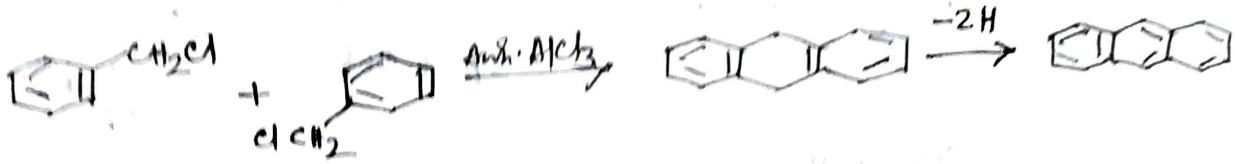
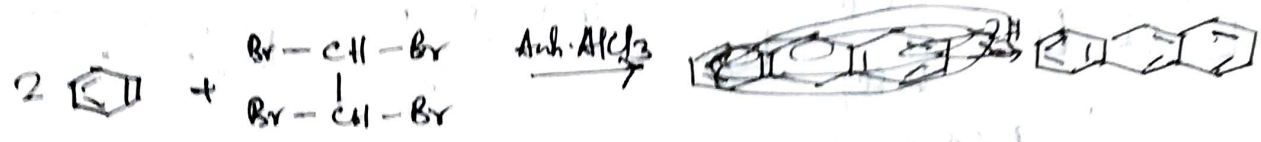
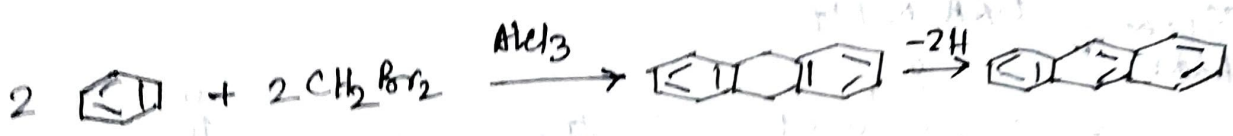
Anthracene :-

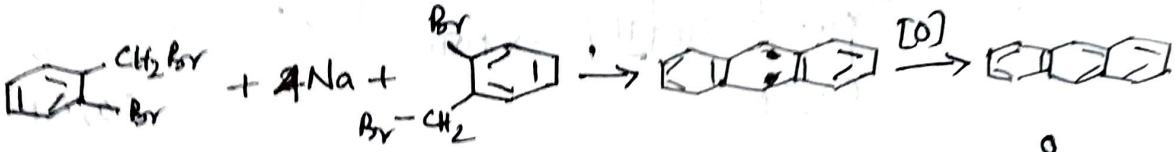
(1) Friedel-Craft reaction :-



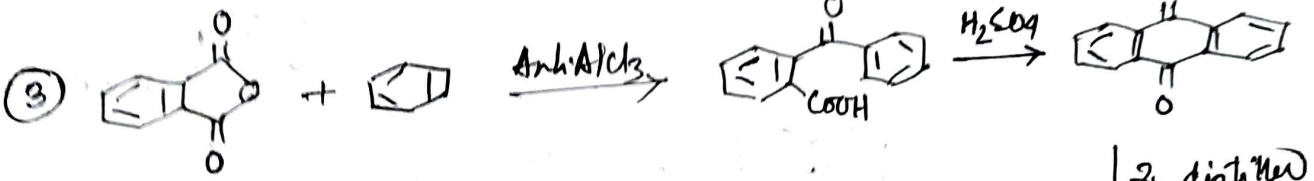


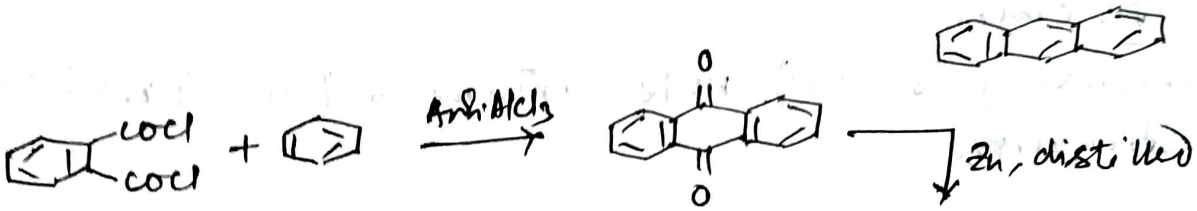


(2)

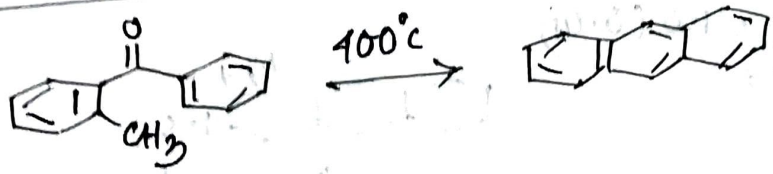


(3)

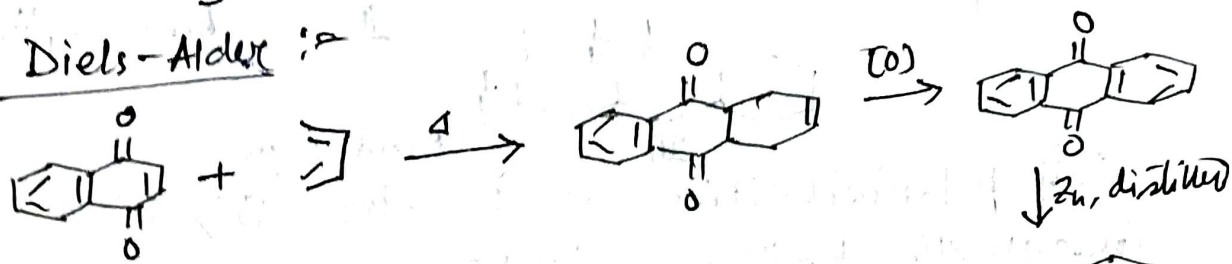




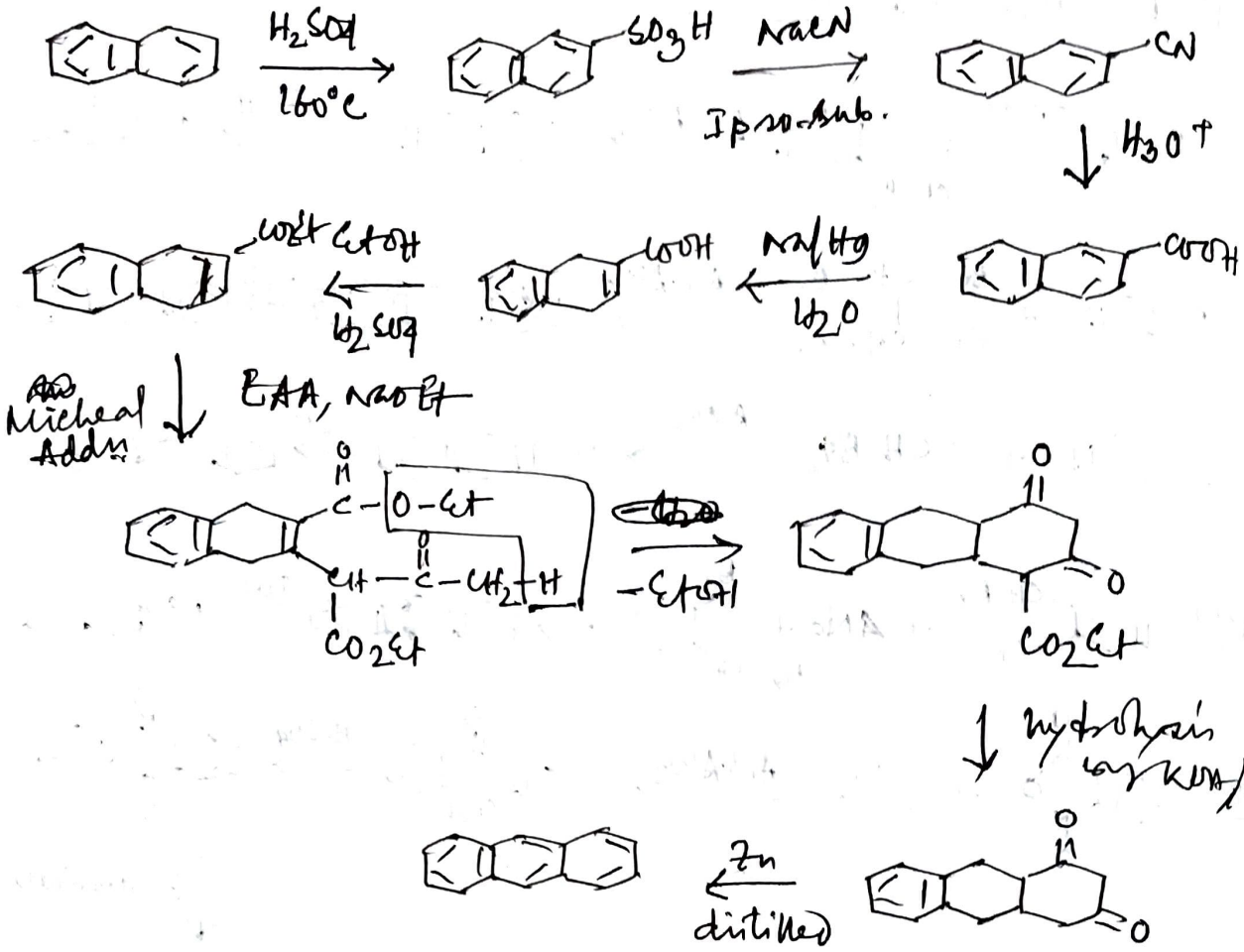
(4) Elbs reaction :-



(5) Diels-Alder :-

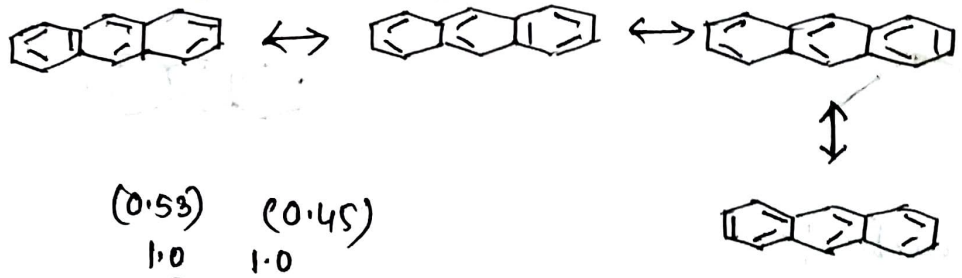


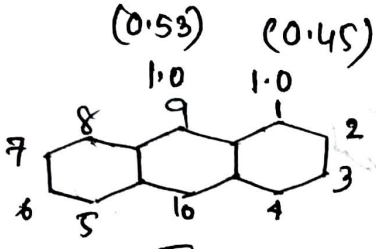
(6) Naphthalene → Anthracene



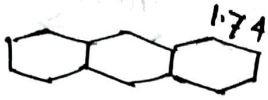
Structure:-

According to (n+1) rule anthracene have 4 resonating structures.

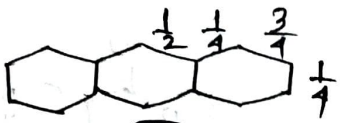




I



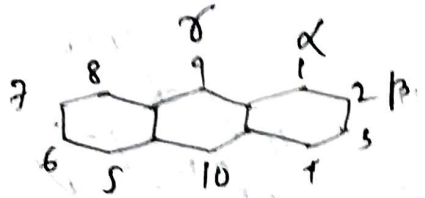
II Bond-length.



III Bond-order

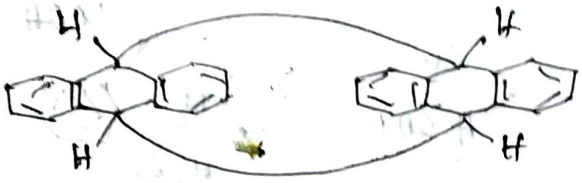
Self-polarisibilities are in order 9 > 1 > 2. Consequently position 9 will be the most reactive than 1 and finally 2.

Isomerism of anthracene derivatives :-



There are 15 possible isomerism for disubstitution if both substituents are identical.

Properties of anthracene :- m.p. = 216°c, colourless. Anthracene form dimer -

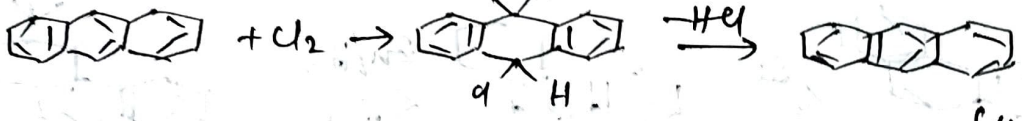


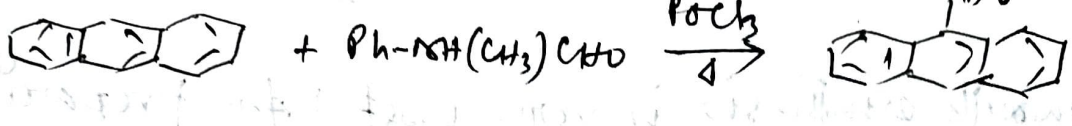
Join in 9, 10 - position.

when it melts it forms monomer from confirmed by X-Ray analysis.

9, 10 - position is reactive, it forms colourless photo-oxide under light.

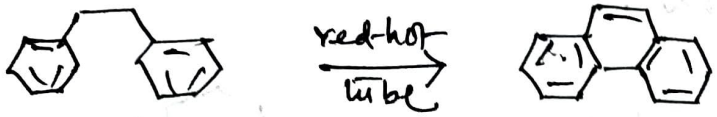
It undergoes Diels - Alder reaction in the 9, 10 - position.

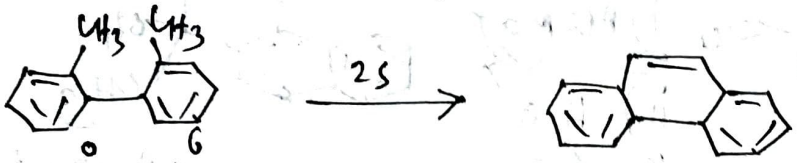
i) 

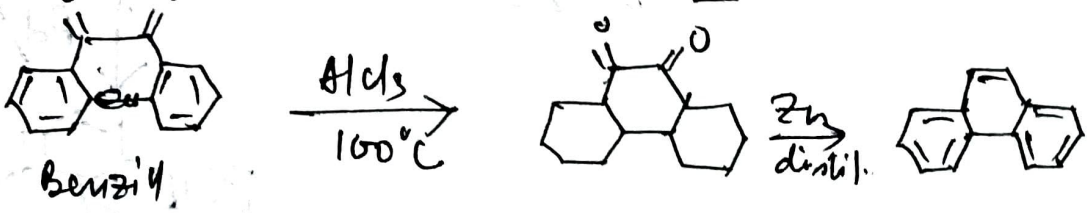
ii) 

Phenanthrene :-

Synthesis :-

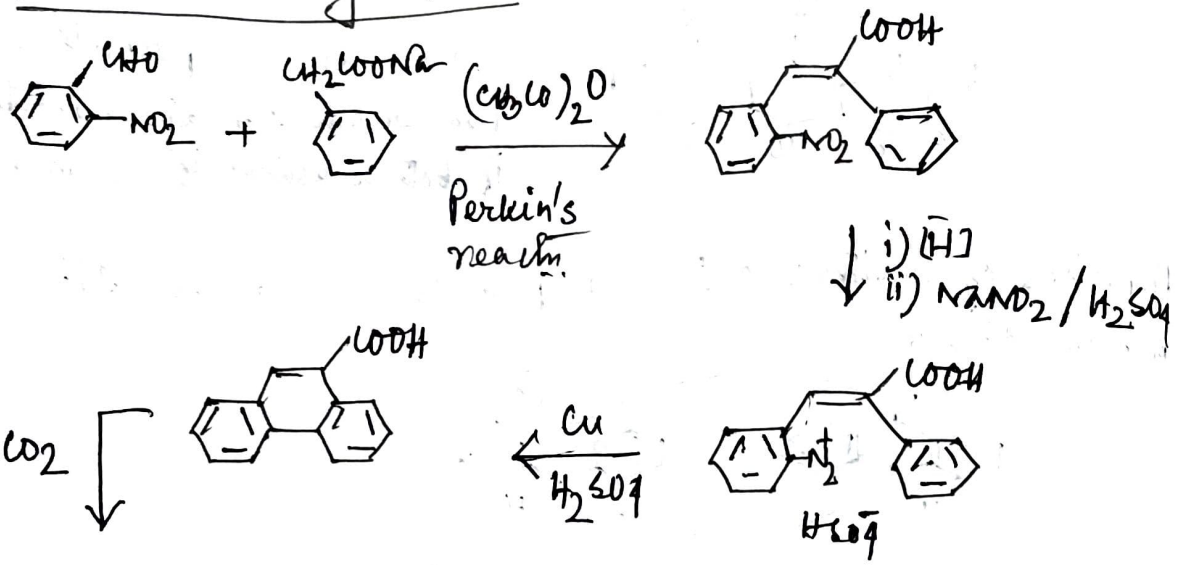
i) 

ii) 

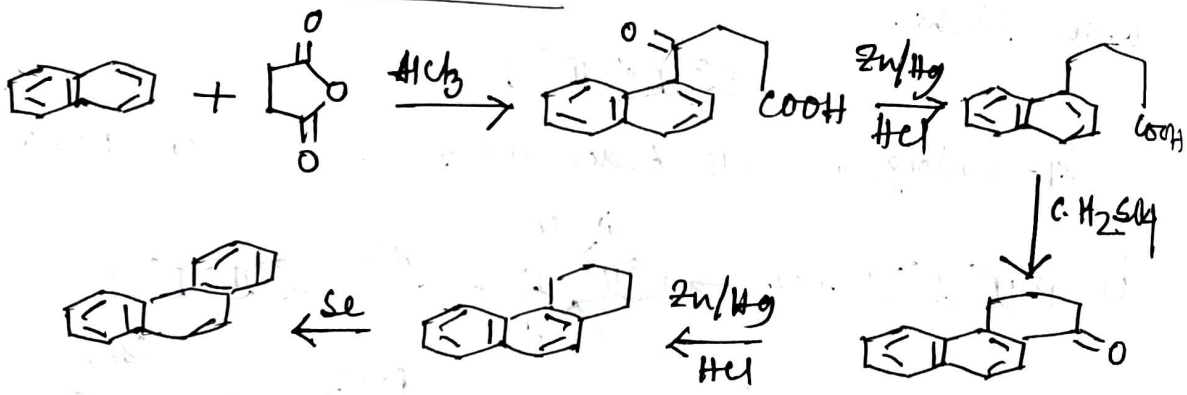
(iii) 

Benzil

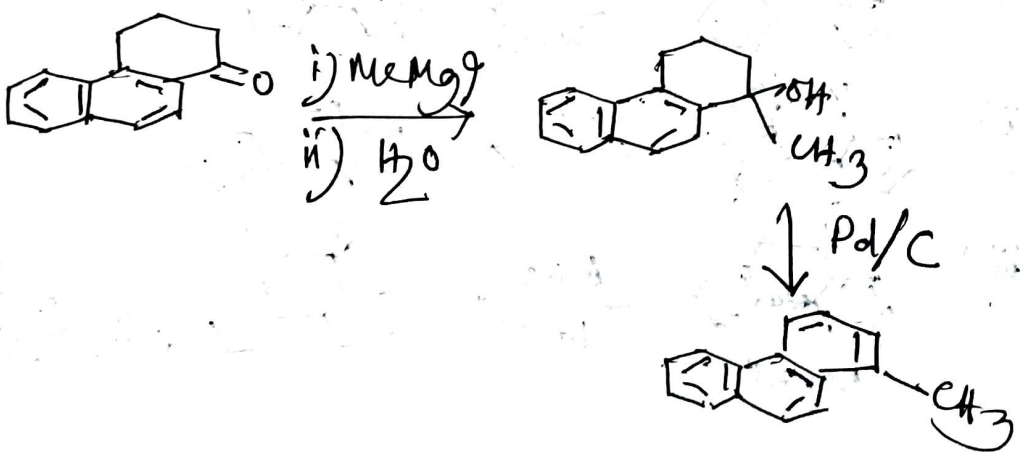
(iv) Pschorr synthesis:-

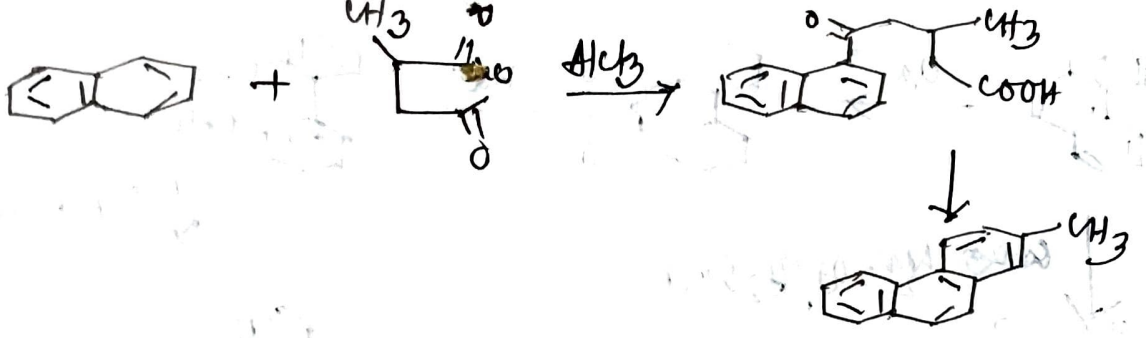


(N) Haworth synthesis:-

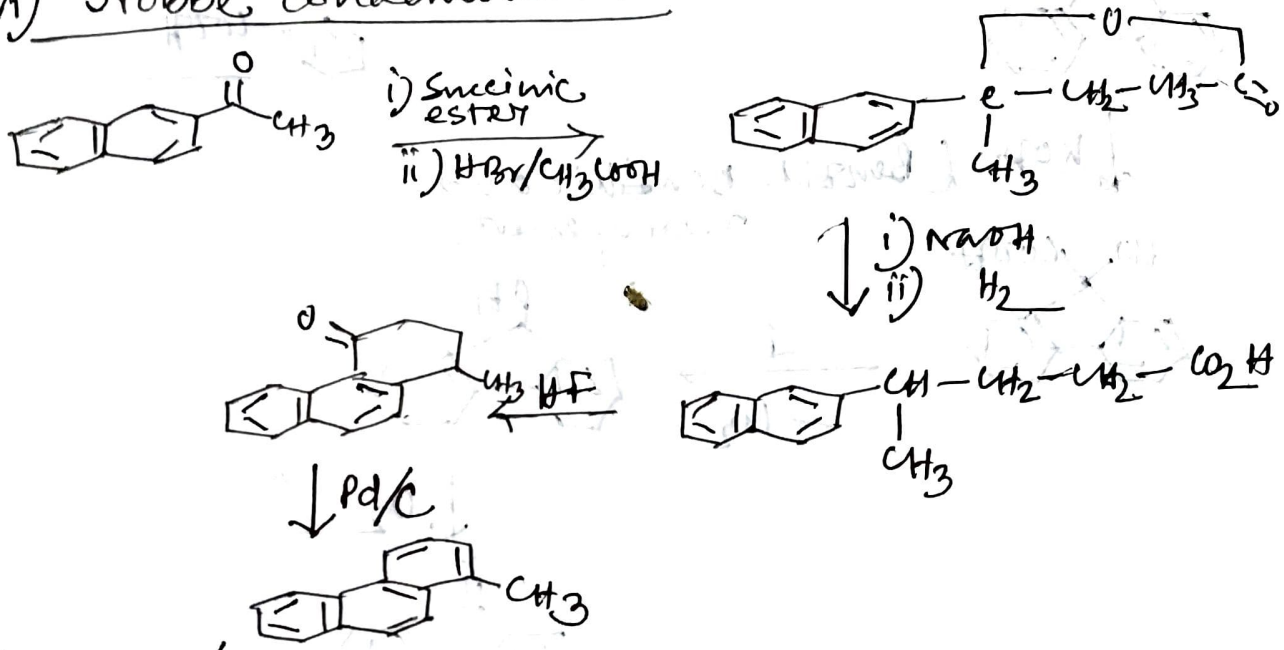


Haworth synthesis is very useful for preparing alkylphenanthrenes with the alkyl groups in known positions.

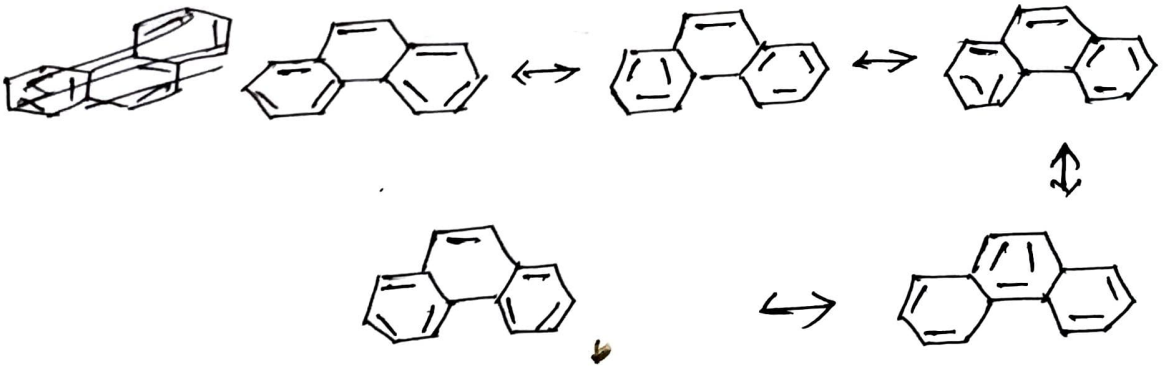




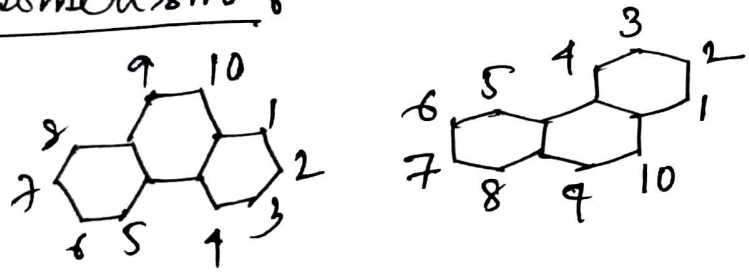
vi) Stobbe condensation :-



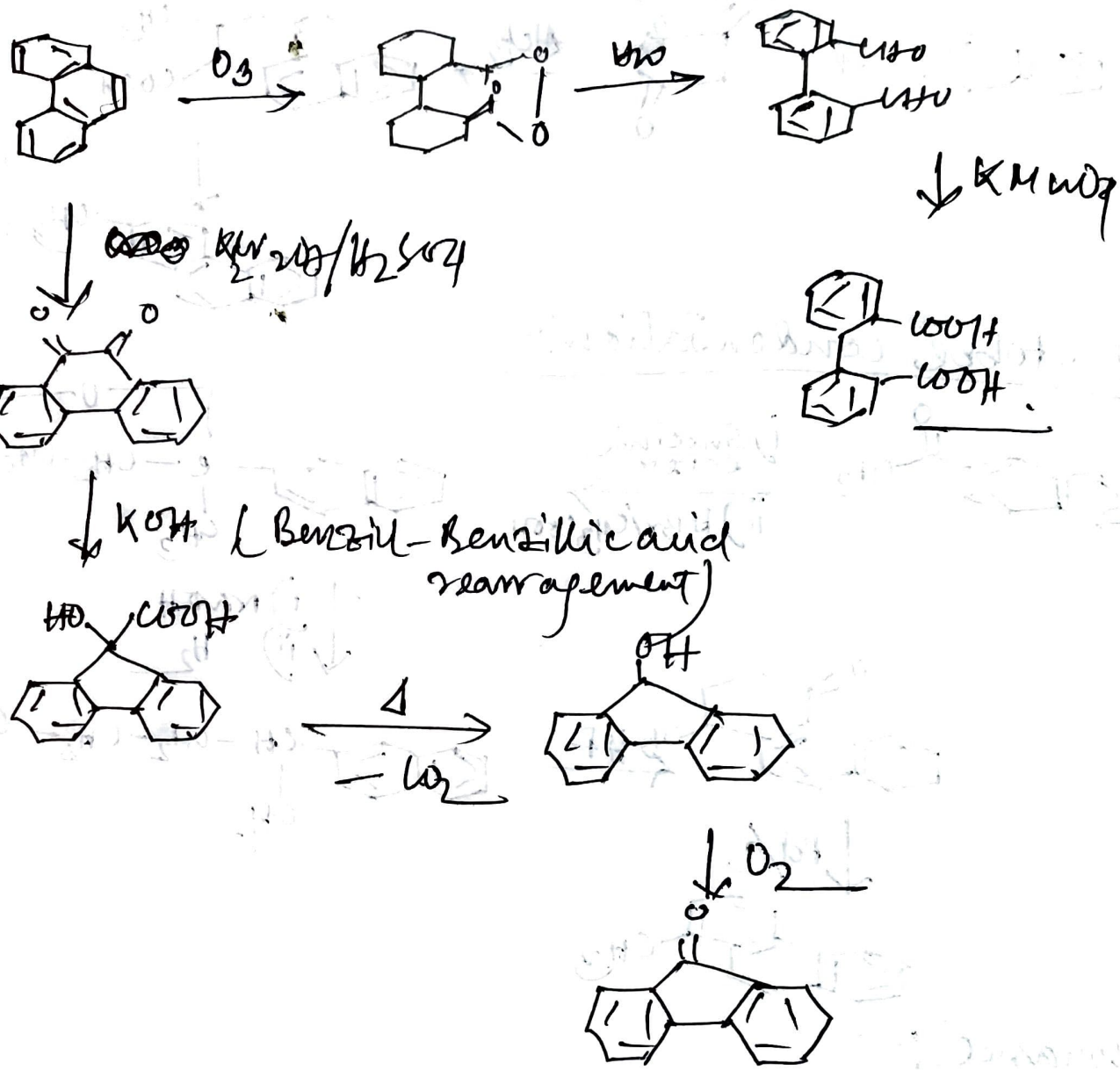
Resonance :-



Isomerism :-



Properties :- m.p. - 99°C, white solid.
9,10 - position is most reactive.
9,10 - have $\frac{1}{5}$ double bond character.


O_3
H_2O
CHO
CHO
$KMnO_4$
$K_2Cr_2O_7/H_2SO_4$
COOH
COOH
KOH
(Benzil-Benzilic acid rearrangement)
HO
COOH
OH
Δ
$-CO_2$
O_2