

REACTIONS OF ORGANIC COMPOUNDS

Lecture 7

12.5 Reactions of Organic Compounds

Learning Outcomes:

At the end of the lesson the students should be able to :

- Explain covalent bond cleavage:
 - homolytic
 - heterolytic

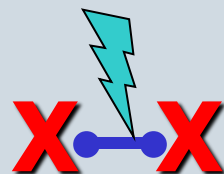
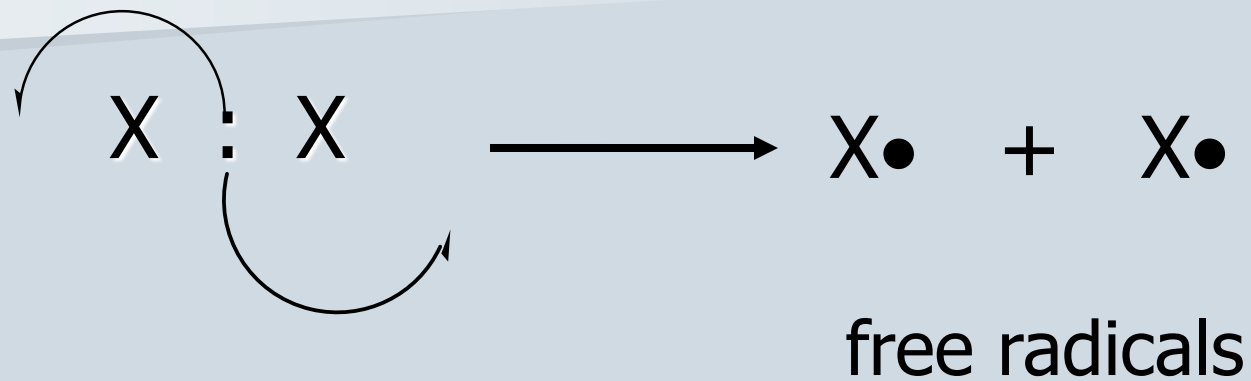
Types of Covalent Bond Cleavage/Fission

- ◆ All chemical reactions involved bond breaking and bond making.
- ◆ Two types of covalent bond cleavage :-
 - Homolytic cleavage
 - Heterolytic cleavage

a) Homolytic Cleavage

- Occurs in a non-polar bond involving two atoms of similar electronegativity.
- A single bond breaks symmetrically into two equal parts, leaving each atom with one unpaired electron.
- Formed free radicals.

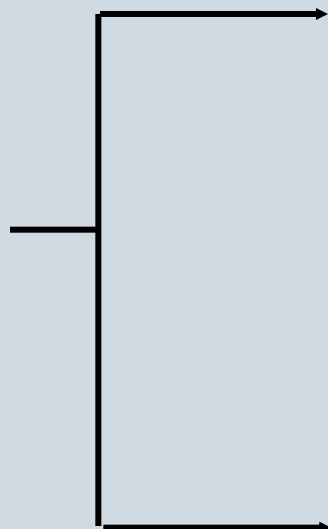
Example:



b) Heterolytic cleavage

- Occurs in a polar bond involving unequal sharing of electron pair between two atoms of different electronegativities.
- A single bond breaks unsymmetrically.
- Both the bonding electrons are transferred to the more electronegative atom.
- Formed cation and anion.

$A : B$



$A:^-$ + B^+
anion cation

A is more
electronegative.

A^+ + $B:^-$
cation anion

B is more
electronegative.

Reaction Intermediates

- a) Carbocation
- b) Carbanion
- c) Free Radical

They are unstable and highly reactive.

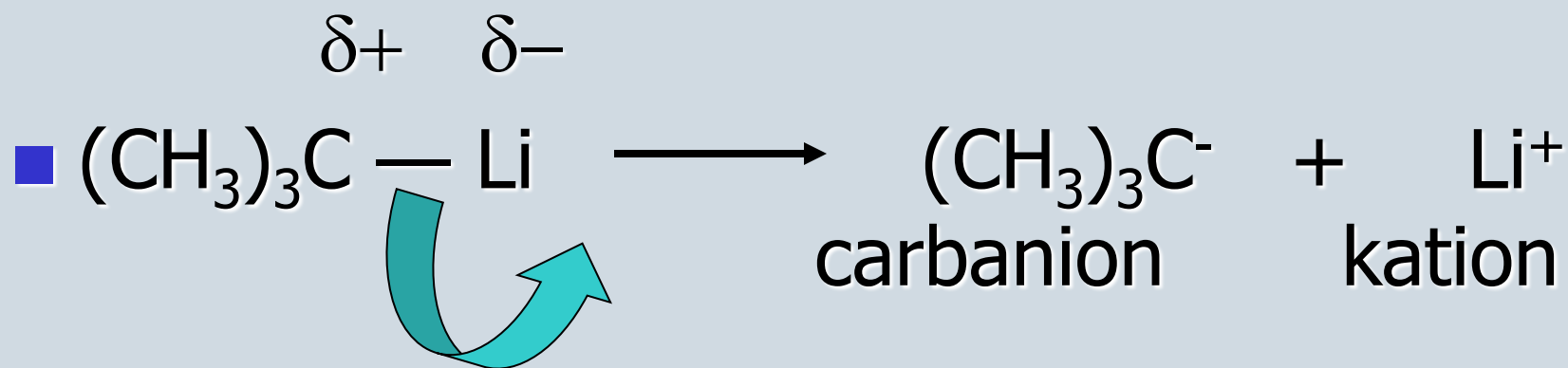
***a)* Carbocation**

- Also called carbonium ion.
- A very reactive species with a positive charge on a carbon atom.
- Carbocation is formed in heterolytic cleavage.

b) Carbanion

- is an anion counterpart
- a species with a negative charge on a carbon atom.
- Carbanion is formed in heterolytic cleavage.

example:

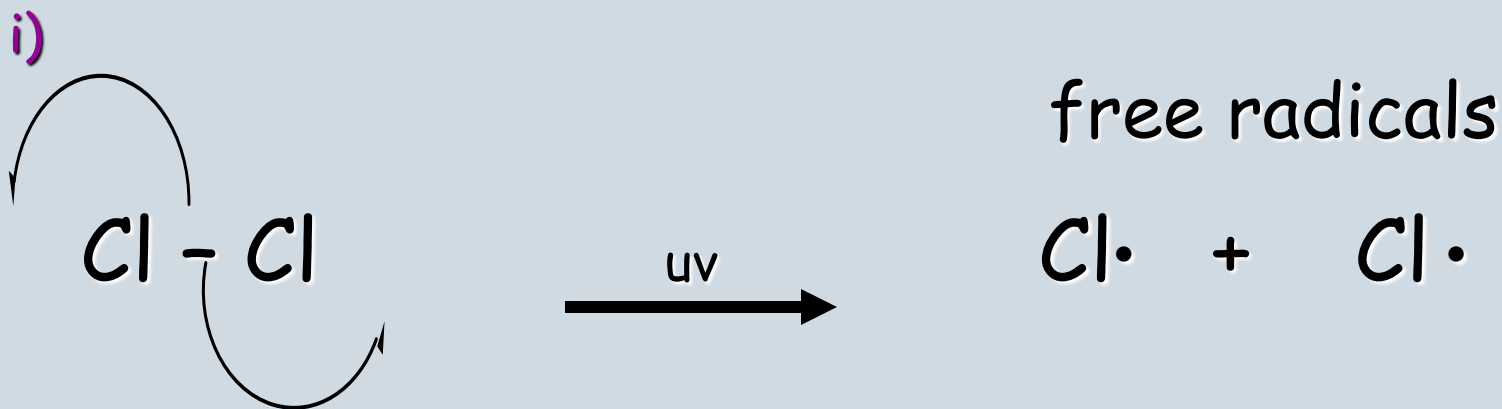


b) Free Radical

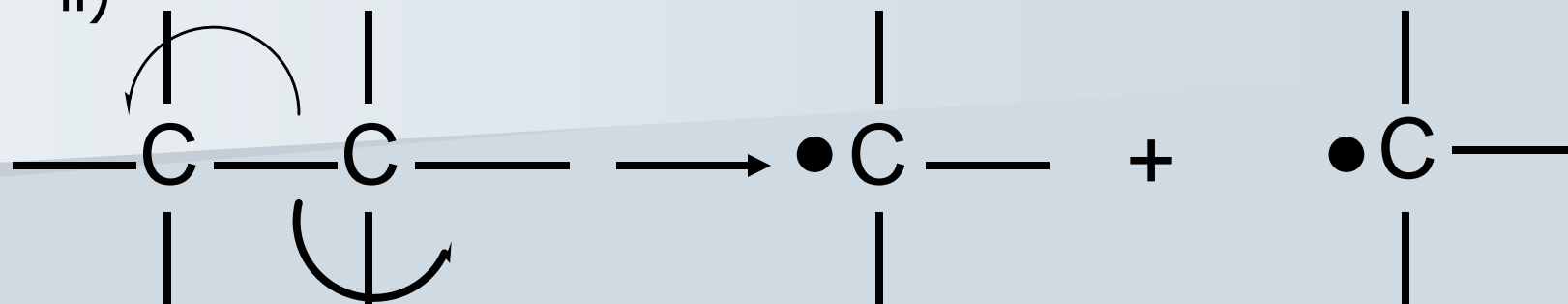
~A very reactive species with an unpaired electron.

~Formed in homolytic cleavage.

Examples:



ii)



iii)

