

Polynuclear Hydrocarbons

Class of aromatic hydrocarbon containing more than one aromatic ring are known as polynuclear hydrocarbons.

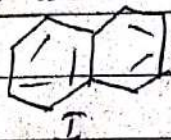
Two or more aromatic rings are fused together generally through ortho carbons are referred to as Condensed polynuclear compounds or fused ring hydrocarbons.

Naphthalene ($C_{10}H_8$)

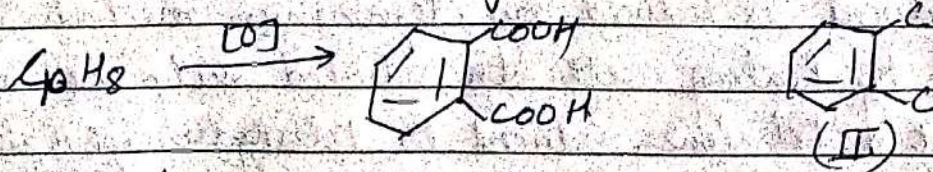
It is largest single constituent of Coal-tar (6%). It is obtained by cooling the middle and heavy oils, where upon naphthalene crystallise out. It has a characteristic odour, Sublimes on heating.

Structure of Naphthalene:-

Erlemeyer (1866) proposed the symmetrical formula (I) for Naphthalene, and Graebe (1869) proved that it consist of two benzene rings fused

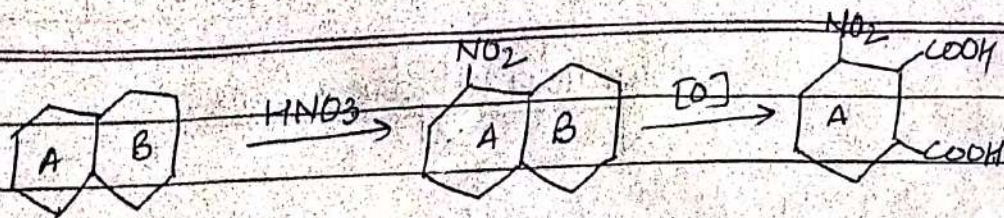


together in ortho positions. He used several methods but the line of approach was same - he found that oxidation of naphthalene gives phthalic acid. Thus naphthalene contains the group (II)

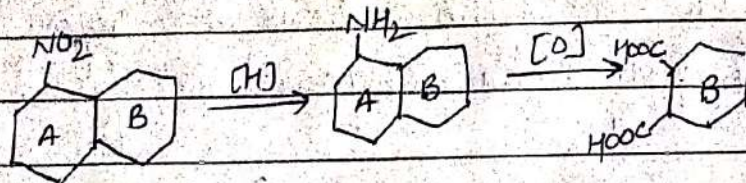


that is a benzene ring with two side chains in the o-positions.

When nitrated naphthalene gave nitronaphthalene



nitronaphthalene on oxidation gave o-nitrophthalic acid. This indicates that the nitro group is in benzene ring, and that it is side chains which are oxidised.



When nitronaphthalene was reduced and the corresponding aminonaphthalene was oxidised phthalic acid was obtained. An amino group attached to the nucleus renders the latter extremely sensitive to oxidation. Hence the inference is that the benzene ring in phthalic acid obtained by oxidation of aminonaphthalene is not the same ring as that originally containing the nitro group in nitronaphthalene i.e. contains two benzene rings. This structure for naphthalene has been confirmed by many syntheses.

Synthesis

(1) Haworth Synthesis

Benzene is treated with succinic anhydride in the presence of aluminium chloride and the ketonic acid produced is reduced by Clemmensen method. The ring is closed by heating with concentrated sulphuric acid and the product α -tetralone, reduced to tetrahydronaphthalene by Clemmensen method. This compound is then dehydrogenated to naphthalene by distilling it with selenium.

