Q.51. How would you affect the following conversion ?

(i) Anthracene to Alizarine and vice-versa.

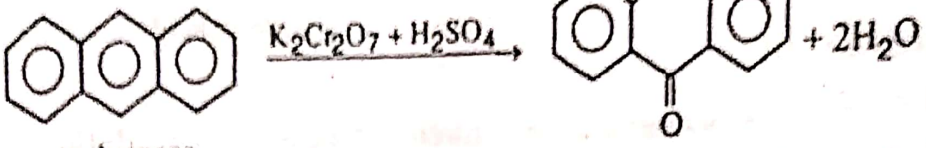
(ii) Anthracene to Anthraquinol.

(iii) Anthracene to Phthalic acid.

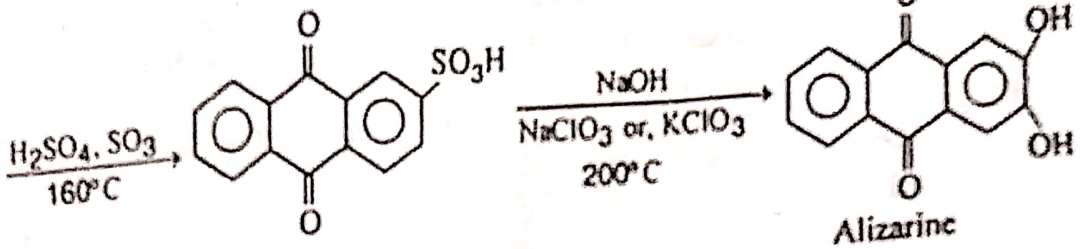
(iv) Anthracene to Anthraquinone.

Ans. :

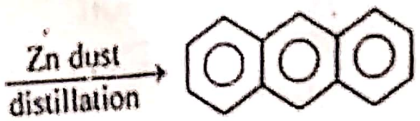
(i)



Anthracene — Anthraquinone

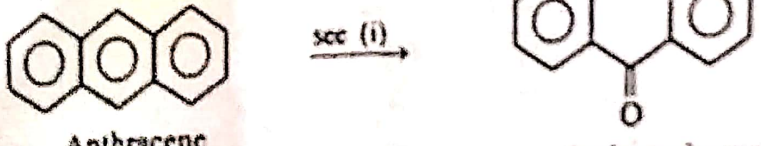


Alizarine

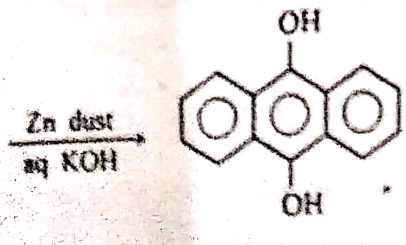


Anthracene

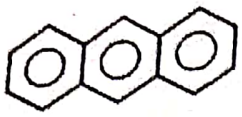
(ii)

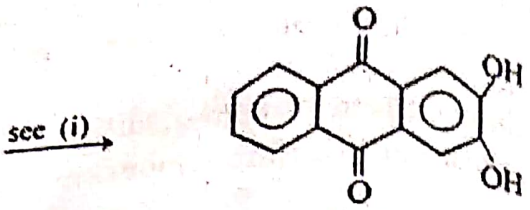


Anthracene — Anthraquinone



Anthraquinol

(iii)  Anthracene



Alizarine

(Pathalic acid)

(iv) See (i)

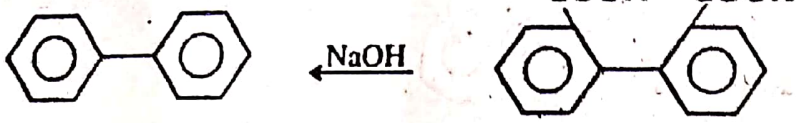
Q.52. Establish the structure of phenanthrene by degradative as well as synthetic methods.

Ans. : *Phenanthrene on oxidation with* $Na_2Cr_2O_7$ *in glacial acetic acid gives 9 : 10 phenanthroquinone which on further oxidation with* $KMnO_4$ *gives diphenic acid. It, on distillation with soda lime, gives diphenyl—*

Phenanthrene $\xrightarrow[Cr_2O_7^{2-}/H^+]{[O]}$ 9 : 10 Phenanthroquinone

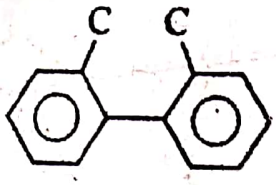
$C_{14}H_{10}$

Δ | $KMnO_4$

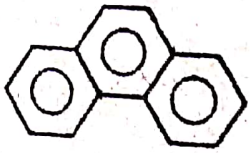


Diphenyl — Diphenic acid

Hence the phenanthrene should have the following skeleton—



This skeleton contains 14 C-atoms. Therefore in the light of tetravaleneey of all C-atoms, the middle ring must be closed, as shown below—



The above structure of phenanthrene is-supported by its synthesis—

1. When benzil is heated at 120°C in the presence of $AlCl_3$, phenanthroquinone is formed, which gives phenanthrene on distillation with Zn dust—