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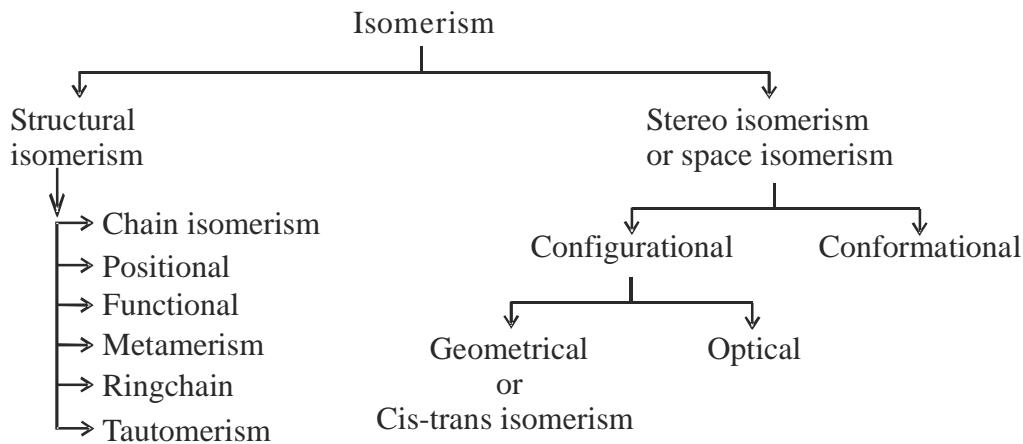
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ISOMERISM

Definition:

The different organic compounds having same molecular formula but different physical or chemical or both the properties are called isomers and the phenomenon is called Isomerism.



A. STRUCTURAL ISOMERISM

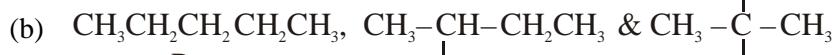
Arises due to the difference in the manner of linkage of atom to atom.

1. Chain isomerism/Skeleton/Nuclear :

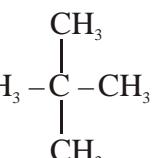
The structural isomerism which arises due to the difference in the length of C-chain is called chain isomerism.



n-Butane



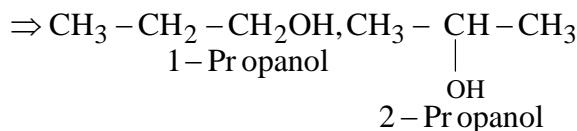
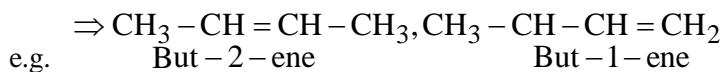
n-Pentane

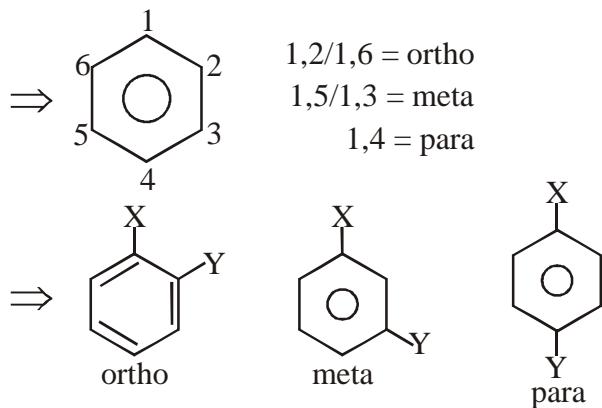


2. Positional Isomerism :

The structural isomerism which arises due to the difference in the position of

- | | |
|----------------------------|-----------------|
| (a) Double bond | (b) Triple bond |
| (c) Same functional groups | |





3. Functional Isomerism :

The isomerism which arises due to the difference in their functional group is called as functional isomerism.

General Formula	Homologous Series	Homologous Series
$C_nH_{2n+2}O$	Alcohol	Ether
C_nH_{2n+2}	Aldehyde	Ketone
$C_nH_{2n}O$	Acid	Ester
$C_{n+1}H_{2n+1}N$	Cyanide	Isocyanide (carbylamine)

- (i) $\Rightarrow \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ & $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3$
Butylalcohol Diethylether

(ii) $\text{C}_2\text{H}_5\text{OH}$ & $\text{CH}_3 - \text{O} - \text{CH}_3$
Ethylalcohol Dimethylether

4. Metamerism :

- The structural isomerism which arises due to the difference in the distribution of C-atom on the either or both sides of same functional group.
 - Metamers can also be chain and position isomers.

Some examples of Metamerism

- (i) $\text{CH}_3 - \text{O} - \text{CH}_3 - \text{CH}_2 - \text{CH}_3$, $\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_3 - \text{CH}_3 - \text{O} - \text{CH} - \text{CH}_3$

|
CH₃

(ii) $\text{CH}_3 - \overset{\text{O}}{\underset{||}{\text{C}}} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$ and $\text{CH}_3 - \text{CH}_2 - \overset{\text{O}}{\underset{||}{\text{C}}} - \text{CH}_2 - \text{CH}_3$
 2-Pentanone 3-Pentanone

5. Ring Chain Isomerism

Shown by unsaturated hydrocarbons and alicyclic compounds.

e.g. $\text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2$
 $\text{CH}_3\text{CH}_2-\text{CH} = \text{CH}_2$ &

* Ring chain isomers are actually a type of functional isomers.

6. Tautomerism :

- It is special type of functional isomerism in which two functional isomers interconvert due to the movement of an acidic H-atom between two poly valent atoms. Here two isomers exist in dynamic equilibrium and hence it is also known as desmotropism/kryptomerism/Alleotropism.



Shown by the compounds having $-\text{C}-$, $-\text{N}=\text{O}$, $-\text{N}=\text{O}$, $-\text{CN}$ groups attached with $-\text{C}-$ group.

- Tautomerism arises due to shift of an atom from one site in the molecule to another equivalent site in the same molecule.

SOME EXAMPLES OF TAUTOMERISM :

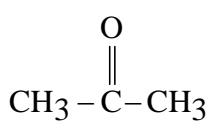
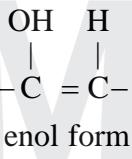
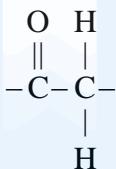
(i) Keto-enol tautomerism :



- Aldehydes and ketones containing $-\text{C}-\text{CH}_2-$ group shows tautomerism.

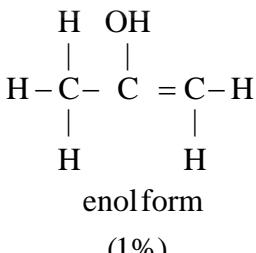


- Enol containing $-\text{C}=\text{C}-$ group shows tautomerism.

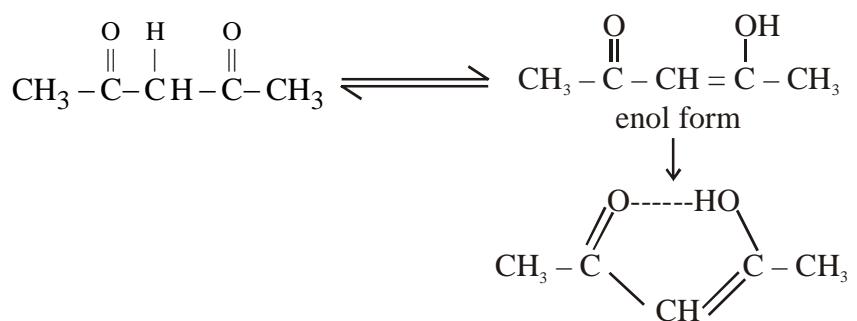


Keto.form \rightleftharpoons

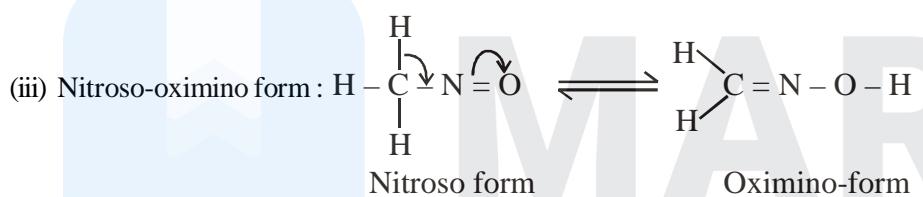
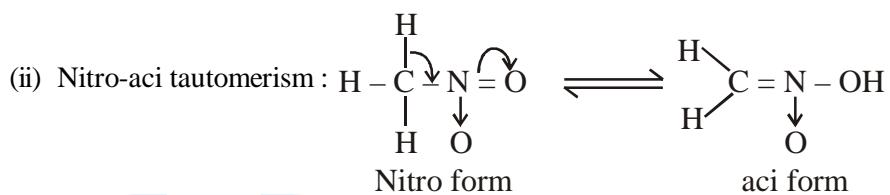
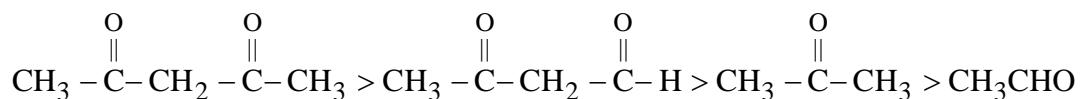
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- β -diketones have more enolic content due to the formation of chelation.

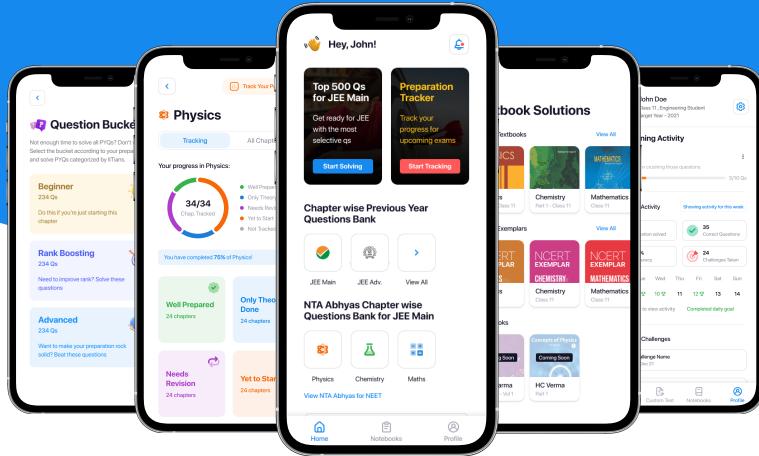


Order of enol-content of some molecule :





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