DEPTH OF BIOLOGY

STUDY MATERIAL

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INSTA- DEPTH OF BIOLOGY

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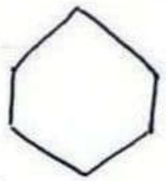
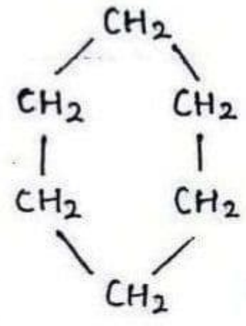
UNIT - 3 Heterocyclic Compounds

HETERO CYCLIC (1st atom bind with last)

Hetero → different

Cyclic → Ring / Close → ①②③④⑤ → 1-5





- 1st Carbon is connected with → 6th.
- It is cyclic
- All are carbon.

So, this is Homo → Same.

- But If we change atleast one carbon with any other hetero atom (other than Carbon), the this carbon compound is known as Heterocyclic Compounds.

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Example :-

* Defination :- "These are those cyclic compounds which contain atleast one different atom than Carbon in a ring"

OR

"They are those organic compound which contain ring or cyclic structure, in which it contain atleast two different atom".

- The atom present in cyclic ring other than carbon is 'Heteroatom'.
- Most Common heteroatom used are

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Nitrogen, oxygen and Sulphur.

others → Phosphorus, silica, copper etc.

Example → Pyrolle, furan, oxazole etc.

- Most of drugs which are used in ph·ceutical science are Heterocyclic compounds.
- These compound may be aromatic and Non-aromatic acc to their ring type.

* Classification of Heterocyclic Compounds

Heterocyclic compound classified as many ways :- [DEPTH OF BIOLOGY]

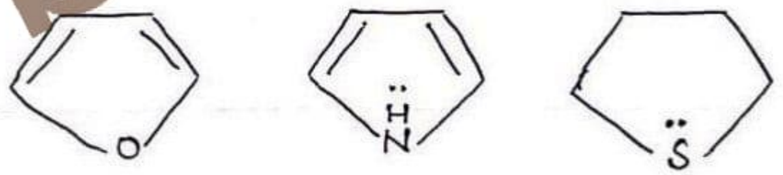
① Acc. to their ring type, it can classified as :-

- Aromatic → Follows Huckle rule
- Non-Aromatic → Not follow Huckle rule

② On the basis of members of ring :-

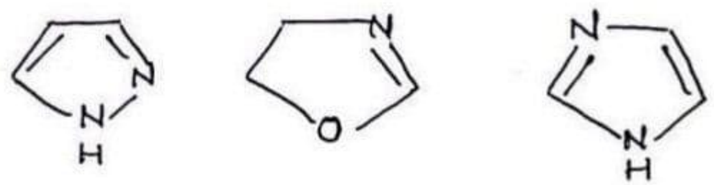
- 5-membered heterocyclic compounds → → A Ring contains five atoms.

- One heteroatom → eg. [4 Carbon + 1 heteroatom]



[Furan] [Pyrolle] [Thiophene]

- More than one heteroatom :-



[Pyrazole] [oxazole]

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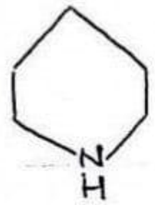
• 6- Membered heterocyclic Compound :-

Those heterocyclic compounds in which six atoms are present in rung.

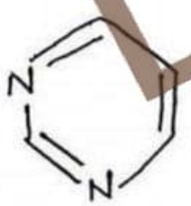
- one heteroatom → eg. [5 carbon + 1 heteroatom]

[Pyridine]



[Piperidine]

- More than one heteroatom → eg:-



[Pyrimidine]

[Pyrazine]

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• 7- Membered heterocyclic Compounds :-

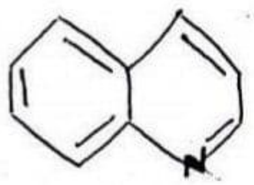
A heterocyclic compound contain 7 atom. [6 carbon + 1 heteroatom].

[Azepine]

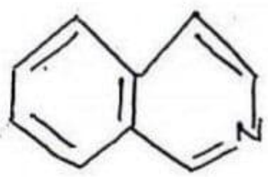
[oxepine]

• Condensed heterocyclic compounds :-

Those heterocyclic compound in which atleast two rung are fused.



[Quinoline]



[Isoquinoline]

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* Nomenclature of Heterocyclic Compound

There are three system for naming heterocyclic compounds :-

ⓐ Common Name System

ⓑ Replacement Method

ⓒ Hantzsch widman method - IUPAC System

ⓐ **Common Name System** → It is also known as a trivials name system.

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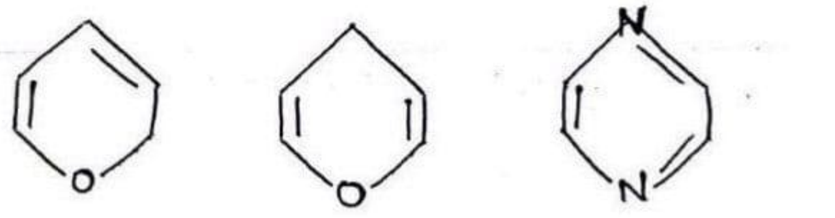
- These are the common name of a heterocyclic compound which usually originated from the compound occurence, its first preparation or its special properties.

- **5 - Membered heterocycles :-**

[Furan] [Thiophene] [Imidazole] [oxazole]

- **6 - Membered heterocycles**



2H - Pyron 4H - Pyron Pyrazine

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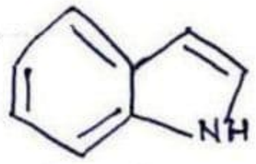
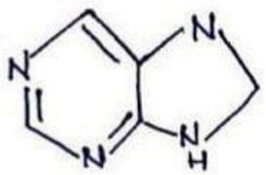
- Fused Heterocycles :-

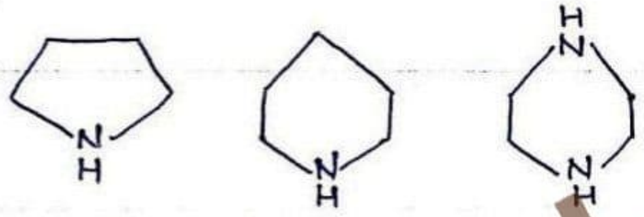


[Indole]



[Purine]

- Saturated Heterocyclic Compounds :-



[Pyrrolidine] [Piperadine] [Piperazine]

(b) Replacement Nomenclature :-

Heterocycle's name is composed of the corresponding carbocycle's name and an elemental prefix for the heteroatom.

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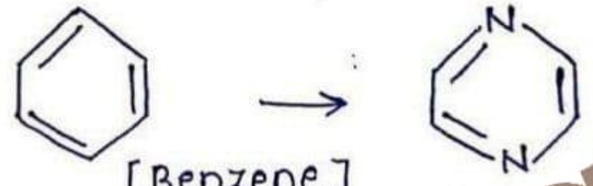
Example :-



[Benzene] [1,4-diazobenzene.

(c) Hantzsch - Widman method [IUPAC]

It is the most widely used system and also called as IUPAC nomenclature system.

- Proposed by Arthur Hantzsh and Oskar Widman in 1887 and 1888.
- IUPAC → Prefix + Suffix

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- **Some Prefix of heteroatoms**

Oxygen (O) → oxa

Nitrogen (N) → Aza

Sulphur (S) → Thia

Phosphorus (P) → Phospha

Silicon (Si) → Sila

Bismuth (Bi) → Bisma

- **Suffix :-**

No. of Membered	Saturated (-)		Unsaturated	
	With 'N'	Without 'N'	With 'N'	Without 'N'
03 - ir	iridine	irane	irine	irene
04 - et	etidine	etane	ete	et
05 - ol	olidine	olane	ole	ole
06 - in		ane	ine	in
07 - ep		epane	epine	epin
08 - oc		ocane		

eg → 

[aziridine]

[azirine]

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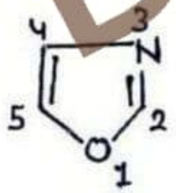
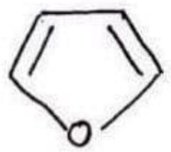
- Firstly choose heteroatom's prefix, then acc. to table, choose the prefix.
- The terminal 'a' of prefix is remove when (on) combination of Prefix and suffix. [DEPTH OF BIOLOGY]
- If there are more than one heteroatom are involved, then prefix are placed in order of priority → O, S, Se, N, P, As ...
  O > S > N.

Ex →



→ oxa + aza + ole
⇒ oxazole.

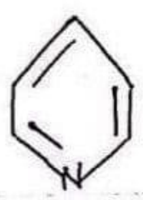
Examples →

ⓐ 

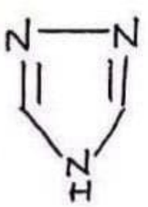
Furan → oxa + ole
= oxole

ⓑ 

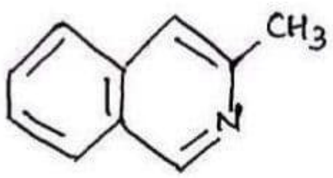
thiophene → Thia + ole
= thiole

ⓒ 

Pyridine → Aza + ine
= Azine

ⓓ 

1, 3, 4 - triazole

ⓔ 

3-Methylisoquinoline

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