Organic Chimestry

Chapter 2 summary

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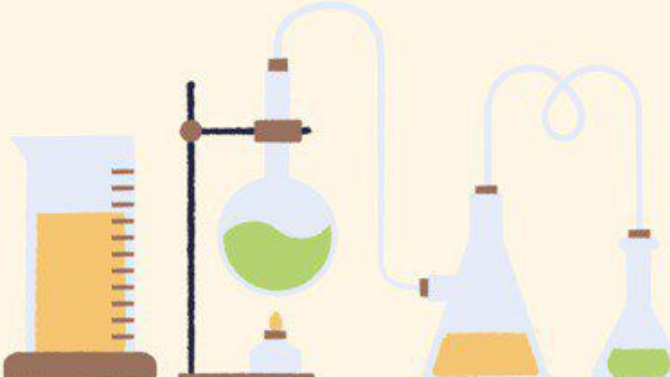


Hemmeh asnan

Chapter two
Alkanes and Cycloalkanes

First : Alkanes

-Acylic Hydrocarbons
-General formula CnH2n+2
-each carbon is SP3 hybridized

The Physical properties:
1.Alkanes are insoluble in water
2.Alkanes have low boiling point cuz of the weak forces (Van der Waals) among molecules.

Namaing of alkanes
1.IUPAC system

First : for continous chain

CH4	Methane.	C6H14.	Hexane
C2H6	Ethane.	C7H16.	Heptane
C3H8.	Propane.	C8H18.	Octane
C4H10.	Butane.	C9H20.	Nonane
C5H12.	Pentane.	C10H22.	Decane

لتسهيل الحفظ:
ميث ايث برب البيت بنتان هكسا هبتا اوكتا النون ديكان

Second : for branched alkanes

1.Determine the longest continous carbon chain

2.Number the chain from the nearer to the first substituent

3.Determine the position of each substituent on the longest chain

4.write substituents first then parent name based on alphabetical order

Note : for more than one identical branch use prefixes

Di (2) Tri (3) Tetra (4)

Types of substituents

1.Alkyl group (CnH2n+1)

-CH3 —— Methyl

-C2H5 —— Ethyl

-C3H7 —— Propyl → CH3CH2CH2~ Propyl

→ CH3CHCH3 Isopropyl

-C4H9 —— Butyl → CH3CH2CH2CH2~ Butyl

→ CH3CHCH2CH3 Sec-butyl

→ CH3CHCH2CH3 Isobutyl

→ CH3CCH3 (CH3) Tertbutyl

2.Halogens. — Chloro Cl~

Bromo Br~

Flooro F~

Iodo I~

Notes:

1-If you have two equal long of carbon chain select one with the most branches.

2-If branching occurs at equidistant then number the chain according to the alphabetical order.

Equidistant: أن تكون التفرعات على نفس البُعد

3-prefixes (di tri tetra sec tert are not included in alphabetical order exept iso is included)

In common names write orqanic part first

Second : Cycloalkanes

-cyclic Hydrocarbons

-General formula CnH2n

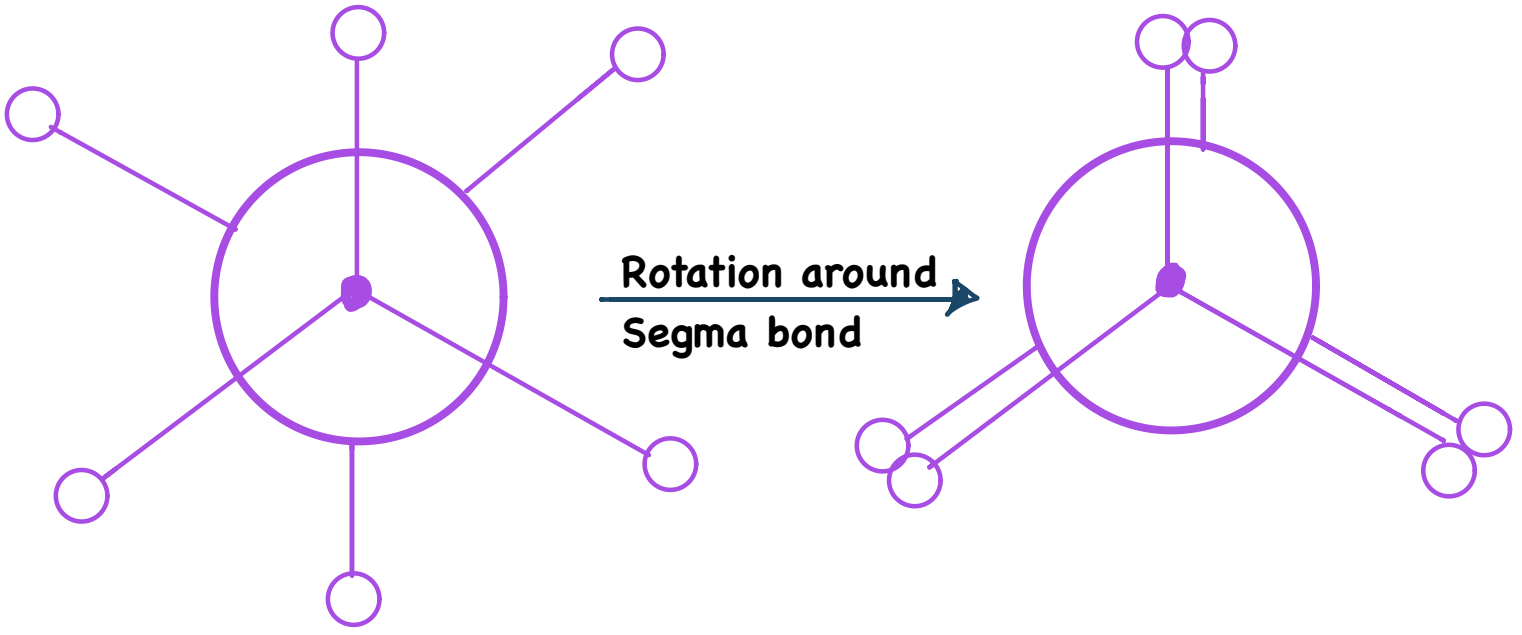
Naming of cycloalkanes

1.If there is one substituent ⟶ no need for numbering

2.If there are two substituent ⟶ Give number 1 to the carbons according to the alphabetical order and 2 to the second one.

Conformers (Conformational isomers) : they are isomers (same molecular formula) with same arrangment of atoms (not constitutional isomers) , they are obtained by interconvertible rotation around (σ) bond.

First : Alkane



Staggered **Eclipsed**

-Staggered conformers are more stable than eclipsed ones

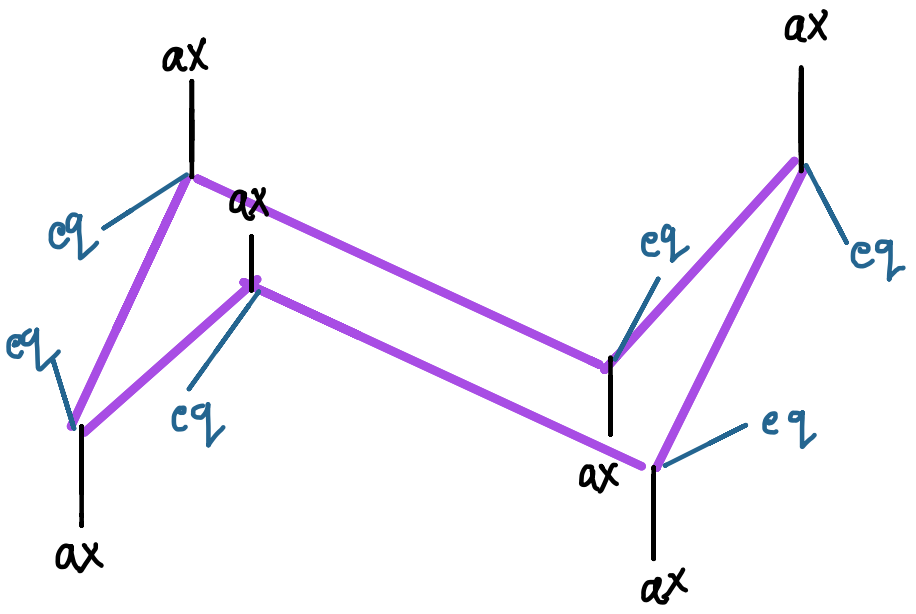
-The relationship is conformers

Second: cyclohexane

Cyclohexane is the most stable and the least strained cycloalkanes.

Boat (less stable)

Chair (more stable)



Axial bond is ⊥ On the plane (less stable)

Equatorial bond is in the plane (more stable)

Notes:

-If ring flips then each ax becomes eq and each eq becomes ax

-If 2 substituents are up up or down down (same sides) then they called cis , if they are 1 up 1 down (opposite sides) then they called trans.

-there is no relation ship between up down and ax , eq.

-ax , eq refers to the stability

Cis - trans isomers condetions in cycloalkanes:

-cyclic.

-2 substituents (not one or three).

-not located at same carbon.

Reactions of Alkanes :

1.combustion if Hydrocarbons

$CH \xrightarrow[Spark]{O_2} CO2 + H2O + heat$

"exothermic"

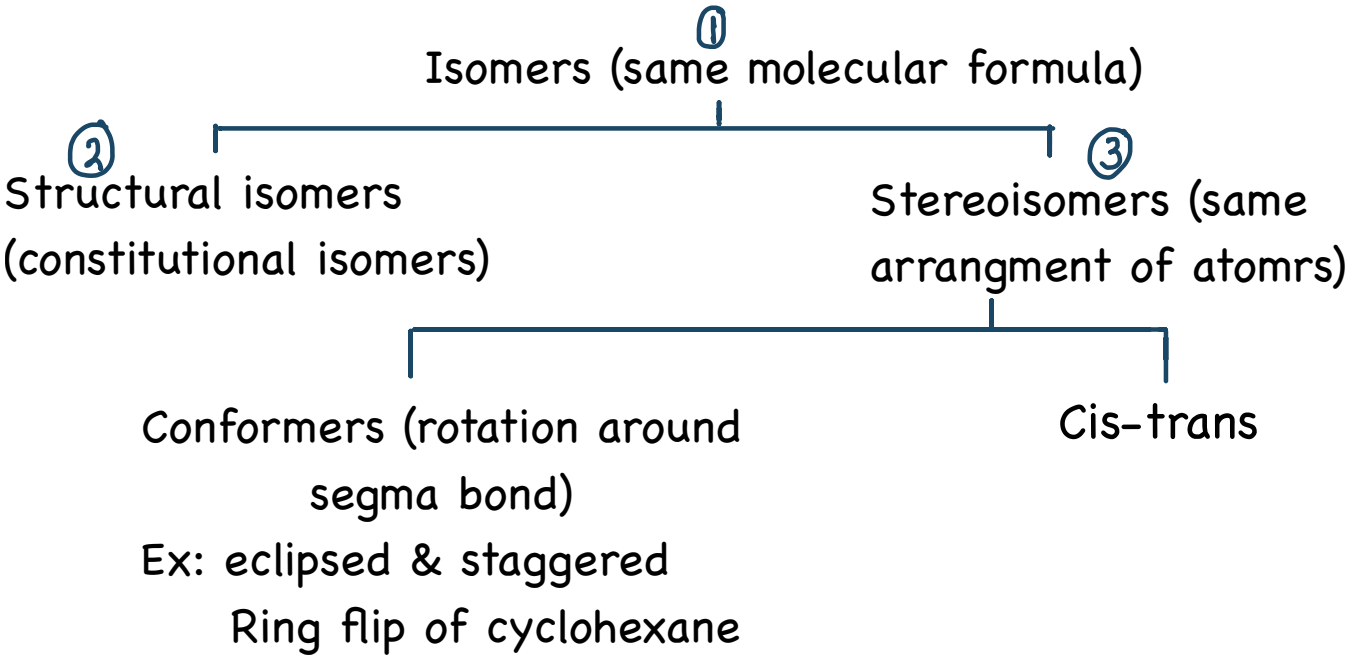
2.Radical substituent reaction

Radical (Odd number of electons that is very reactive) ex $\cdot\ddot{Cl}:$ $\cdot CH$

Ex. $CH4 + Cl2 \xrightarrow{\Delta \text{ or } h\nu} CH4Cl + HCl$

This is called Monochlorination

Summary of isomerism



Note: You can't find a relationship (Cis-trans) and (Conformers) at same time.