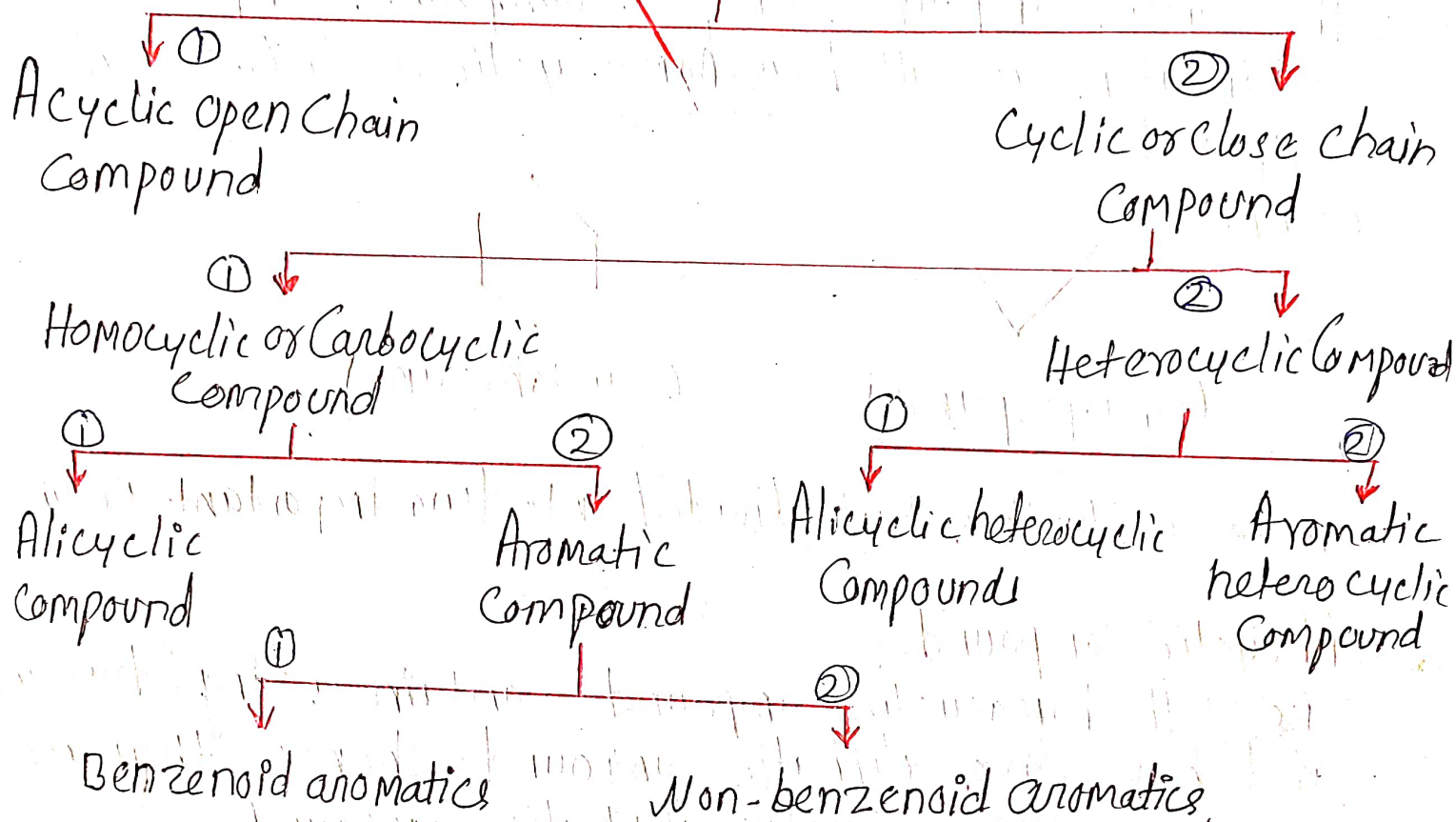




Pharmaceutical organic chemistry-I

UNIT-I

* Classification of organic Compounds :-



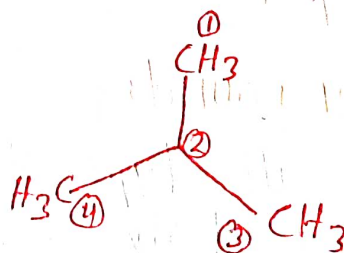
① Acyclic or open-Chain Compounds :-

organic compounds in which all the Carbon atoms are linked to one another to form open chain (straight or branched) are called acyclic or open chain compounds.

For Example :-



Butane (straight Chain)



Isobutane (Branched Chain)

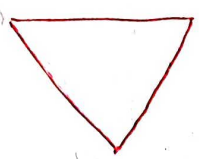
② Cyclic or closed chain Compounds :-

- Organic Compounds with a closed chain of atoms are called as closed chain or cyclic compound.

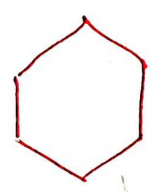
① Homocyclic or Carbocyclic Compound :-

- The Cyclic Compounds entirely composed of Carbon atom are called as homocyclic or Carbocyclic Compounds.

Example :-



(Cyclopropane)



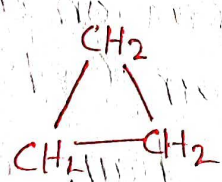
(Cyclohexane)

→ These are further sub divided into two important groups.

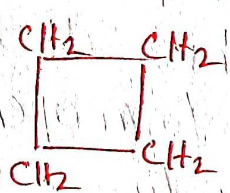
① Alicyclic Compounds :-

- Some of the homocyclic Compounds contain a ring structure but behave like aliphatic Compounds, hence they are named alicyclic or cyclic aliphatic compound.

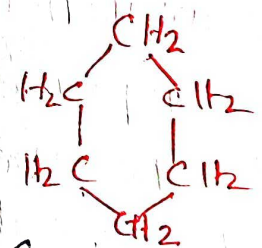
Example :-



(Cyclopropane)



(Cyclobutane)



(Cyclohexane)

② Aromatic Compounds :-

- These are specific type of compound :- they contain at least a closed chain of six carbon atom.
- It is the beginning compound of specific smell are known as aromatic compound.
- parent member of this family is benzene.



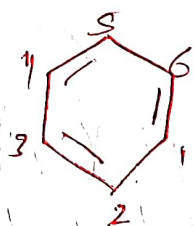
Pharmaceutical organic chemistry-I

— These divided into two Sub groups —

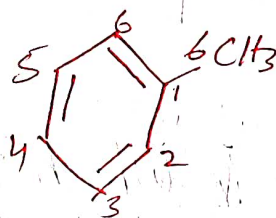
(a) Benzenoid aromatic Compound :-

These Compounds Consists of at Least one benzene ring i.e a Six Membered Carbocyclic ring having alternate single and double bond.

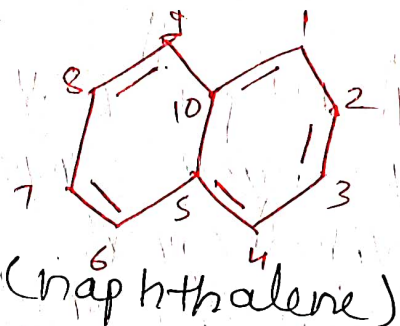
Example :-



(Benzene)



(Toluene)

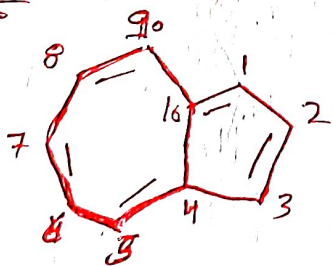


(Naphthalene)

(b) Non-benzenoid aromatics :-

— There are aromatic Compounds, which have Structural Units different from benzenoid type and are known as Non-benzenoid aromatics.

Example :-



(Azulene)

(c) Heterocyclic Compounds :-

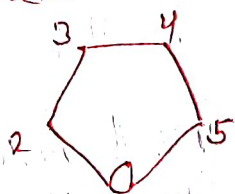
— Cyclic Compounds Containing one or more hetero atoms (e.g O, N, S etc) in the ring are called heterocyclic Compounds. These are of two type.

(4)

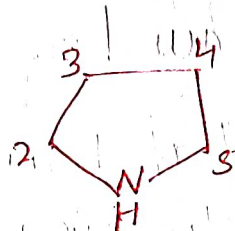
① Alicyclic heterocyclic Compounds:-

Heterocyclic Compounds which resemble aliphatic Compound in their properties are called Alicyclic heterocyclic Compound.

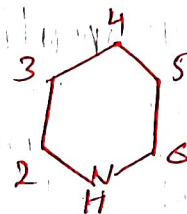
Example-



(Tetrahydrofuran)



(pyrrolidine)

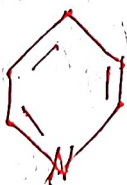


(Piperidine)

② Aromatic heterocyclic:-

Heterocyclic Compounds which resemble benzene and other aromatic Compounds in most of their properties are called Aromatic heterocyclic Compounds.

For example:-



(pyridine)



(pyrimidine)



(Furan)

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Pharmaceutical organic chemistry-I

* Nomenclature of organic Compounds:-

— Main two system are adopted for naming an organic compound.

① Common Name of organic Compound:-

— The compounds were named based on their sources or the name of their discoverer. These names called common names.

For example :-

CH_3OH (Wood Spirit)

NH_2CONH_2 (Urea)

CH_3COOH (Vinegar)

HCOOH (Formic acid)

② IUPAC SYSTEM:-

— Iupac nomenclature of organic compounds refers to the systematic approach taken for the nomenclature of organic compound as per the recommendation of the "International Union of Pure and applied Chemistry" (Iupac).

— The Iupac nomenclature of organic compounds essentially consist of three parts which are Stem name, prefix and Suffix.

(i) Primary prefix:-

It is used in cyclic compounds (cyclo)

(ii) Secondary prefix:-

It represent the substituents or branches.

PrefixPrimary Suffix

<u>Substituents</u>	<u>Prefix</u>	<u>Nature of Chain</u>	<u>Primary Suffix</u>	<u>Generic name</u>
-X	→ Halo			
-NO ₂	→ Nitro	C - C	-ane	Alkane
-R	→ Alkyl	C = C	-ene	Alkene
-CH ₃	→ Methyl	C ≡ C	-yne	Alkyne
-CH ₂ CH ₃	→ Ethyl			

viii) WORD ROOT :-Chain Length Root word

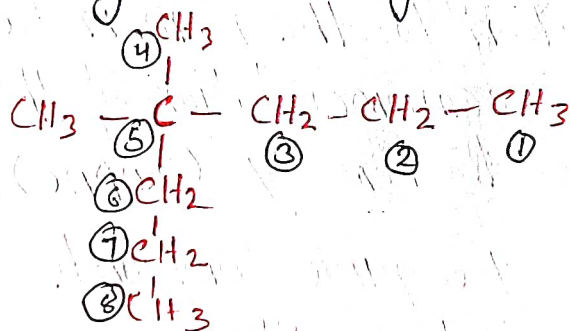
C ₁	→ Meth -
C ₂	→ Eth -
C ₃	→ Prop -
C ₄	→ But -
C ₅	→ Pent -

Chain Length Root Word

C ₆	→ Hex
C ₇	→ Hept
C ₈	→ Oct
C ₉	→ Non
C ₁₀	→ Dec

Example :-① Rule: 1 - Longest Chain Rule :-

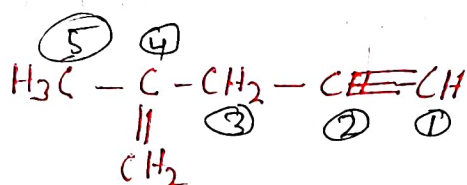
- select the longest chain of Carbon Chain

② Rule: 2 - Lowest Number.

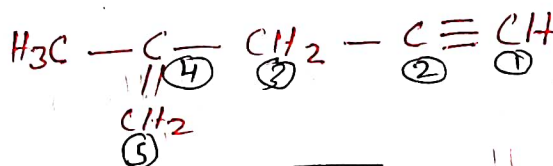
- Selected principle Carbon Chain is numbered from the side where substituent or multiple bond or functional group is nearer (Lowest possible number)

- priority order: Functional group > Double bond > Triple bond > Substituent.

Pharmaceutical organic chemistry-I



Wrong

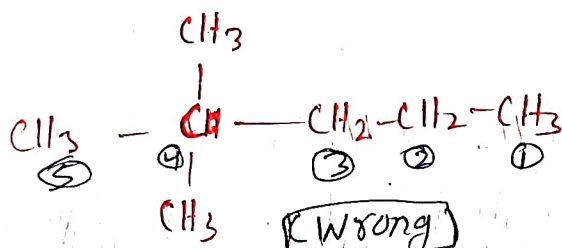


Correct

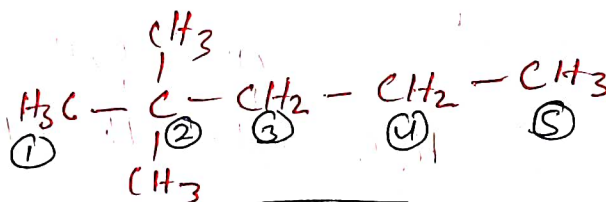
③ Rule 3 - Lowest Sum number:-

- In Case if more than one Substituents are present then choose the Chain having maximum number of Substituents, multiple bonds and functional groups.

Priority order:- Functional group > Multiple bond > Substituents.



Wrong

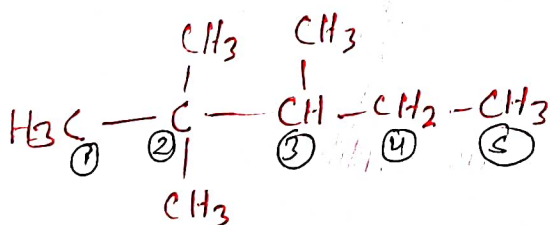


Correct

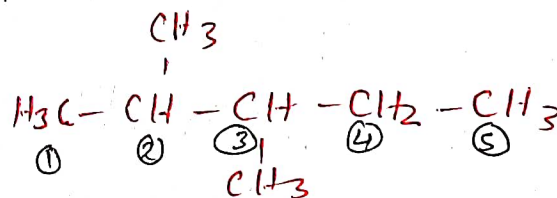
④ Use of prefixes di, tri etc:-

- If the Compound Contains more than one similar alkyl groups.

Example:-



(2,2,3 trimethylpentane)

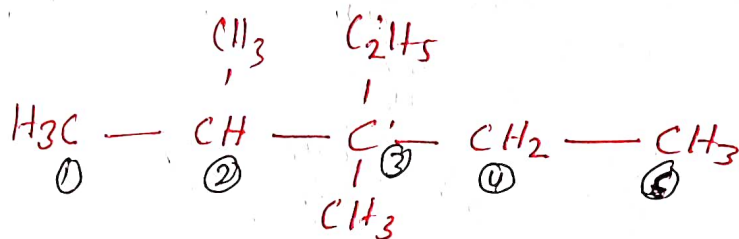


(2,3-dimethylpentane)

⑤ Rule 5:-

- If two different alkyl groups are located at the equivalent position.

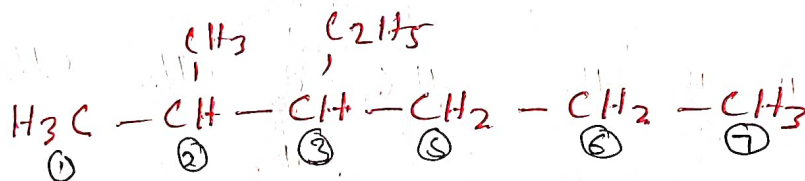
Example:-



(3-ethyl 2,3-dimethylpentane)

⑥ Rule 6:-

If a compound has two or more chains of the same length then principle chain is selected in such a way that greater number of substituents work as prefix.



3-ethyl-2-methyl hexane

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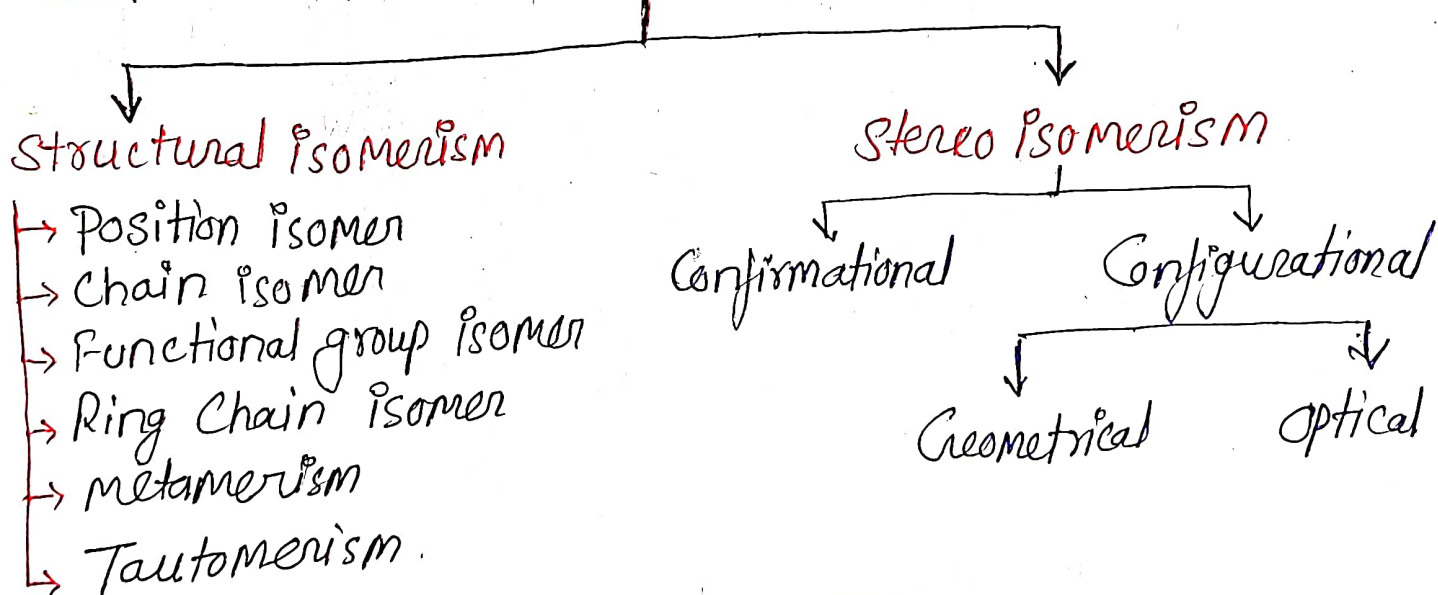
Pharmaceutical organic chemistry-I

* Isomerism :-

The Compound which have the Same Molecular formula but differ from each other in Physical or Chemical Properties, and are called isomers and the phenomenon is called Isomerism.

- Since isomers have the Same Molecular formula, the difference in their properties must be due to different mode of combination or arrangement of atoms within the molecule.

* Classification of Isomerism :-

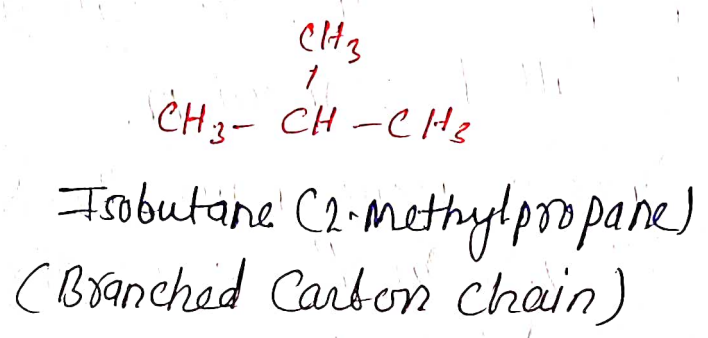
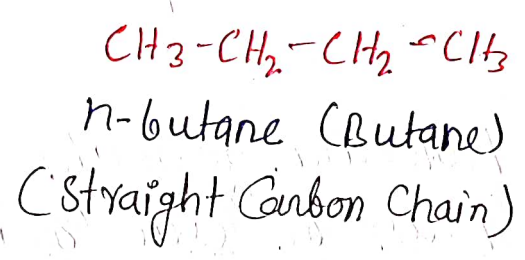


① Structural / Constitutional Isomerism :-

→ Constitutional isomers are compounds that have the same molecular formula but different structural formulas.

- The structural isomerism is also called as Constitutional isomerism as per the IUPAC.
- It is kind of isomerism where the molecules having the same molecular formula with different orders and bonding as opposed to that of the stereoisomerism.

Example:-



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