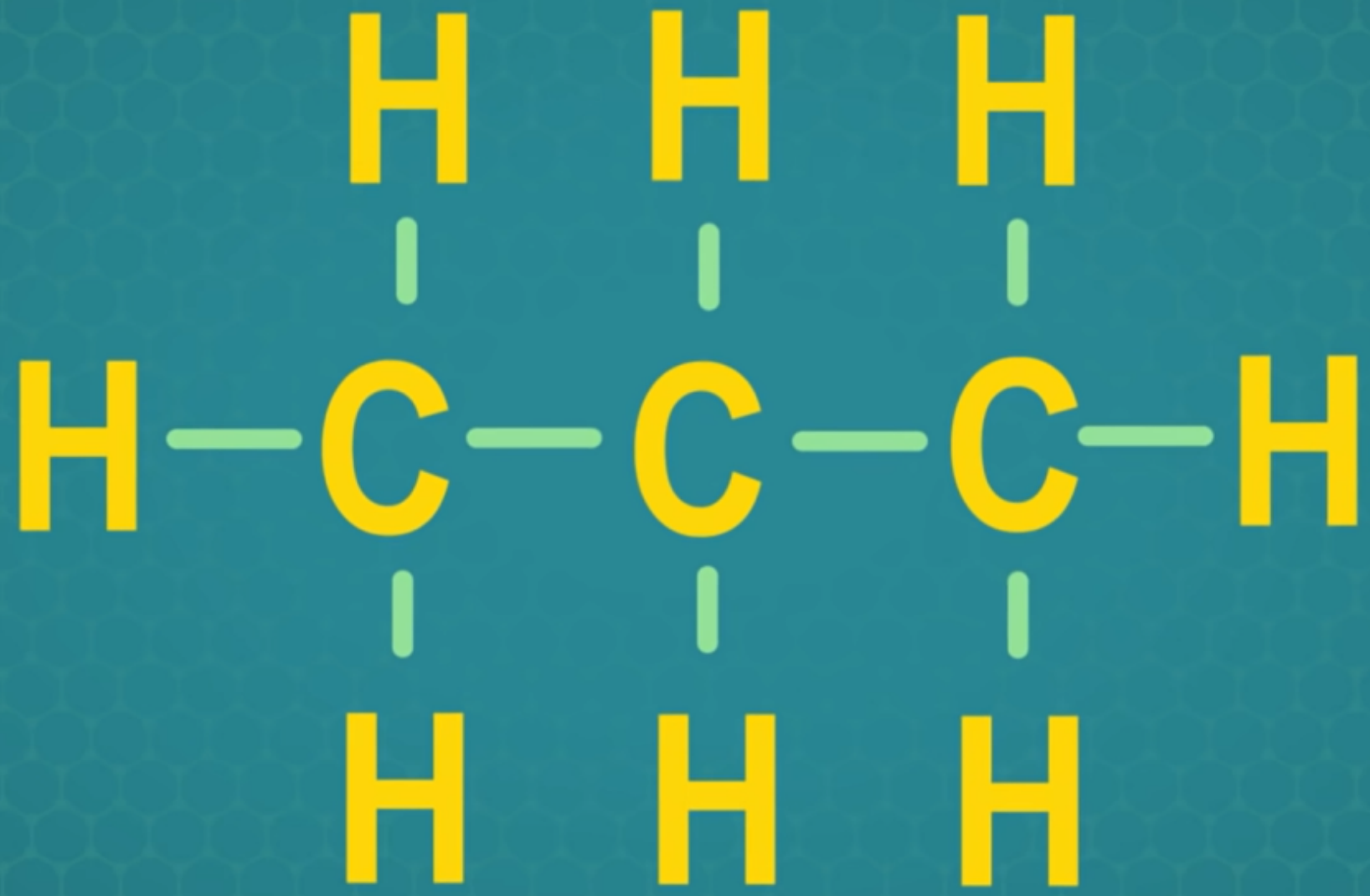
- Until **Friedrich Wöhler** (German chemist) who is best known for the synthesis of urea, an organic compound, from ammonium cyanate, an inorganic salt.



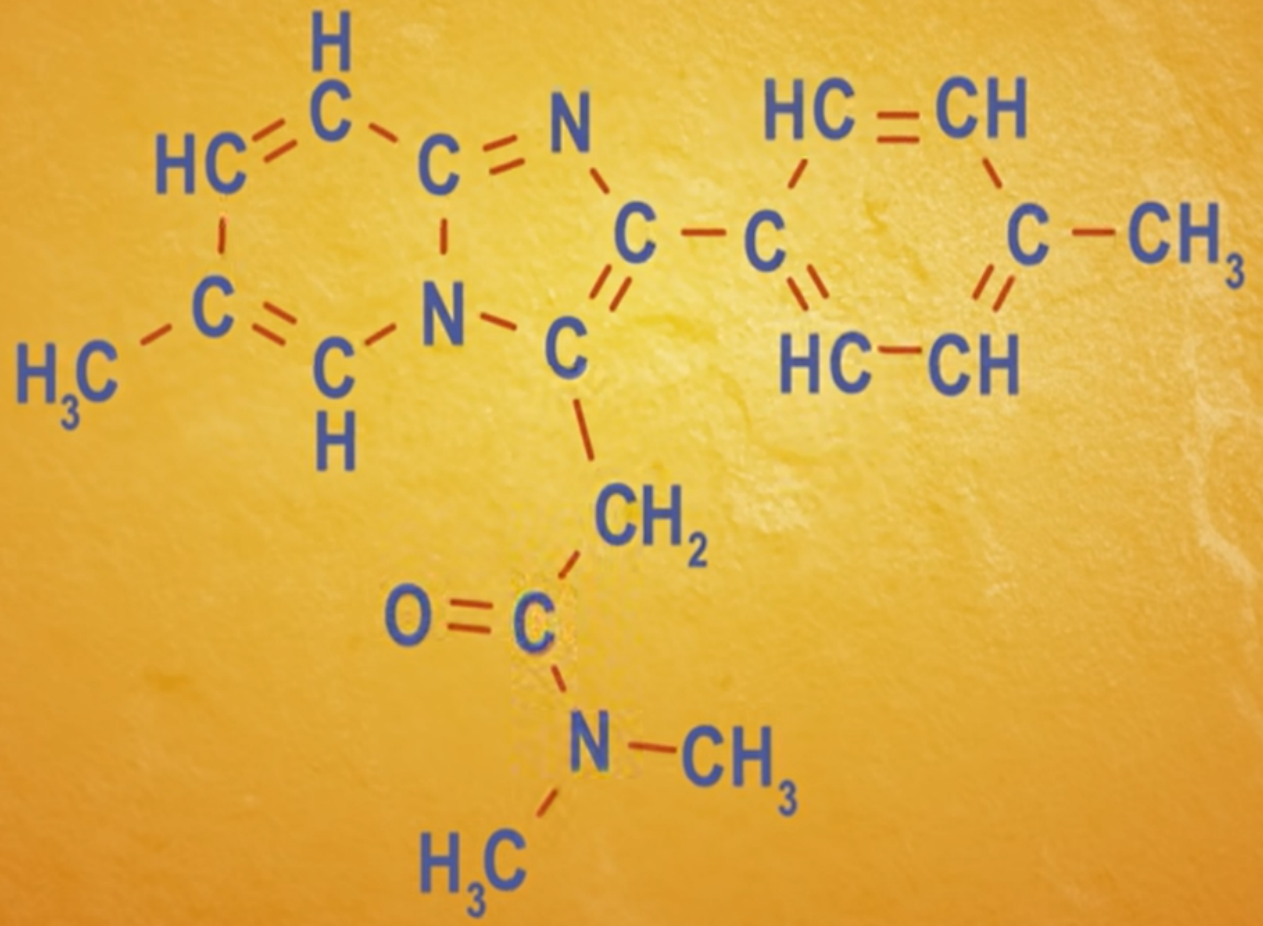
Ammonium cyanate **Urea**

DIFFERENT WAYS TO REPRESENT ORGANIC MOLECULES

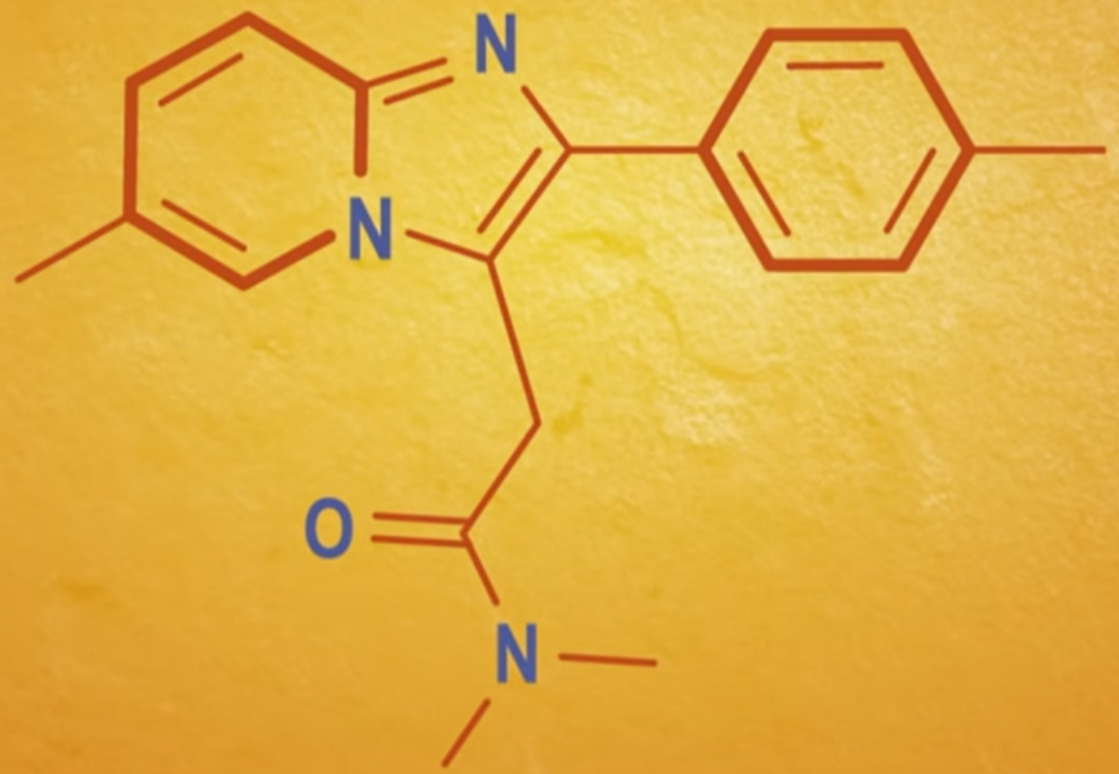
DASH FORMULA



CONDENSED MOLECULAR FORMULA

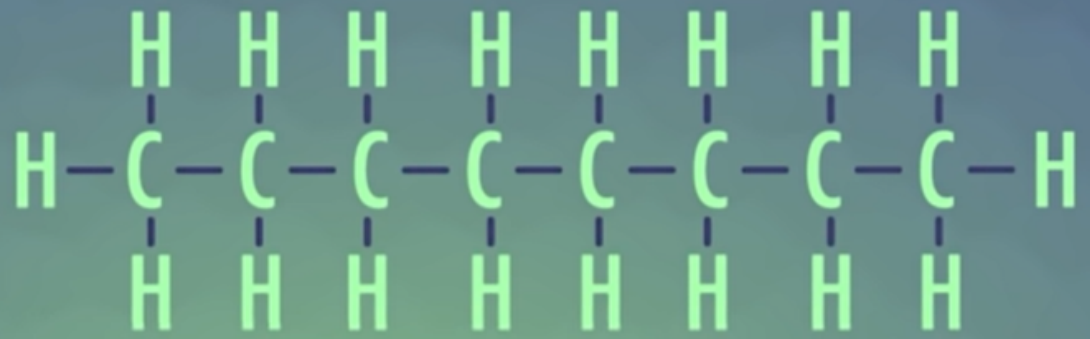


BOND LINE FORMULA



C_8H_{18}

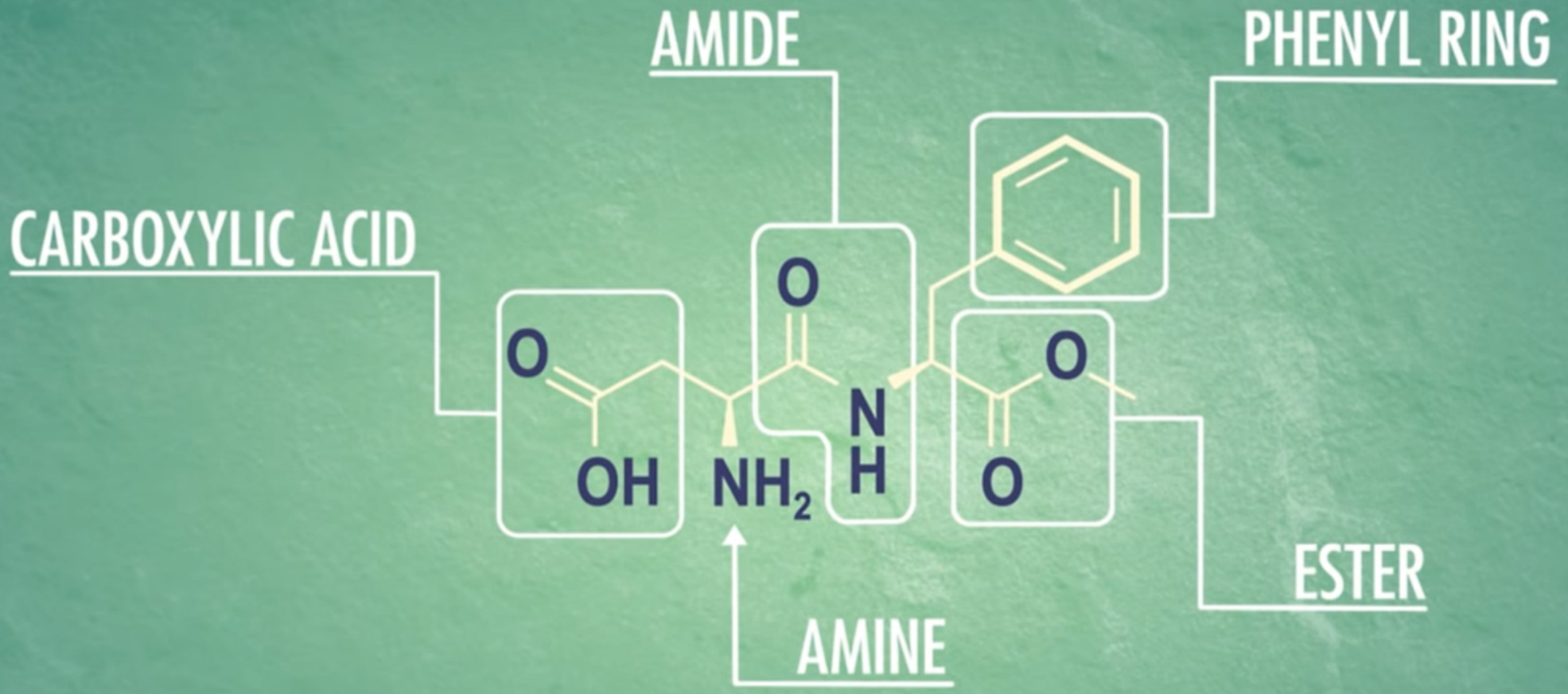
DASH FORMULA



CONDENSED FORMULA

$H_3C-CH_2-CH_2-CH_2-CH_2-CH_2-CH_2-CH_3$

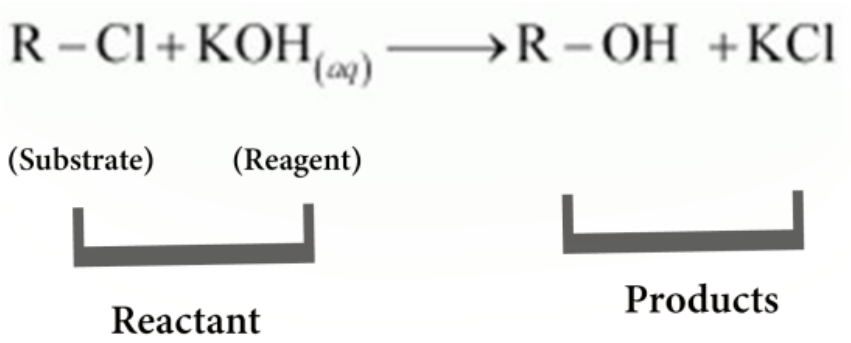
BOND LINE FORMULA



FUNCTIONAL GROUPS

ORGANIC REACTION

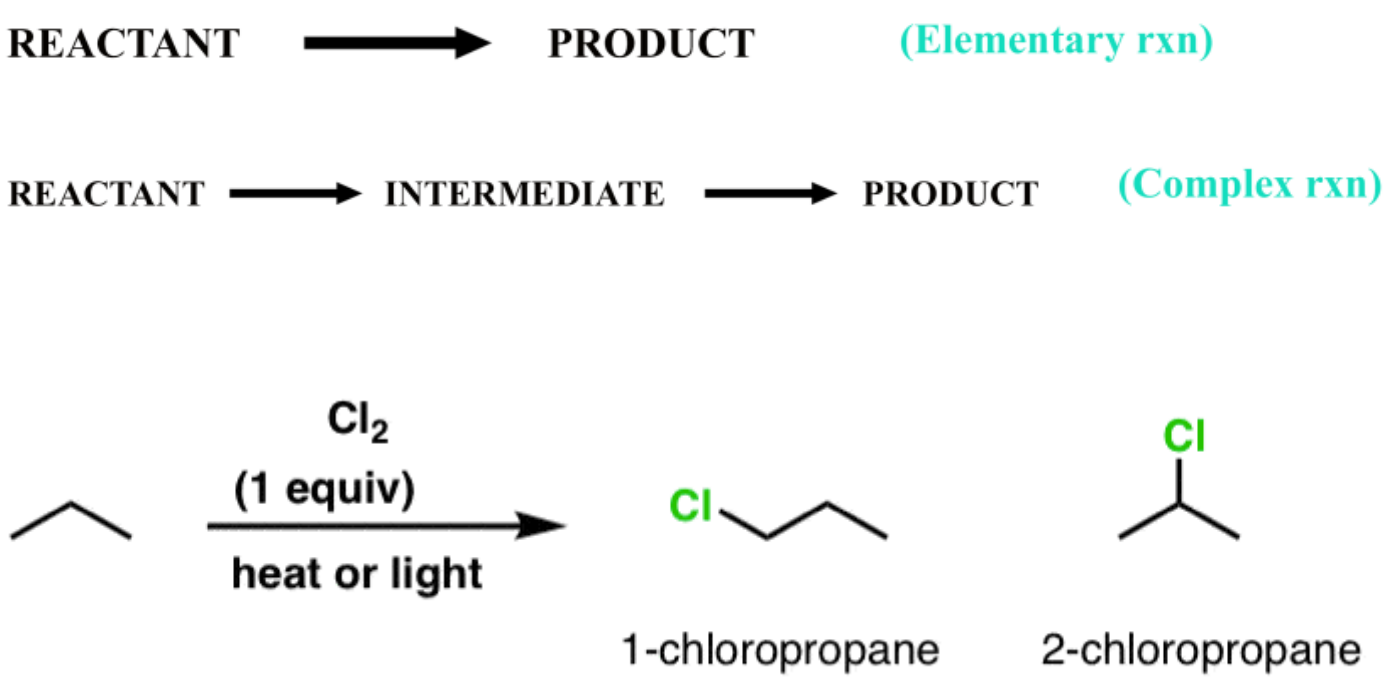
- Breaking of old covalent bonds & formation of new covalent bond is called as the organic reaction.



- **Substrate-** (Organic compound)
- **Reagent-** maybe organic or inorganic compound which attack on substrate.

MECHANISM OF REACTION

- Step by step description of organic rxn is called as reaction mechanism.



REACTION INTERMEDIATES

Heterolysis

C — C

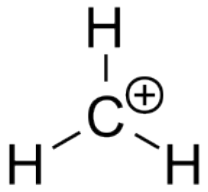
Homolysis

C — C

Neutral

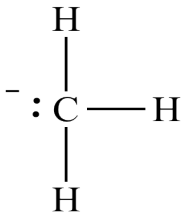
Most reactive

Carbocation



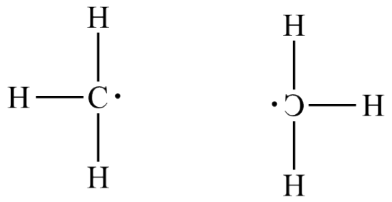
Giving electron

Carbanion



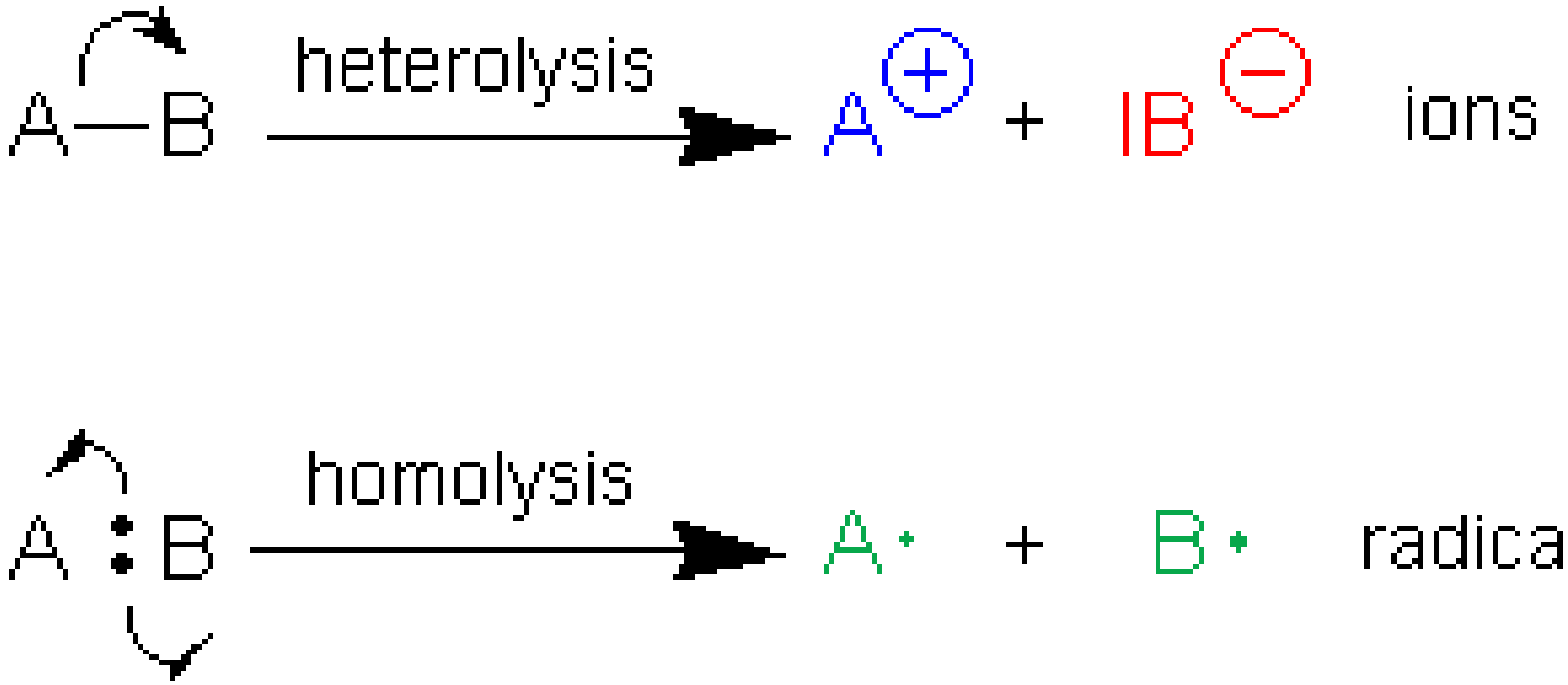
taking electron

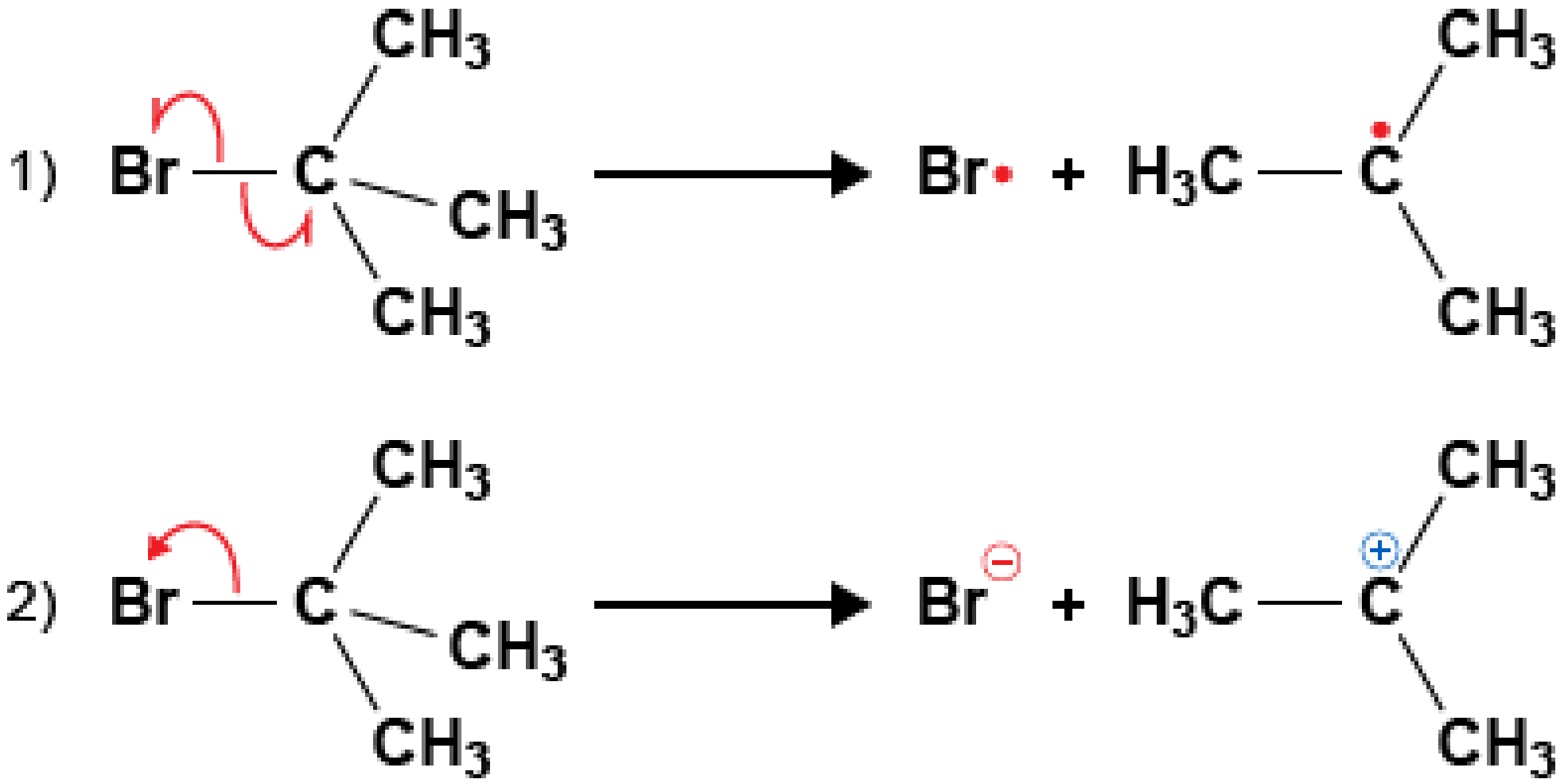
Carbon Free-Radical



Giving electron

Stabilized By

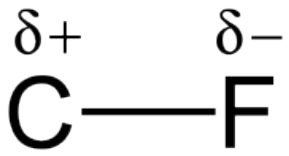

A—B
heterolysis
A⊕ + ⊖B
ions
A : B
homolysis
A· + ·B
radicals

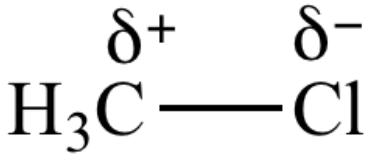

1)
Br
C
CH3
CH3
CH3
Br
+
H3C
C
CH3
CH3
2)
Br
C
CH3
CH3
CH3
Br
+
H3C
C
CH3
CH3

INDUCTIVE EFFECT OR I-EFFECT

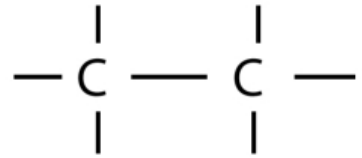
- Partial displacement of sigma electron towards more EN atom.

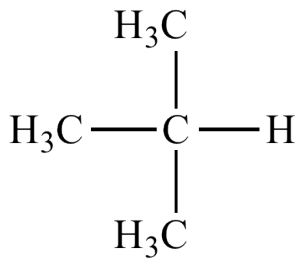
Polar bond



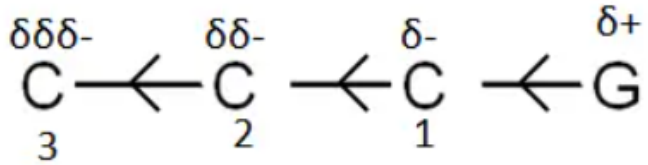


Non polar bond



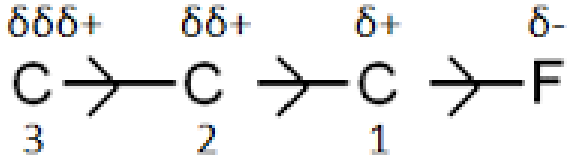


Electron donating group



δ- > δδ- > δδδ-

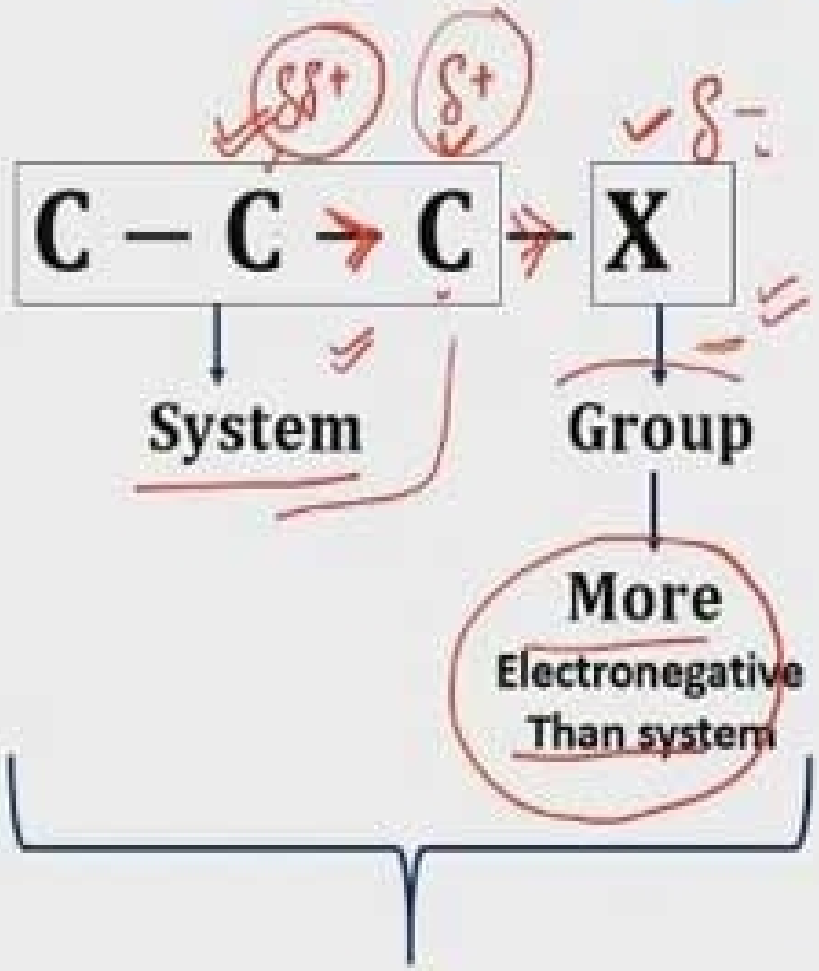
Electron withdrawing group

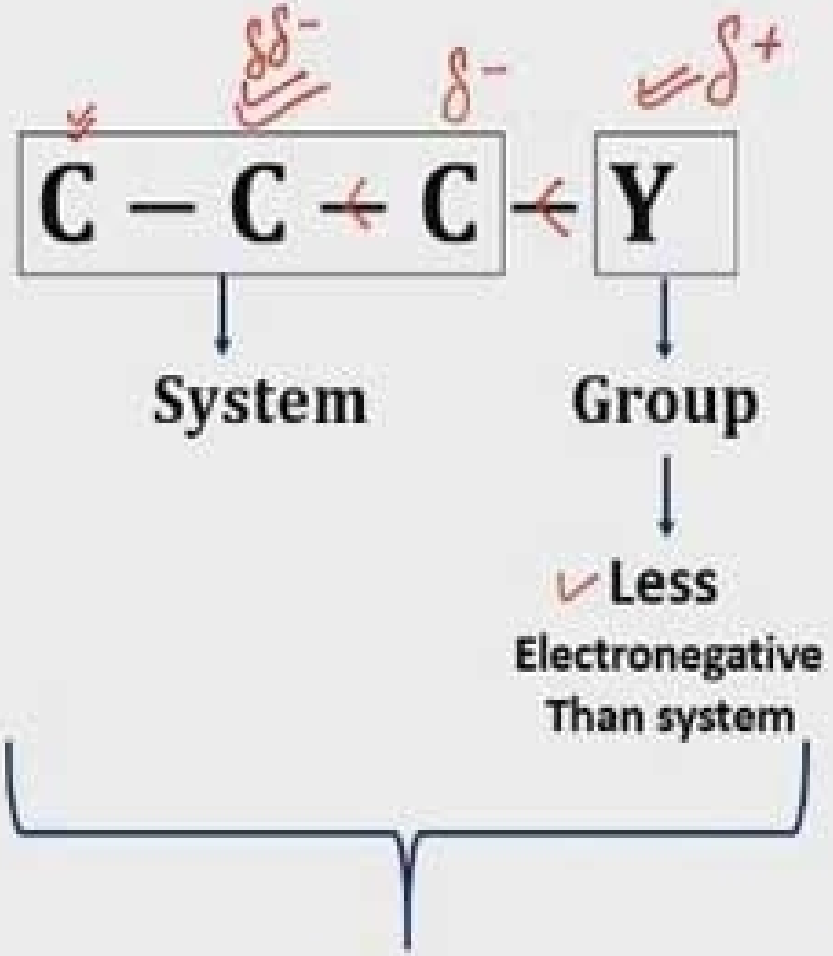


δ+ > δδ+ > δδδ+

I- effect is distance dependent.

Types of Inductive Effect





–I effect

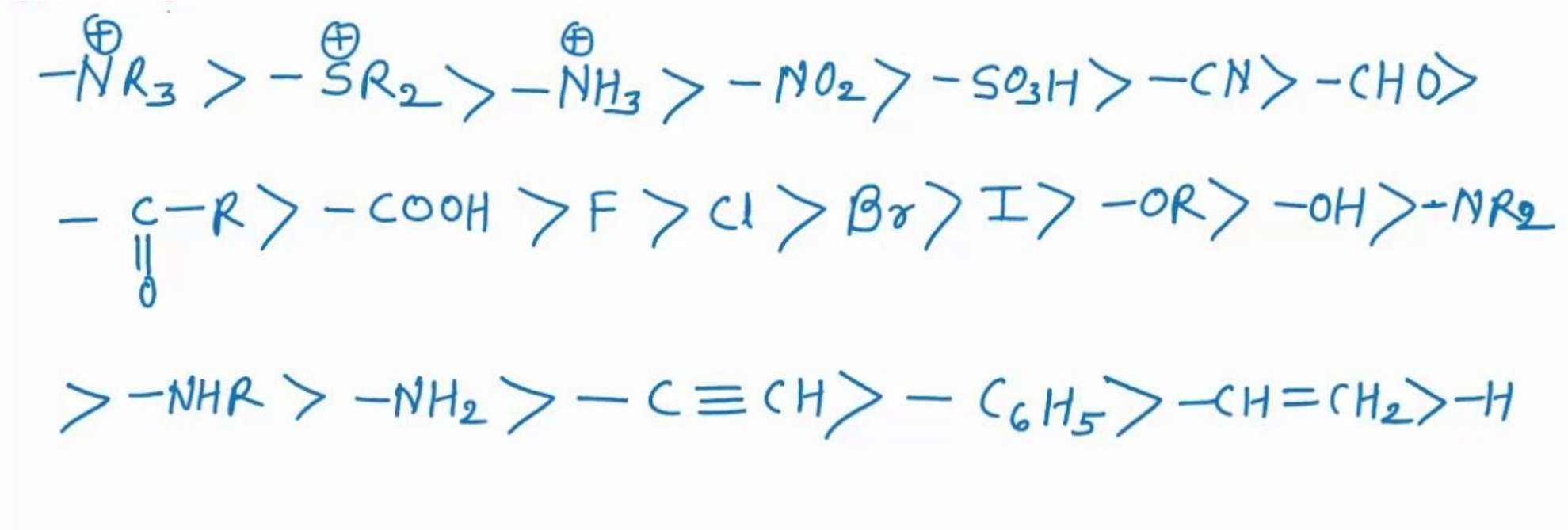
"X" is called – I effecting group

+I effect

"Y" is called + I effecting group

- I GROUP & - I EFFECT

- The group which attract electron cloud is known as -I group and effect is -I effect.



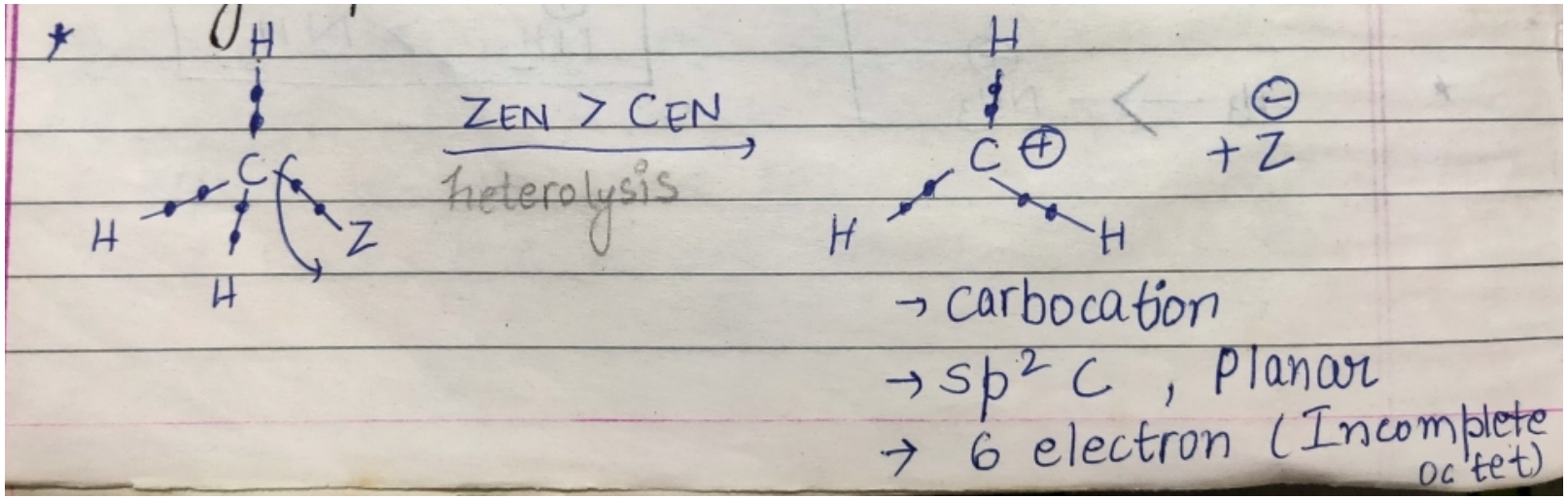
+ I GROUP & + I EFFECT

- The group which release electron cloud into the system is known as + I group and effect is + I effect.

APPLICATION OF I EFFECT

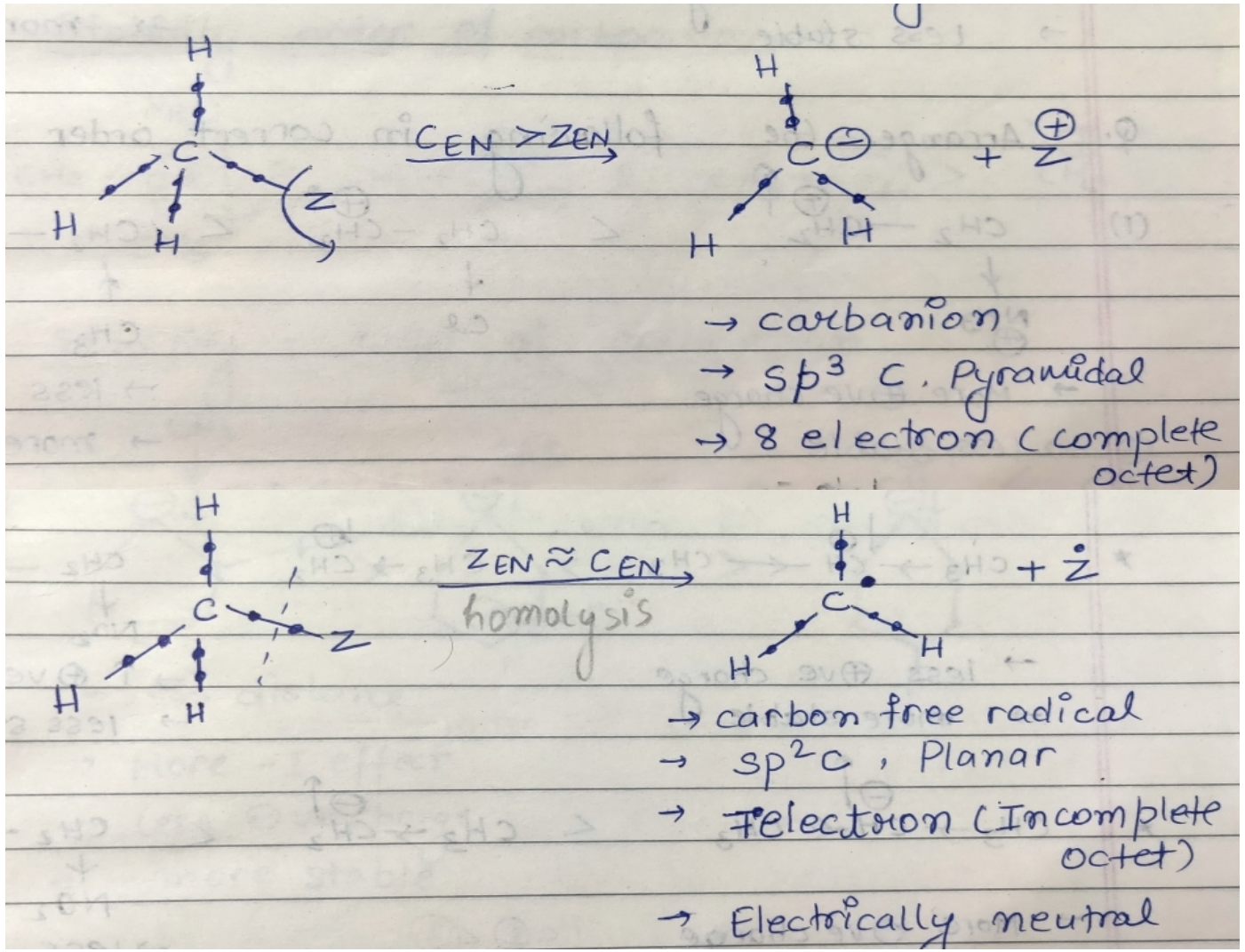
- Stability of carbocation, carbanion & free radical due to I effect

Carbocation

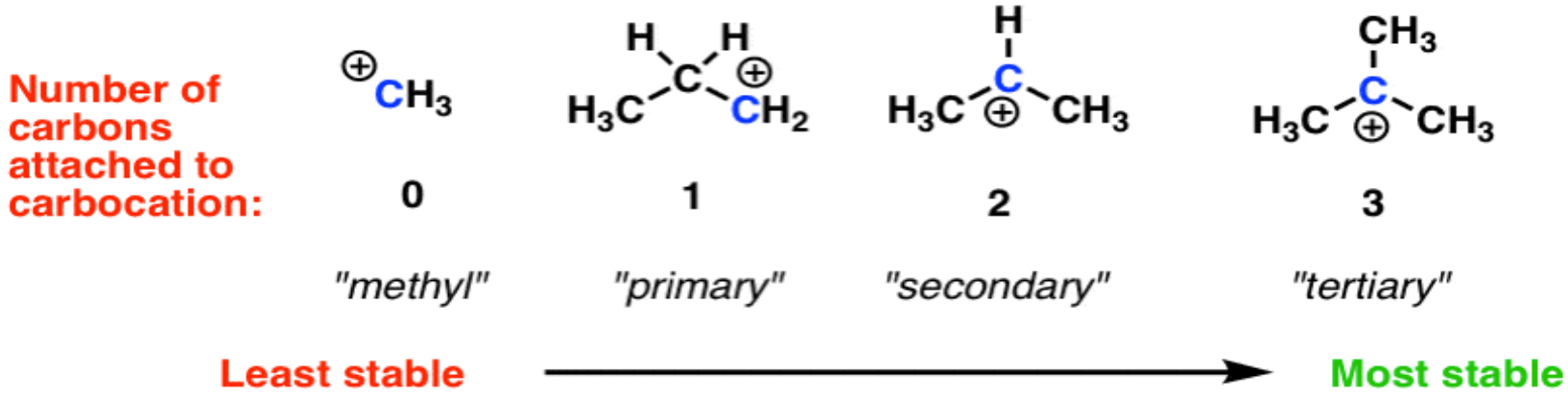


Carbanion

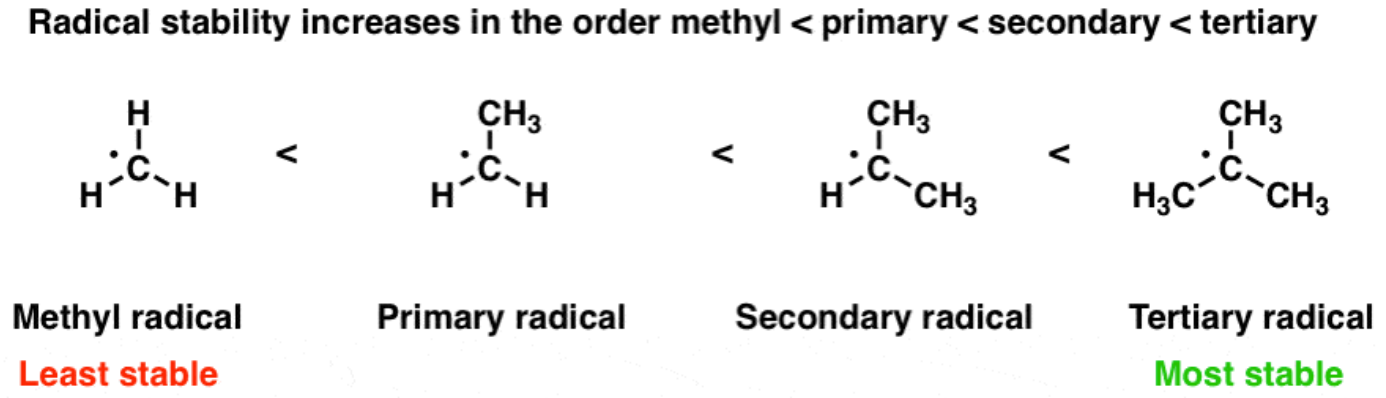
Free radical



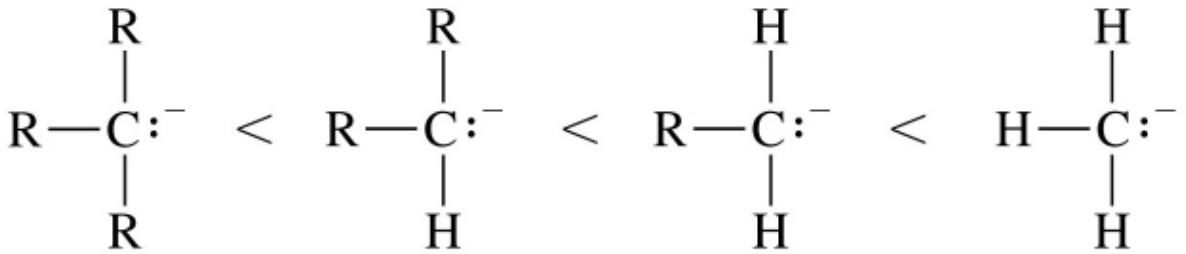
Stability order of carbocation



Stability order of free radical



Stability order of carbanion



Stability of carbanions

3° < 2° < 1° < methyl

Stability order?