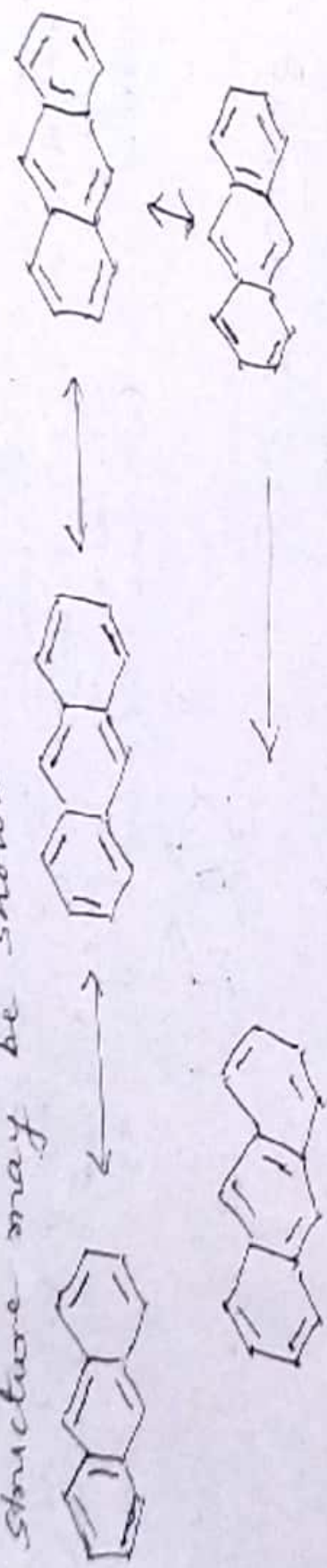
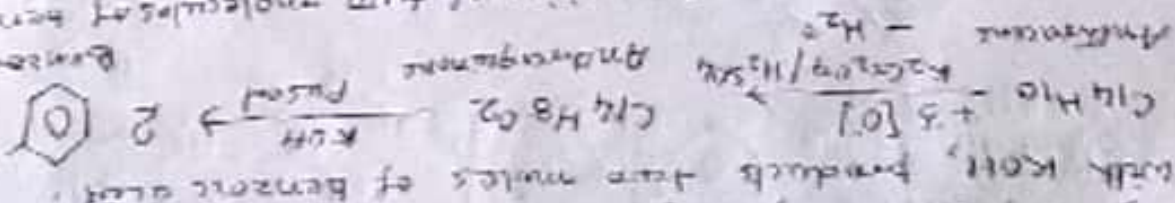


9,10 dihydro anthracene
 (C) Resonance structure: From X-rays, ~~N.M.R~~ N.M.R
 it appears that Anthracene

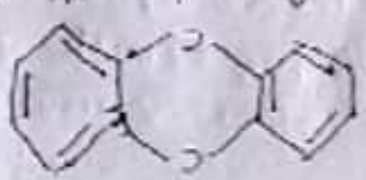
Spectrum analysis, it appears that Anthracene is resonance hybrid molecule whose resonating structure may be shown as below



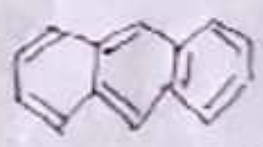
(b) When Anthracene is oxidised in presence of $K_2Cr_2O_7$ and H_2SO_4 solution, it forms anthraquinone. Given the fusion with KOH , products are two moles of benzoic acid.



Formation of two molecules of benzoic acid from anthracene in above conversion, confirms the presence of at least two benzene ring in anthracene molecule. On the basis of formation of D-benzoylbenzoic acid, the probable structure of anthracene may be written as

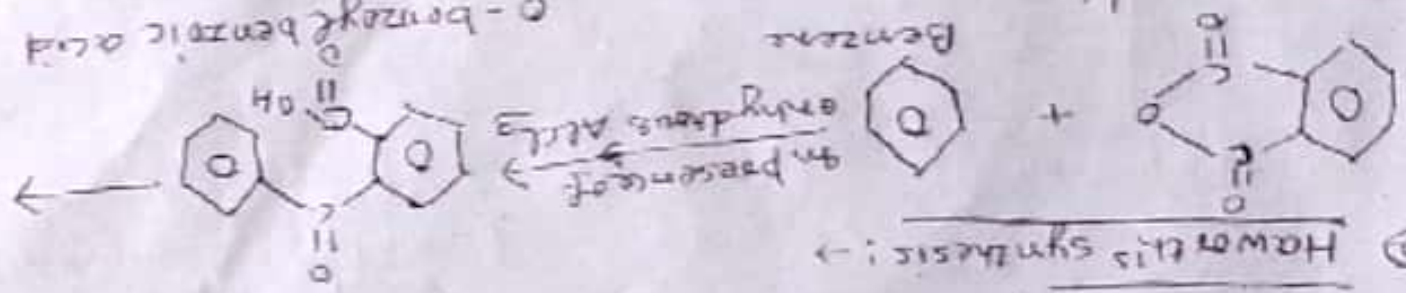


(4) From molecular formula, it appears that the above skeleton of anthracene only accommodates 10 hydrogen atoms whereas the molecule is completely cyclic. Therefore, it appears that anthracene contains three benzene rings fused at the position in linear manner. Therefore, the probable structure of anthracene may be written as



(5) SYNTHESIS:

(a) Haworth's synthesis:-



Heated with conc. H_2SO_4 $-H_2O$
Decarboxylation

Phthalic anhydride

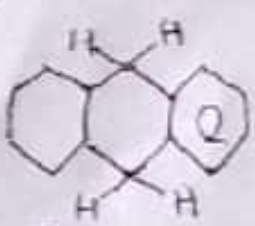
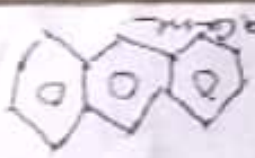
Benzene

o-benzoyl benzoic acid

Distilled with $Pd/Sr (-H_2)$

In presence of $[O]$

Anthraquinone



Anthracene

Structure of Anthracene

The structure of Anthracene is derived on the basis of following analytical and synthetic evidences:

(1) Molecular Formula From elementary analysis and molecular weight determination, molecular formula of Anthracene is established as $C_{14}H_{10}$

(2) Presence of Aromatic character:

(a) As Anthracene gives electrophilic substitution reaction (e.g. Nitration, Sulfonation, halogenation etc) like benzene hence it must have aromatic character like benzene

(b) From molecular formula of Anthracene it appears that the compound should be highly unsaturated but it fails to give unsaturation test. Therefore, the compound is not aliphatic, hence it must have aromatic ring.

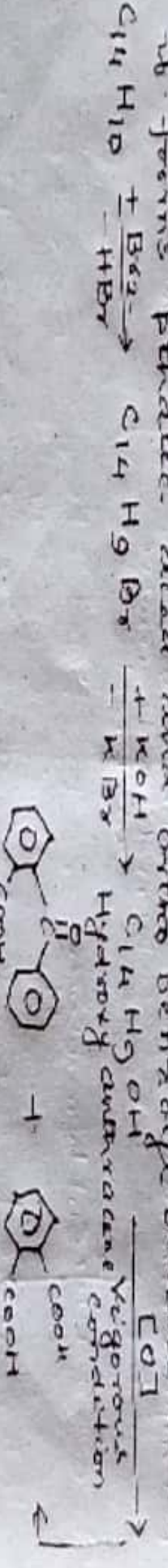
(c) Anthracene on oxidation forms Anthraquinone.



Anthraquinone is not in the list of aliphatic chemistry. Hence it is aromatic compound. Therefore, structure of Anthracene (continued)

(3) Oxidation of skeleton structure of Anthracene:-

(a) Anthracene on Bromination forms Bromo anthracene which on fusion with KOH, it forms hydroxy anthracene. When hydroxy anthracene is oxidised under vigorous condition it forms phthalic acid and ortho benzoyl benzoic acid.



Formation of o-benzoyl benzoic acid suggests the presence of at least two benzene ring in its molecule.

Date - 13.05.2020 Paper - VII

By

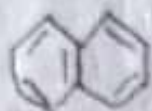
Dr. Sanjay K. Singh
Asstt. of Chem.
S.N. SIKRS College
Satna

TOPICS:- Poly nuclear hydrocarbon
(ANTHRACENE)

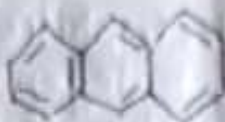
Poly nuclear compound:-

When two or more than two benzene nucleus fused at ortho position, the compound thus obtained is known as poly nuclear compound or poly nuclear hydrocarbon.

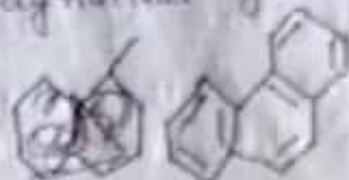
e.g



Naphthalene



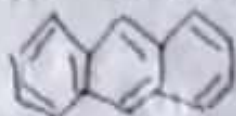
Anthracene



Phenanthrene

ANTHRACENE

Anthracene is a poly nuclear compound in which three 'Benzene' ring fused together at ortho position in linear manner. The structure of anthracene is as follows:-



Preparation of Anthracene from coal tar:-

Coal tar $\xrightarrow{\text{Fractionally distilled}}$ Green oil at $260^{\circ}-350^{\circ}\text{C}$ $\xrightarrow{\text{It is cooled}}$ Crude crystals of Anthracene containing Phenanthrene and Carbazole as impurities
[washed with Naphtho Solvent to remove Phenanthrene]

Product (Impure anthracene)

Now it is washed with Pyridine to remove Carbazol

Product containing carbazole as impurities

Sublimation

Sublimate
Pure anthracene (100%)