

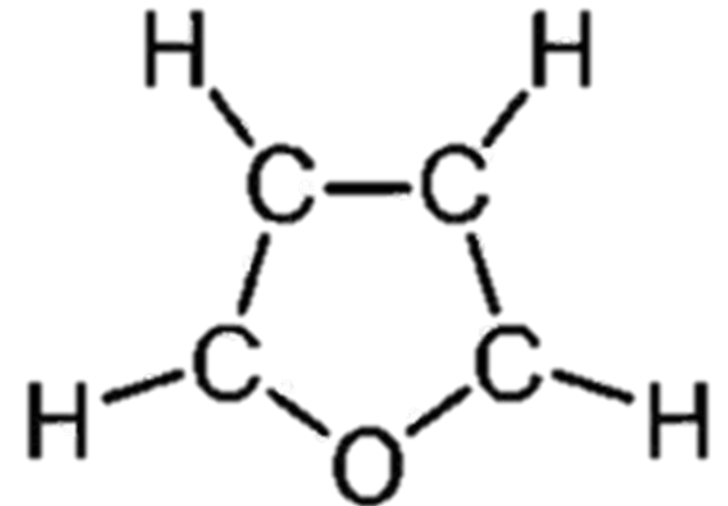
Heterocyclic Compounds

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Objectives :

- ✓ Define heterocyclic compound .
- ✓ Identify the five membered heterocyclic compounds(pyrrole, furan , thiophene) .
- ✓ Explain physical properties of five membered heterocyclic compound (pyrrole , furan , thiophene) .

Introduction

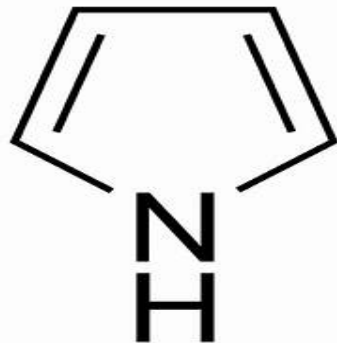
- ▶ Heterocyclic compounds are the cyclic organic compounds which contain at least one hetero atom, the most common heteroatoms are the nitrogen, oxygen and sulphur but heterocyclic rings containing other hetero atoms are also widely known.

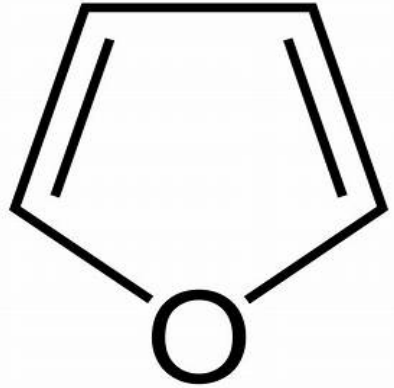
Medicinal importance of heterocyclic compounds

- ▶ They play an important roles in medicine and biological systems.
- ▶ A great majority of important drugs and natural products, e.g. **penicillin's and cephalosporins**, are heterocyclic compounds.
- ▶ The purine and pyrimidine bases, two nitrogenous heterocyclic compounds are structural units **of RNA and DNA**.

pyrrole

- ▶ **Pyrrole** is a nitrogen-containing unsaturated five-membered heterocyclic aromatic compound. It shows aromaticity by delocalization of a lone pair of electrons from nitrogen.





Furan

- ▶ **Furan**, is an oxygen-containing five-membered aromatic heterocyclic compound
- ▶ The highly electronegative oxygen holds on the electron density tightly.
- ▶ Although it has a lone pair of electrons, these electrons cannot delocalize easily, and so the system is generally considered to be almost non-aromatic or weakly aromatic.

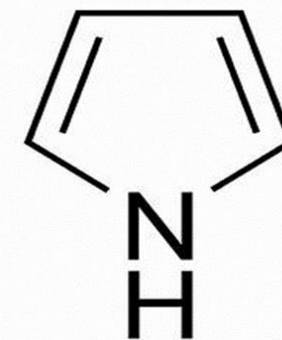


Thiophene

- ▶ **Thiophene** is a Sulphur-containing five-membered unsaturated heterocycle.
- ▶ Thiophene is considered weakly aromatic.
- ▶ The thiophene ring is present in many important pharmaceutical products.

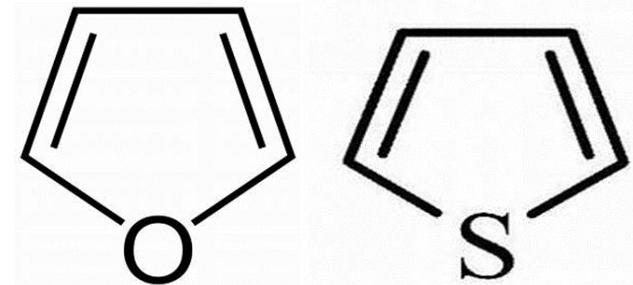
Physical properties of pyrrole, furan and thiophene

- ▶ **Pyrrole** is not basic compound.,
- ▶ **Pyrrole** accepts a proton on one of the carbon atoms adjacent to the nitrogen atom
- ▶ The proton on the nitrogen atom can be removed by hydroxide ion to yield its conjugate base.



Physical properties of pyrrole, furan and thiophene

- ▶ Furan and thiophene are both clear and colorless liquids at room temperature.
- ▶ While furan is extremely volatile and highly flammable with a boiling point close to room temperature (31.4 C),
- ▶ The B.P of thiophene is 84 C. Thiophene possesses a mildly pleasant odour.



Summary

- ▶ An example of 5 membered ring heterocyclic compound are Pyrrole, furan and thiophene
- ▶ One of the importance of heterocyclic compounds is that The purine and pyrimidine bases are structural units of RNA and DNA.
- ▶ Pyrrole is a not basic compound.