

**B.Sc. Semester-IV
Core Course-IX (CC-IX)
Organic Chemistry-III**



**III. Heterocyclic Compounds
14. Classification and Structure**



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Heterocyclic Compounds

22 Lectures

Classification and nomenclature, Structure, aromaticity in 5-numbered and 6-membered rings containing one heteroatom; Synthesis, reactions and mechanism of substitution reactions of: Furan, Pyrrole (Paal-Knorr synthesis, Knorr pyrrole synthesis, Hantzsch synthesis), Thiophene, Pyridine (Hantzsch synthesis), Pyrimidine, Structure elucidation of indole, Fischer indole synthesis and Madelung synthesis), Structure elucidation of quinoline and isoquinoline, Skraup synthesis, Friedlander's synthesis, Knorr quinoline synthesis, Doebner- Miller synthesis, Bischler-Napieralski reaction, Pictet-Spengler reaction, Pomeranz-Fritsch reaction
Derivatives of furan: Furfural and furoic acid.

Coverage:

1. Classification and Structure

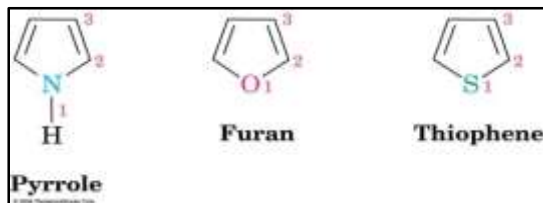
Homocyclic and Heterocyclic Compounds

Cyclic Compounds

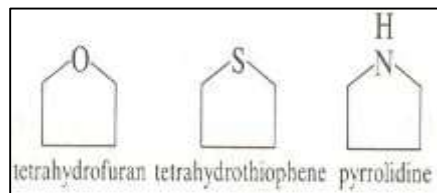
Heterocyclic

Compounds contain ring made up of carbon atoms and another kind of atoms.
(most commonly N, O, S)

Aromatic

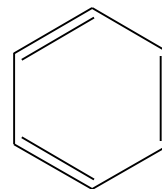


Non aromatic

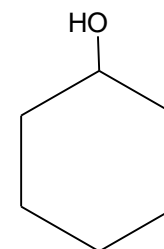


Homocyclic =(allicyclic = carbocyclic)

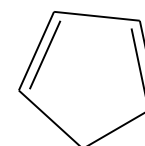
Compounds contain ring made up only of carbon atoms .



benzene



cyclohexanol



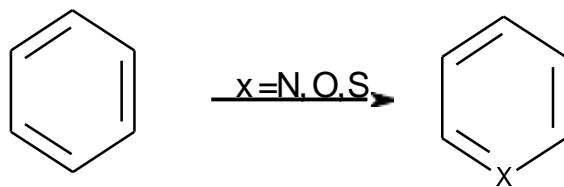
cyclopentadiene

Heterocyclic Compounds

Heterocyclic Compound:

If the ring system is made up of carbon atoms and at least one other element is hetero atom, the compound can be classified as heterocyclic.

As hetero atom can be N, O, S, B, Al, Si, P, Sn, As or Cu. But, the elements that are found most commonly together with carbon in a ring system are Nitrogen (N), Oxygen(O), and Sulfur(S).

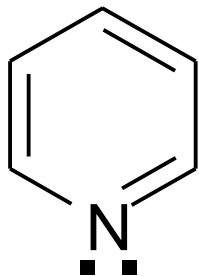


Definition: **Heterocyclic compounds** are organic compounds that contain a ring structure containing atoms in addition to carbon, such as sulfur, oxygen or nitrogen, as the heteroatom. The ring may be aromatic or non-aromatic

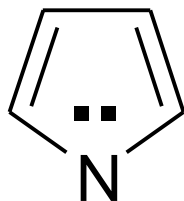
Significance – Two thirds of all organic compounds are aromatic heterocycles. Most pharmaceuticals are heterocycles.

Heterocyclic Compounds

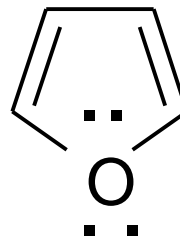
Some Examples of Heterocyclic Compounds:



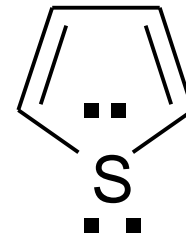
Pyridine



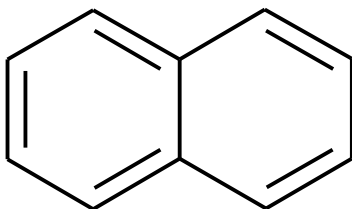
Pyrrole



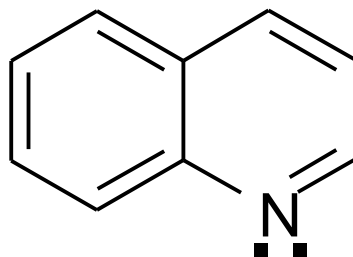
Furan



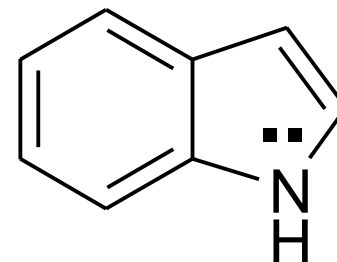
Thiophene



Naphthalene
Not Heterocyclic



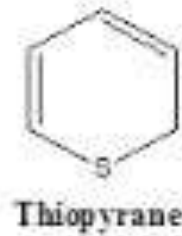
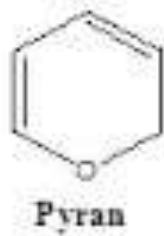
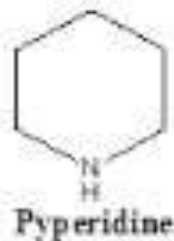
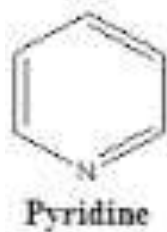
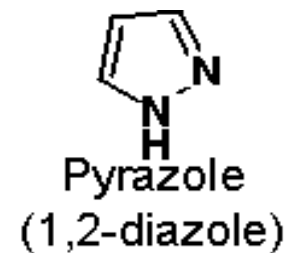
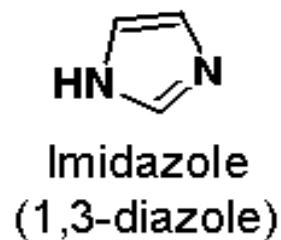
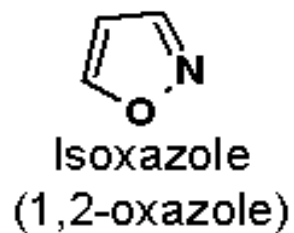
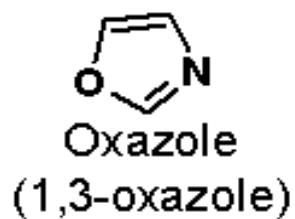
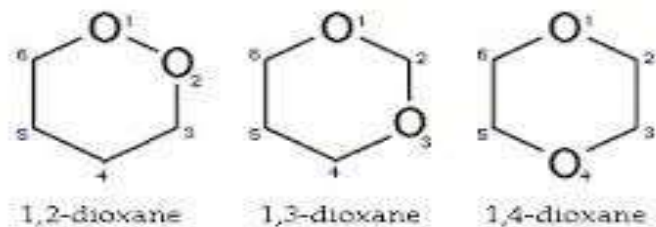
Quinoline



1H-Indole

Heterocyclic Compounds

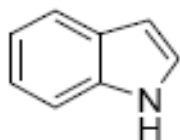
Some Examples of Heterocyclic Compounds:



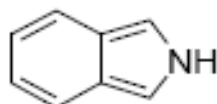
Heterocyclic Compounds

Some Examples of Heterocyclic Compounds:

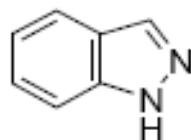
common ring-fused azoles



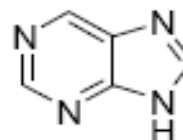
indole
(found in the amino acid tryptophan)



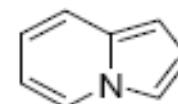
isoindole



indazole



purine
(DNA/RNA base)



indolizidine

Thank You



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