

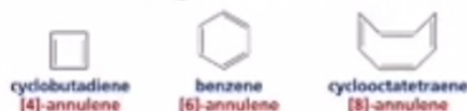
Heterocyclic chemistry

➤ Criteria for aromaticity:

- Compound must have uninterrupted cyclic cloud of electrons.
- Odd number of pairs of μ electrons.
- Planar
- Obey huckel's rule



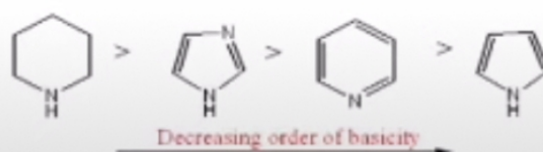
➤ Compound has alternate single and double bond called annulenes



➤ Use Hantzsch-Widman rule for partially unsaturated heterocycles.

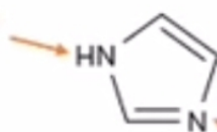
➤ Notes:

- Pyrrole has higher boiling point than furan & thiophene due to hydrogen bond.
- According to "reactivity" aromaticity: benzene > thiophene > pyrrole > furan.
- According to basicity:
 - pyrrole > furan > thiophene > benzene.
 - Indole not basic because lone pair delocalized in aromaticity.
 - pyrrolidine is more basic than pyrrole.
 - Pyridine is more basic than pyrrole
 - Pyridine is less basic than piperidine



- Imidazole is more basic than pyrrole

Pyrrole like nitrogen



pyridine like nitrogen "basicity"

- Electrophilic aromatic substitution reaction:
 - Pyrrole > furan > thiophene > benzene
 - For pyrrole, furan, thiophene occur at position 2
 - For indole occur at position 3
 - For pyridine occur at position 3
 - For pyridine N-oxide occur at position 2,4,6 but 4 is major.
 - For quinoline occur at position 5,8
 - For isoquinoline occur at position 5,8
- Nucleophilic substitution reaction:
 - Pyrrole, furan, thiophene doesn't undergo this reaction.
 - For pyridine occur at position 2,4
 - For quinoline occur at position 2,4
 - For isoquinoline occur at position 1,3