

2.8.7.2030.

FEBRUARY 2013

SUN	MON	TUE	WED	THUR	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

~~MONDAY~~  
MONDAY

WEEK 05 / DAY 028-337



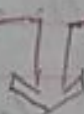
B.Sc. Part II (Hons.)

Organic chemistry.

Paper III C. (Gr. B.)

— Dr. Manj Kumar

AROMATIC  
COMPOUNDS



AROMATICITY (HUCKEL RULE) :

The Aromatic compounds apparently contain alternate double and single bonds in a cyclic structure, and resemble benzene in

chemical behaviour. They undergo substitution rather than addition reactions.

TUESDAY  
WEEK 05 / DAY 029-336 2013

JANUARY 2013						
SN	M	T	W	T	F	S
1		1	2	3	4	5
2	7	8	9	10	11	12
3	14	15	16	17	18	19
4	21	22	23	24	25	26
5	28	29	30	31		

This characteristic behaviour is called Aromatic character or Aromaticity.

Aromaticity is, in fact, a property of the  $sp^2$  hybridized planar rings in which the p-orbitals (One on each atom) allow cyclic delocalization of  $\pi$  electrons.

Criteria for Aromaticity:

On the basis of the above considerations, can be laid down criteria or rules

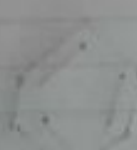
which help us in knowing whether a particular

compound is aromatic or non-aromatic.

Rule 1. An aromatic compound is cyclic and planar.

Rule 2: Each atom in an aromatic ring has a p-orbital.

These p-orbitals must be parallel so that a continuous overlap is possible around the ring.



Rule 3.

The cyclic  $\pi$  molecular orbital (electron cloud) formed by overlap of p orbitals must contain  $(4n+2)\pi$

electrons, where  $n = \text{integer}$

0, 1, 2, 3, ... etc. This is

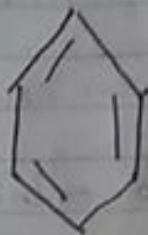
Handle them carefully, for words have more power than iron bombs. Pearl Strachan Hurd

Known as Huckel Rule.

9 Examples :

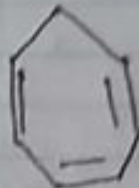
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12

13 Benzene



Cycloheptatriene

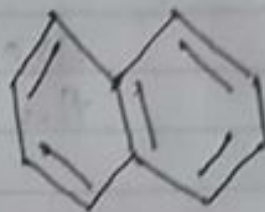
14

15



16

17 Cycloocta  
tetraene



Naphthalene

18

19

20

Date: 24.7.2020

MARCH 2013

Wk	M	T	W	T	F	S	S
10	4	5	6	7	8	9	10
11	11	12	13	14	15	16	17
12	18	19	20	21	22	23	24
13	25	26	27	28	29	30	31

FEBRUARY

THURSDAY

07

WEEK 06 / DAY 038-327

## Benzene

It is a cyclic and planar compound. It has a p-orbital on each carbon of the ring involved in a double bond. It has three double bonds and six  $\pi$  electrons, which is in accordance with Huckel rule:

$$4n + 2 = 6 \quad \text{or} \quad 4n = 6 - 2$$

$$\therefore 4n = 4 \quad \text{and} \quad n = 1$$

Cycloheptatriene. It is cyclic and planar. It has three double bonds and six  $\pi$  electrons.

Cyclooctatetraene. It is cyclic and has a p-orbital on each atom of the ring.

You don't manage people; you manage things. You lead people. - Admiral Grace Hooper.

The Huckel rule is not satisfied, since there are 8  $\pi$  electrons.

$$4n + 2 = 8 \text{ equal}$$

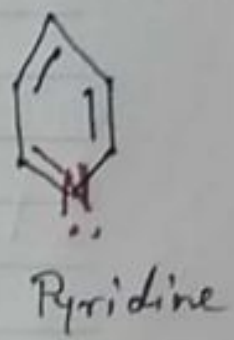
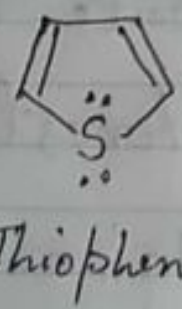
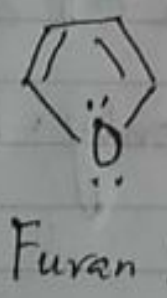
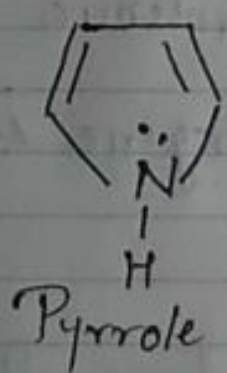
$$4n = 6 \therefore n = 1.5$$

The compound is non aromatic. Moreover, it has been determined that cyclooctatetraene is not planar but tub-shaped.

## Heterocyclic Aromatics :

Heterocyclic compounds also behave as aromatic if they obey the aromaticity rules.

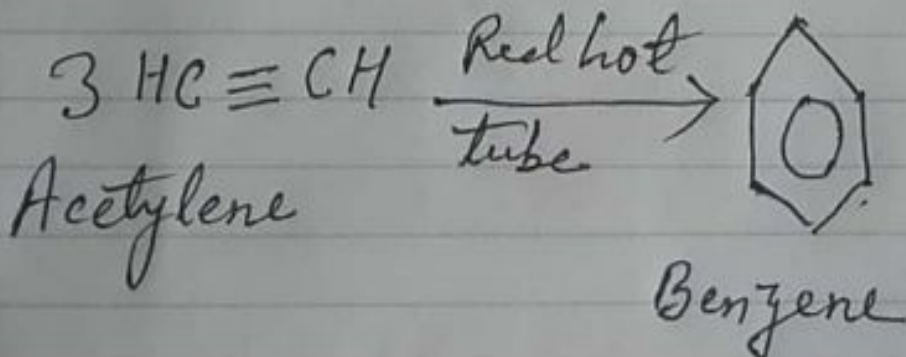
Examples of such heterocyclics are:



9 Preparation of Benzene :

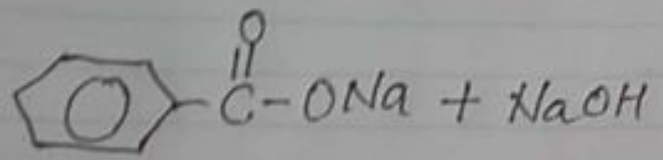
10 Benzene is obtained on large  
11 scale from petroleum and  
12 coal-tar. The synthetic  
13 methods on laboratory  
14 scale are of academic  
15 interest only. Benzene is  
16 obtained :

17 (i) By passing acetylene through  
18 red-hot tube at  $500^{\circ}\text{C}$

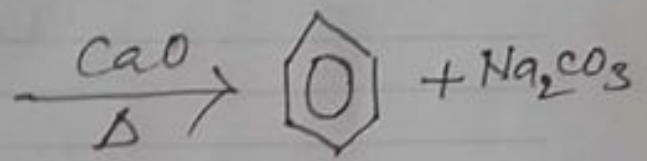




(ii) By heating benzoic acid or its sodium salt with sod-lime (NaOH+CaO)



Sod. Benzoate



Properties :

(i) Benzene is a colourless liquid, b.p. 80.1°C, mp 5.5°C.

(ii) It is insoluble in water, forming the upper, of two layers when mixed. It is miscible with alcohol, ether and chloroform.

A fair request should be followed by the deed in silence. -Dante (Alighieri).