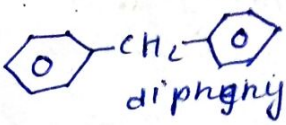
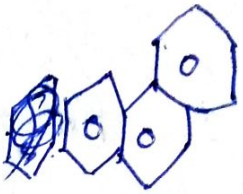
Unit IV

poly nuclear Hydrocorbons.

* Those compound in which more than two hydrocorbon aromatic rings are present. is called poly nuclear hydro corbon.

* On the basis of st. poly nuclear hydrocorbon is of two types :-

1. Isolated rings example -  diphenyl ,  diphenyl methyl

2. Fused Rings -   napthalene  Anthracine  phenothrene.

Napthalene 

molecular Formula - $C_{10}H_8$

m.w - 128

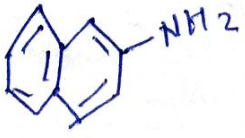
1. It is one of largest constituent of coaltar.
2. It is the simplest fused ring system.
3. It is a colourless crystaline solid having melting point 80°C
4. it is water insouble but soluble in organic solvent.

Derivatives of napthalene :-

(a) Mono substitution :-

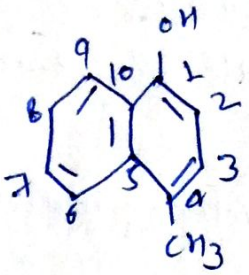
2-napthanol

2-napthalamine

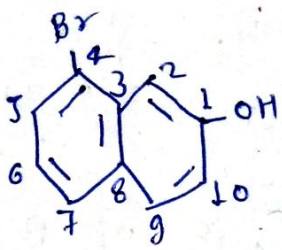


B-napthalamine

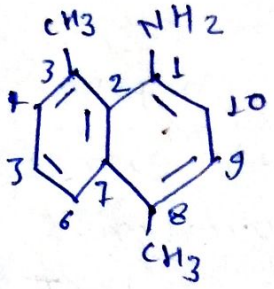
(b) poly substitution :—



4-methy napthol



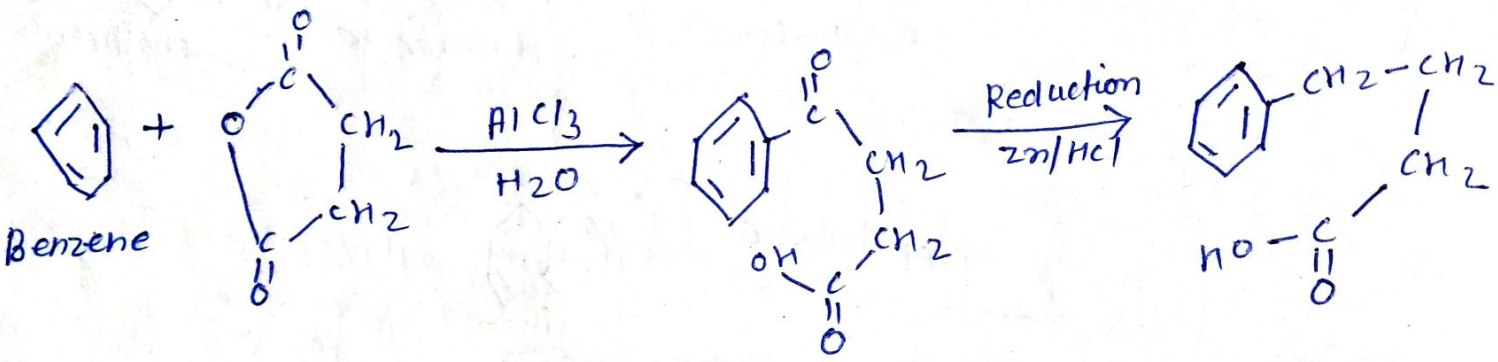
4-bromo napthol

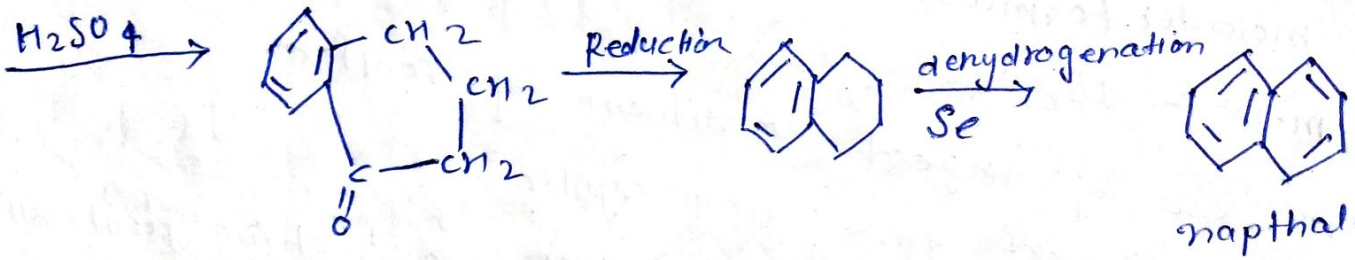


3,8-dimethyl napthalamine

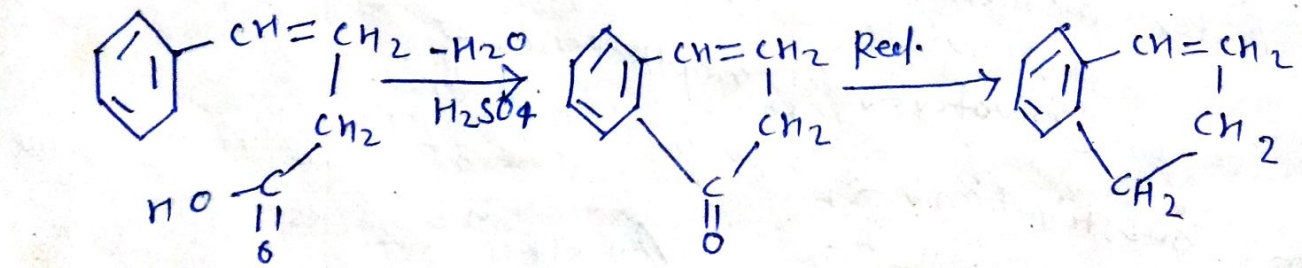
Synthesis of napthlene :—

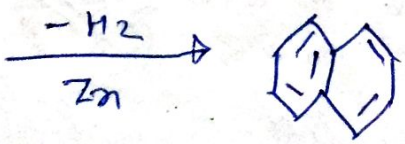
1. Haworth synthesis :—





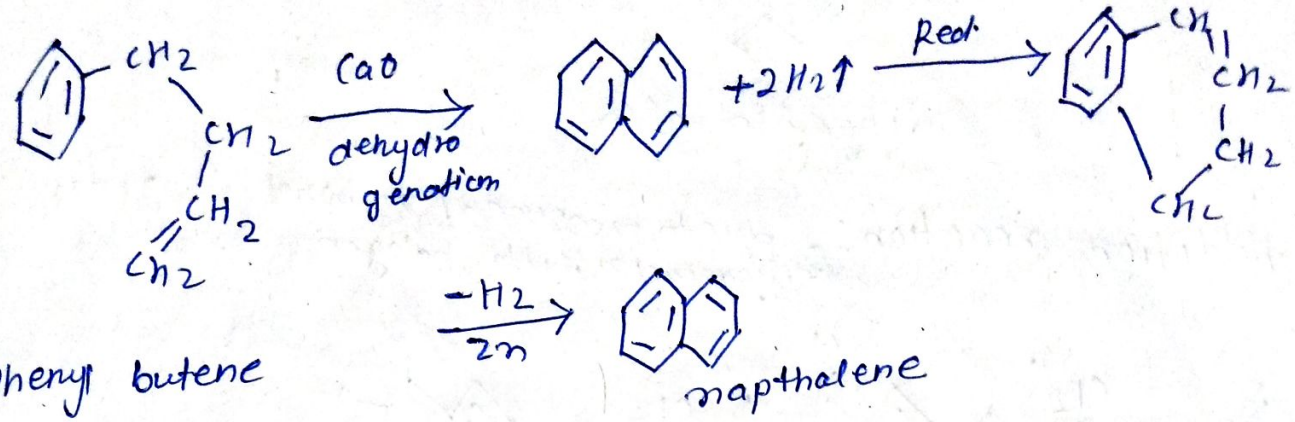
2. By phenyl butenoic acid :—





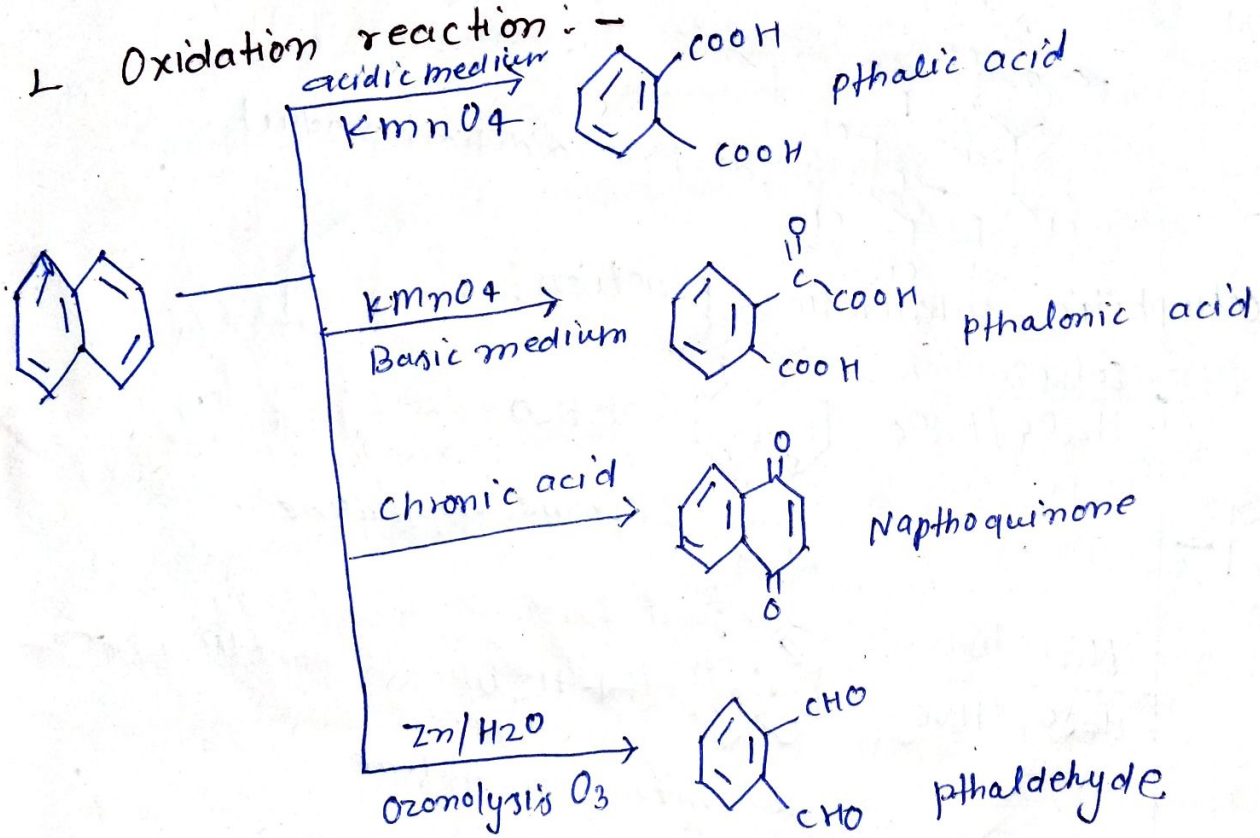
napthalene.

3. By phenyl butene :—

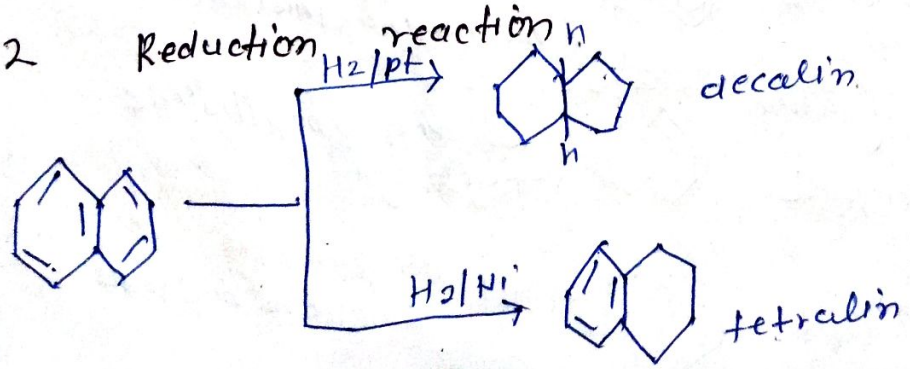


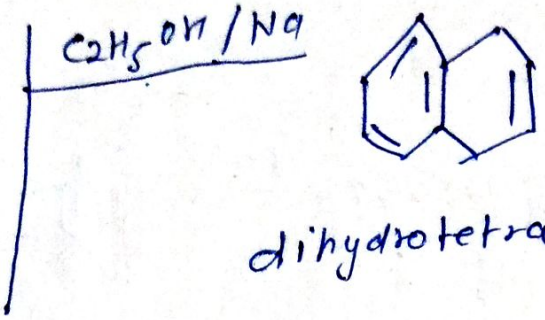
Chemical Reaction of napthalene

1 Oxidation reaction :—



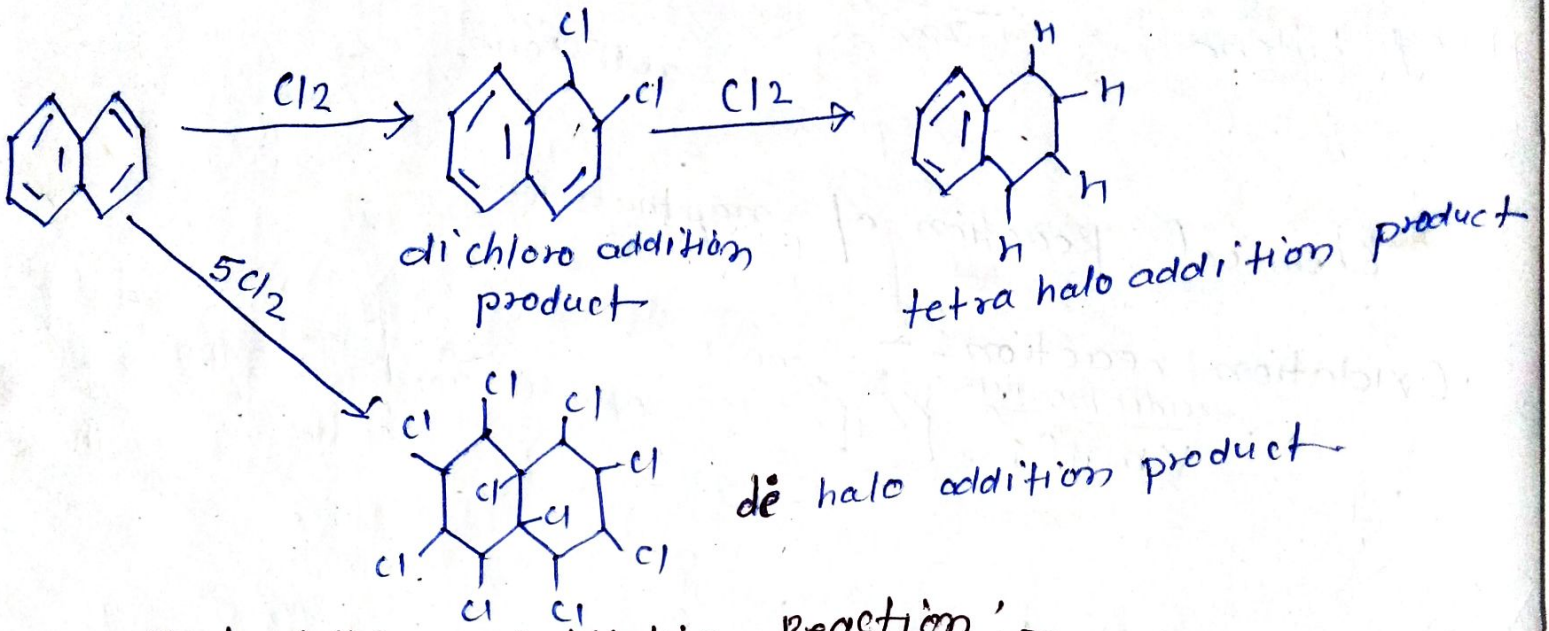
2 Reduction reaction





dihydrotetralen

3. Addition reaction :- due to presence of π bond it gives addition reactn with halogen.

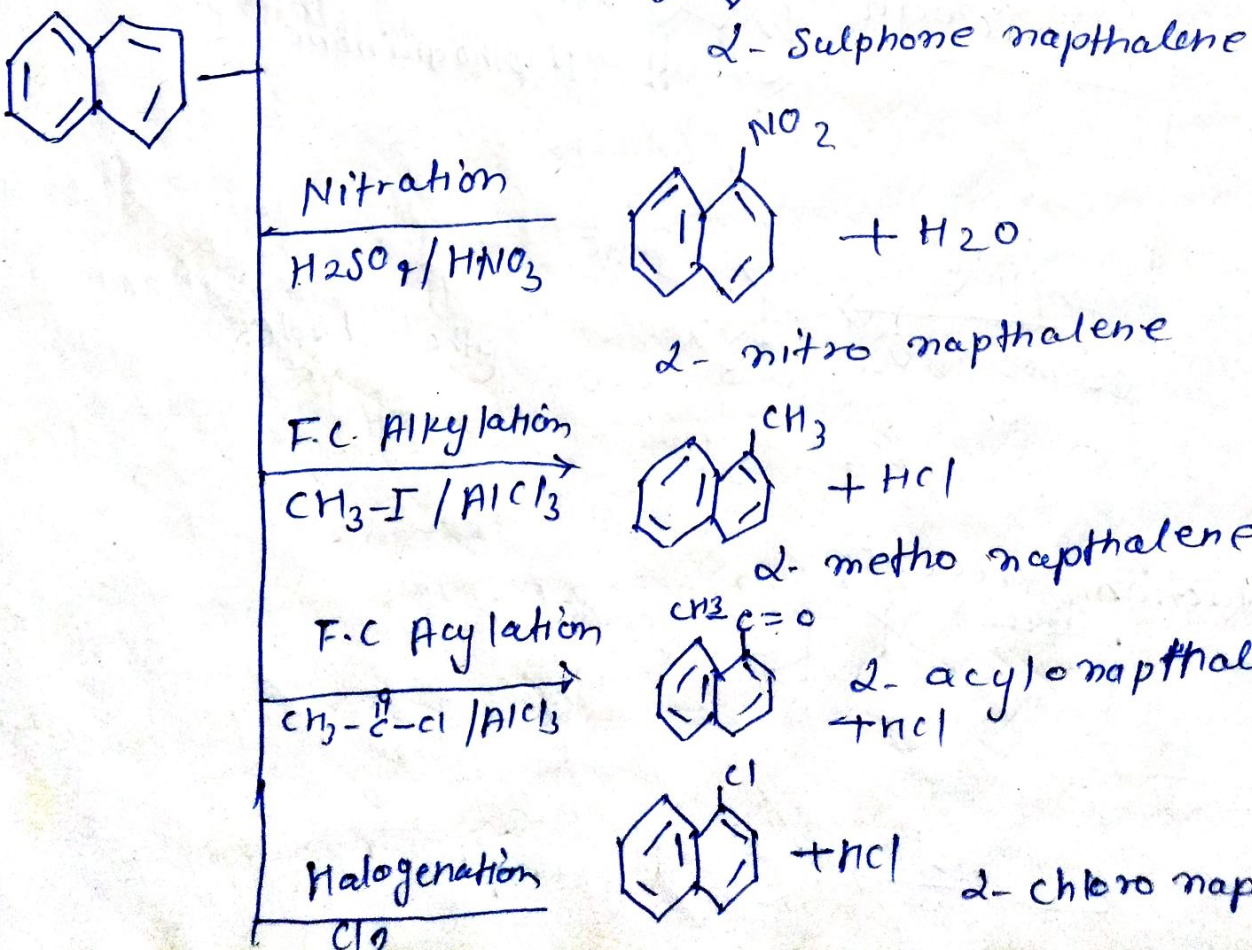


di chloro addition product

tetra halo addition product

de halo addition product

4 Electrophilic substitution Reaction :-



2- Sulphone napthalene

2- nitro napthalene

2- metho napthalene

2- acylonapthalene

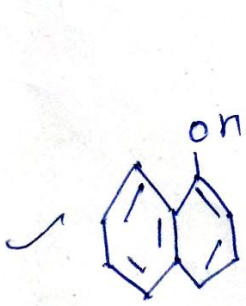
2- chloro napthalene

(5) Medicinal use of phenopthalene:-

± The napthalene and its other derivative are used as follows -

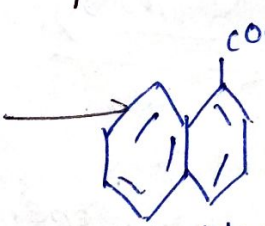
1. In the production pthalic anhydride.
2. In the synthesis of dyes (colour).
3. napthalene ring derivative carbarel drugs are used as insectisiide कीटनाशक.
4. Nadogelobb drugs is used a β-blocker.
5. Sulphonated napthalene is used as surfactant
6. Napthalene sulphonic acid are use to make plasticizers and natural rubber.
7. Also used in leather industry.
7. molten napthalene is used to solubilize the poorly soluble aromatic compounds.
8. In household napthalene is used as fumigant.
9. Napthalene is used in production of plastic and bear bottles.
10. Napthalene drugs are used int quiring the cough urin infection, eye trobble and fever

Derivative of Napthol.

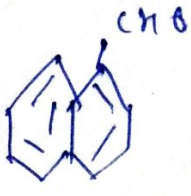


napthol

Napthalamine



Napthalinic acid

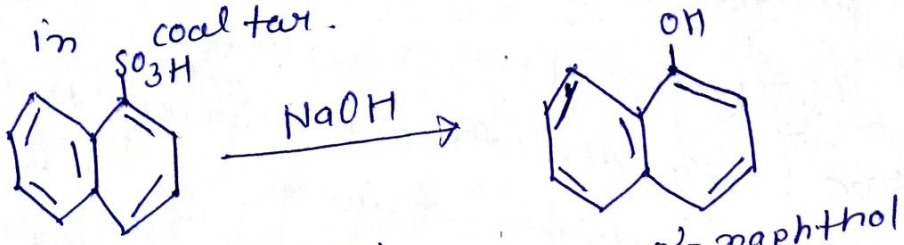


Napthaldehyde

Napthanone.

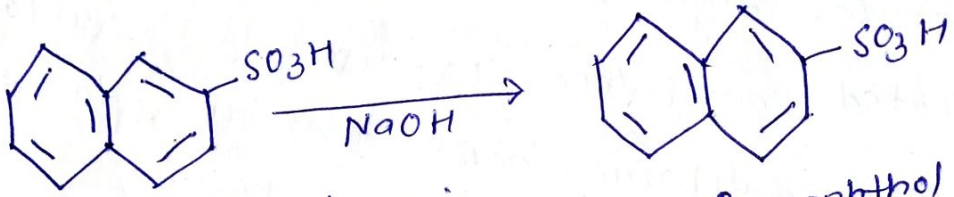
(A) Naphthols

Method of synthesis :- Two types of naphthols (α or β naphthol) occures in small quantities in coal tar.



Naphthalene-1 sulphonic acid.

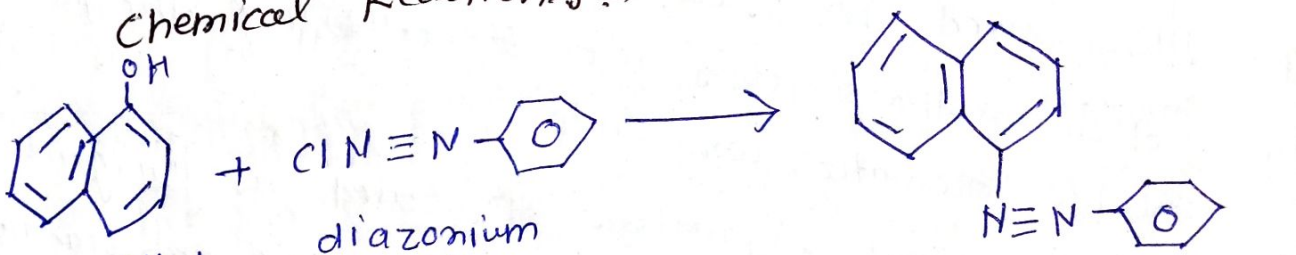
2-naphthol



Naphthalene-2 sulphonic acid.

β-naphthol

Chemical Reactions :-



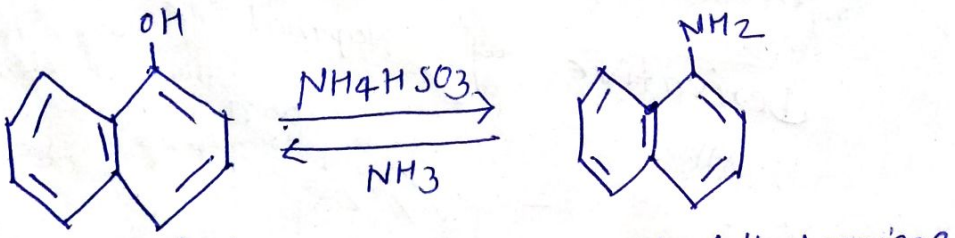
1-naphthol

diazonium salt

4-phenylazo-1-Naphthol

(B) Naphthylamine :-

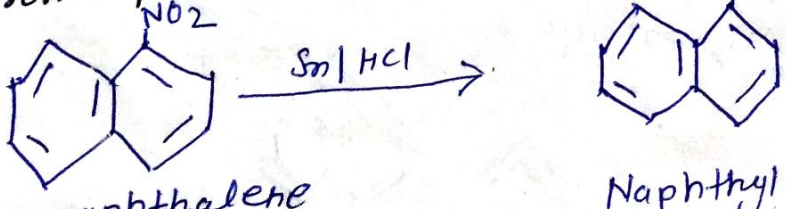
(i) Synthesis (a) From naphthol (Bucherec reaction)



Naphthol

Naphthylamine

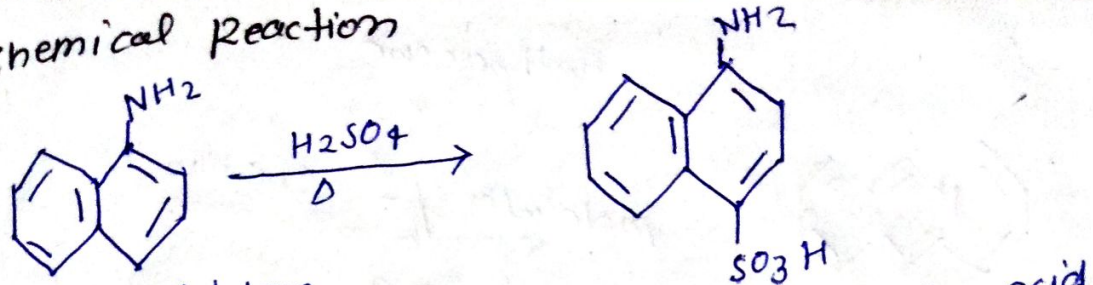
(b) From Nitro Naphthalene.



Nitro naphthalene

Naphthylamine

Chemical Reaction

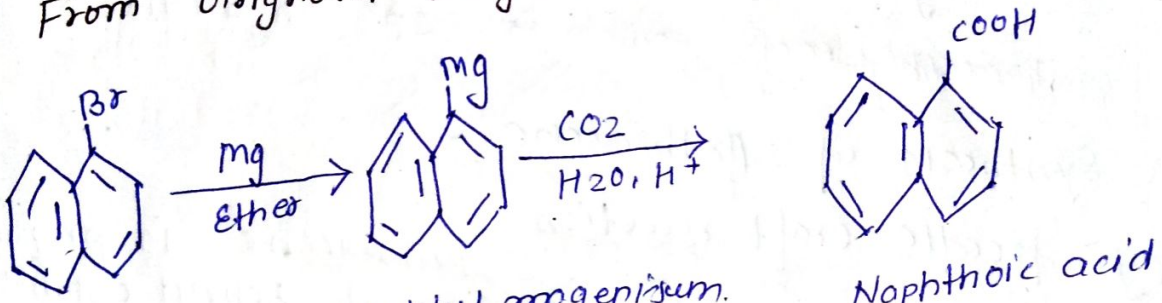


Nitronaphtalene — Naphthionic acid

Naphthoic acid

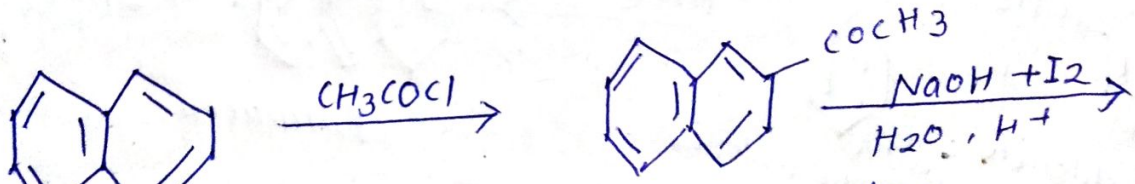
method of synthesis :-

(i) From Grignard Reagent

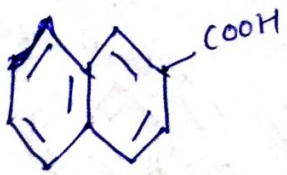


Bromo napthalene — Naphtyl mogenisum bromide — Naphthoic acid

(ii) By Iodoform Reaction :-



Naphthalene — Acetyl napthalene

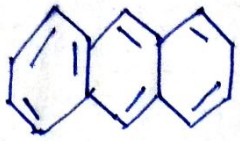


+ CHI_3

Bi product

Naphthoic acid

Anthracene



molecular :- $C_{14}H_{10}$

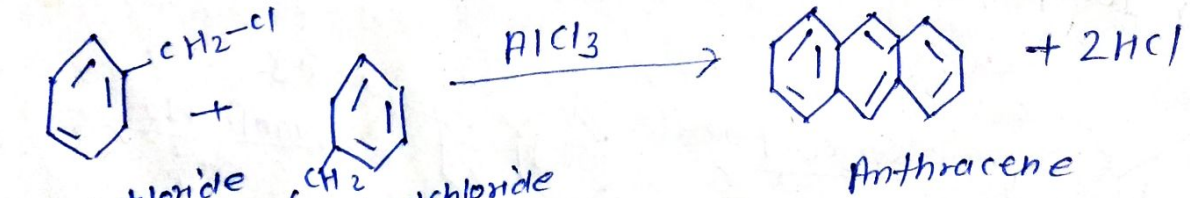
m.w - 178

Anthracen composed of three fused benzene ring and it is obtained from coaltar.
it is a colourless solid polycyclic aromatic hydrocarbon and shows, blue fluorescence in U.V light.
The melting point of anthracene is 218 °c.
In anthracene each corbon is sp^2 hybridize.

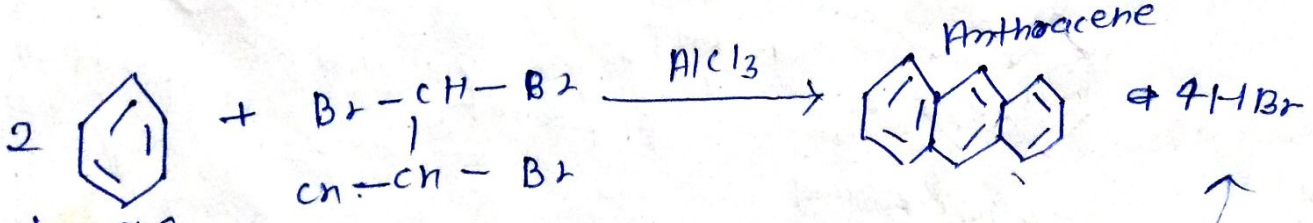
Synthesis of Anthracene :-

1. By freedle craft reaction

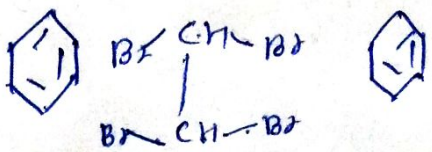
Anthracene is prepared by condensation of two molecules of benzyl chloride in the presence of aluminium tri chlorid ($AlCl_3$)



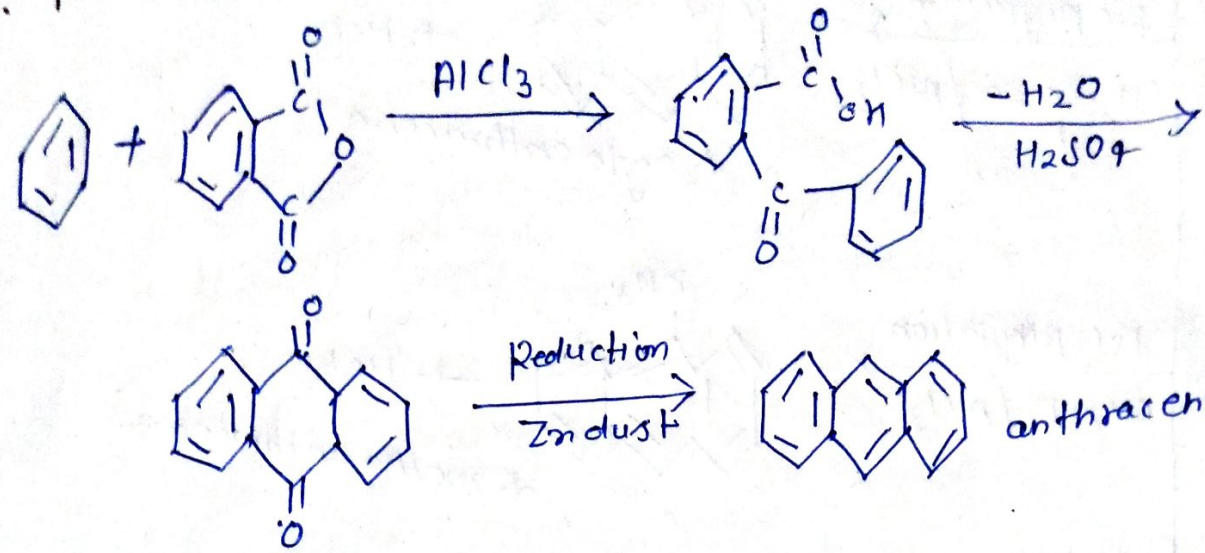
2. From benzene :-



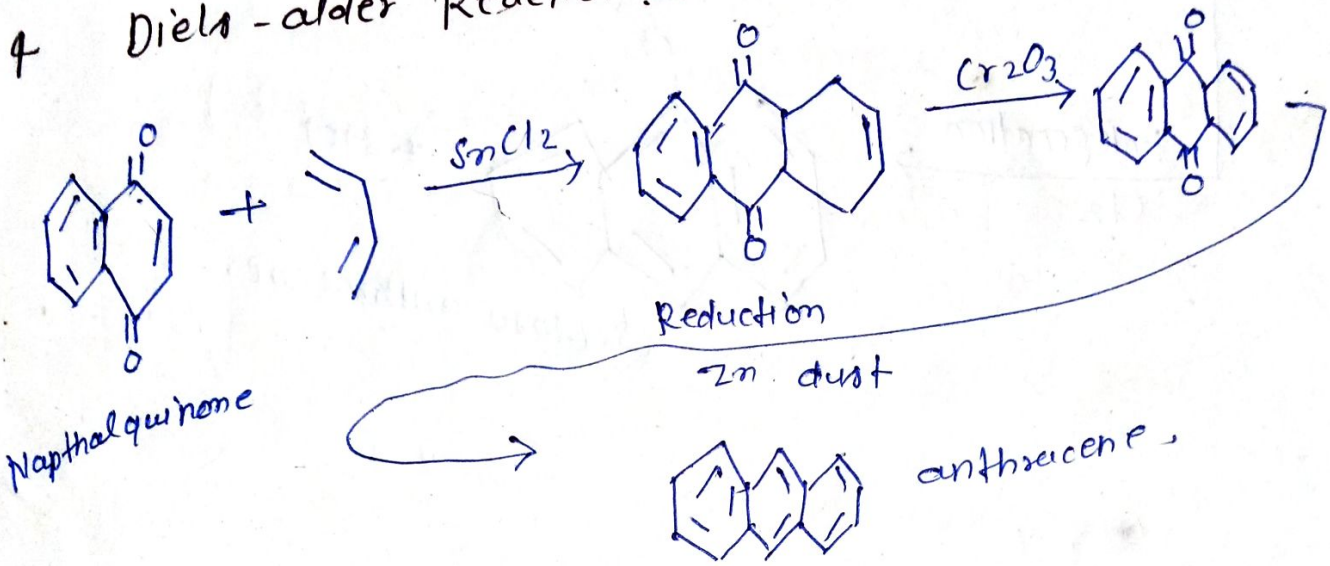
mech-



3. From pthalmic anhydride:-

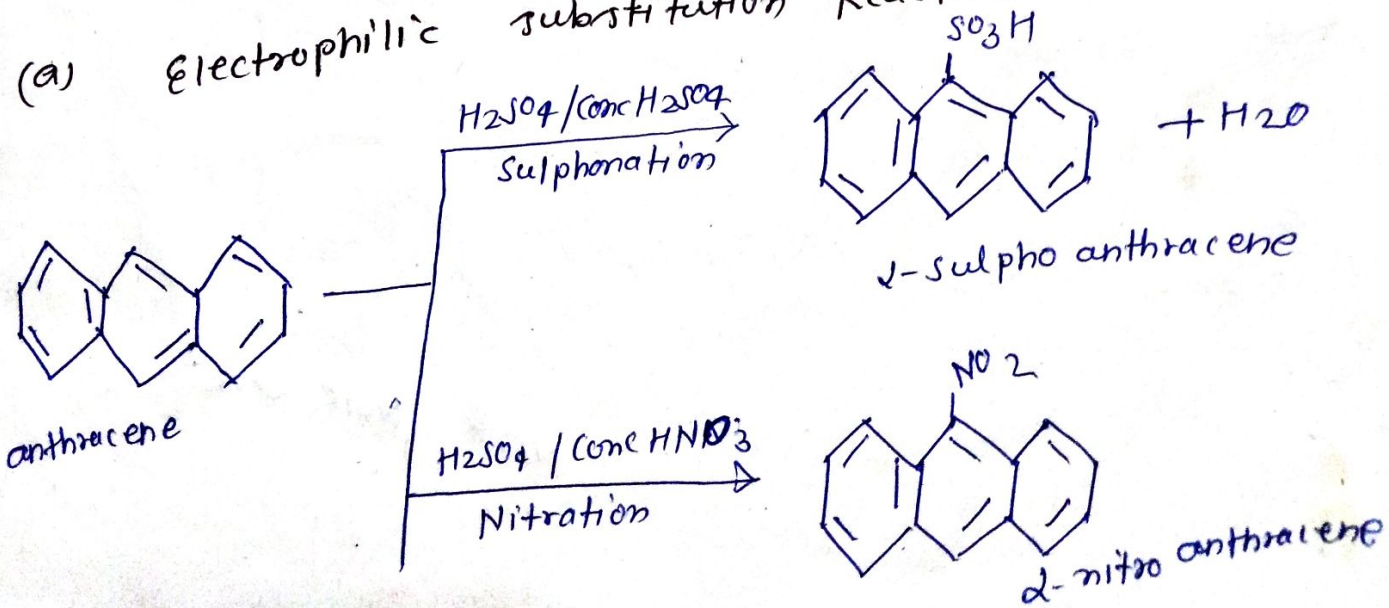


4 Diels-alder Reaction:-



Chemical Reaction of Anthracene:-

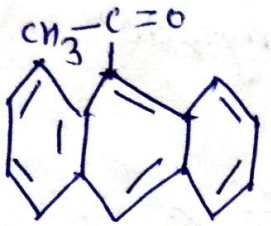
(a) Electrophilic substitution Reaction -



F.C Acylation

$CH_3-C=O$ / $AlCl_3$

I

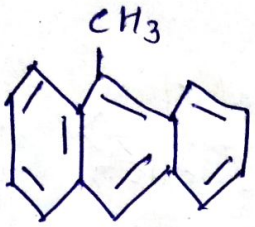


+ HCl

2- aglo anthracene

F.C Alkylation

CH_3-I / $AlCl_3$

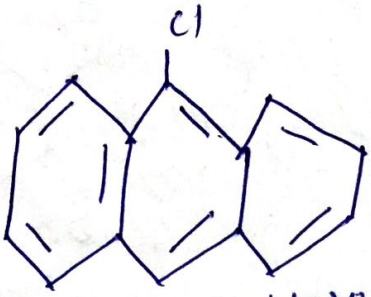


+ HCl

2- metho anthracene

Halogenation

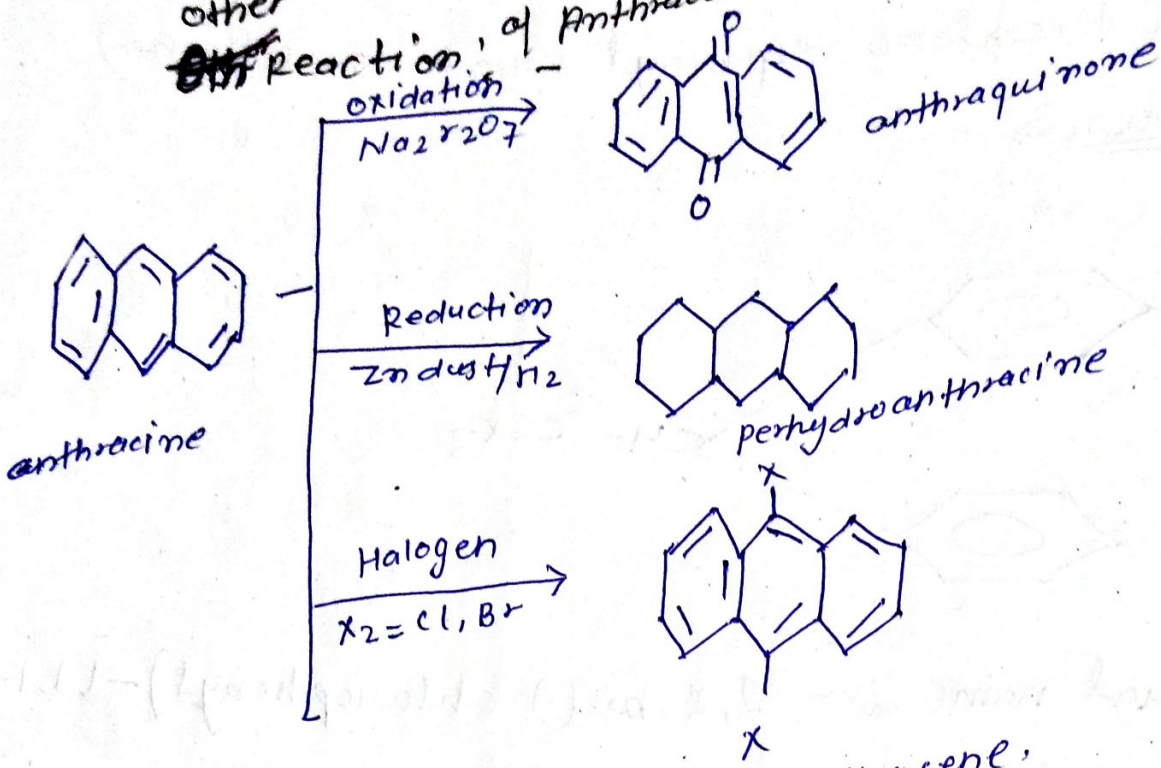
Cl_2



+ HCl

2-chloro anthracene.

other reaction of Anthracene :-

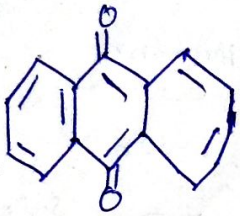


di halo anthracene.

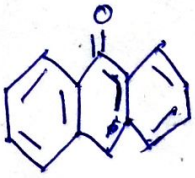
Use of Anthracene :-

* It is used a wood preservative and insecticid for crop.
* Antracine's derivative anthraquinone is used as dye.
* It is used as scintillator for detecters of high energy photan e^- and α-particles.
* Various derivative of anthracine have diff. pharmacological action show use as drugs. eg- emodine- pergative, elizarine - spasmolitise action.
* Some natural drugs like senna, casera & elloy contain anthraquinonon
* it has anti malerial, antibiotic, antifungal & anti HIV activities.

Derivative of Anthracine

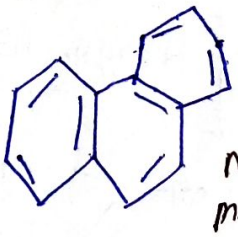
1. 

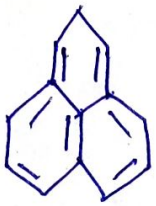
Anthraquinone

2. 

Anthrone.

Phenanthrene :-





m.f - $C_{14}H_{10}$
m.w. 178

1 It is a colourless crystaline substance obtain from coaltar and it is isomeric form of anthracene

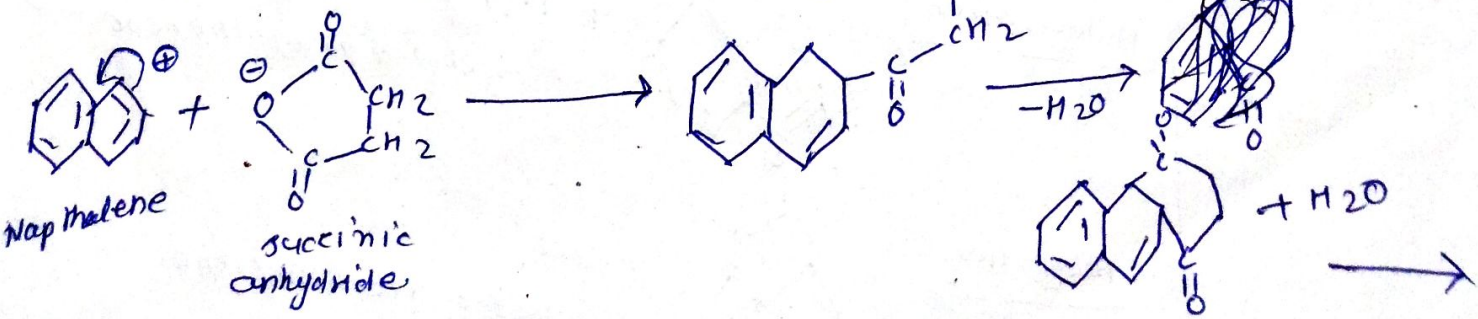
2 it is fused ring angular poly hydrocorbon.

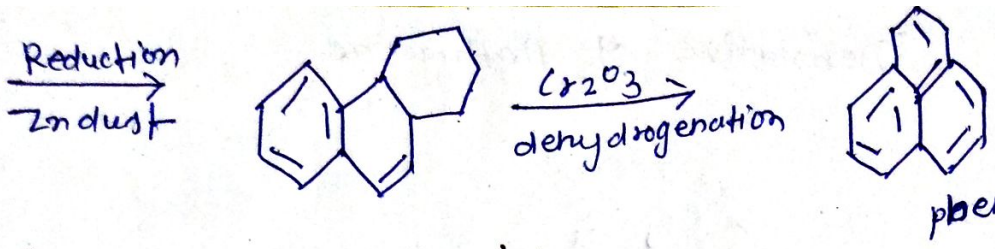
phenanthrene is more reactive than anthracene and its soln in benzen gives blue colour.

They are aromatic in nature and each corbon is sp2 hybridize.

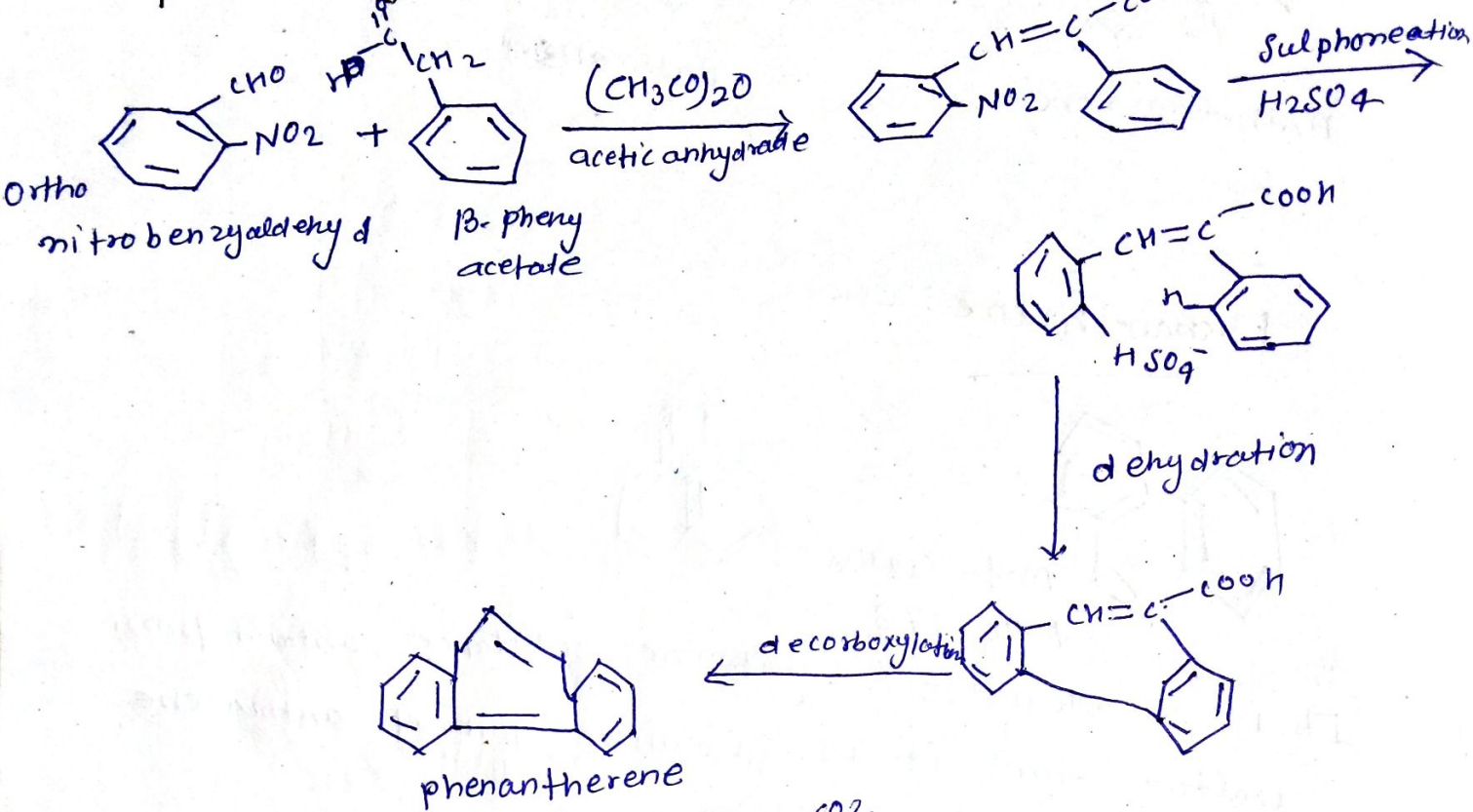
Method of synthesis :-

(i) Haworth synthesis



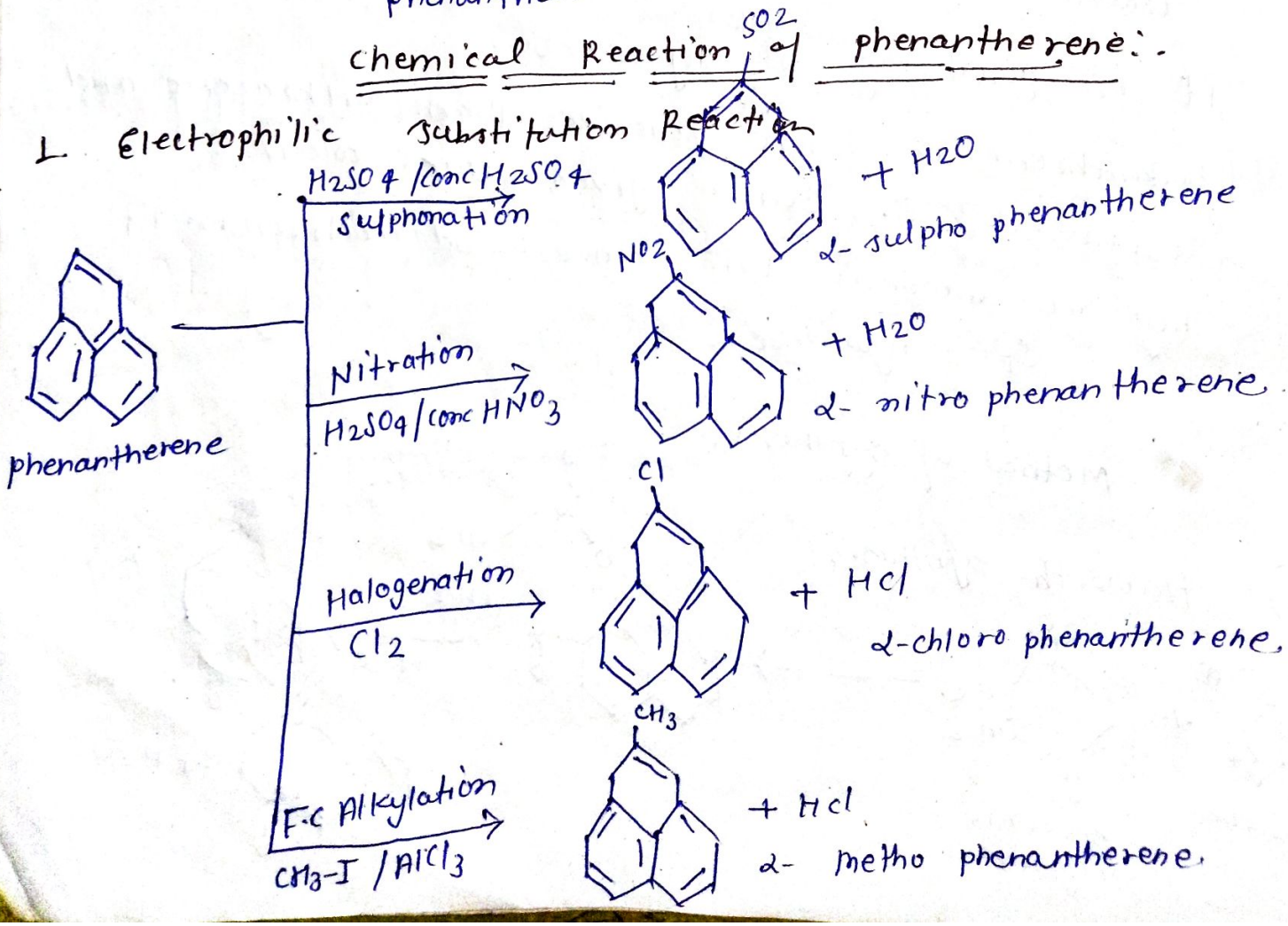


2 pschorr synthesis: -

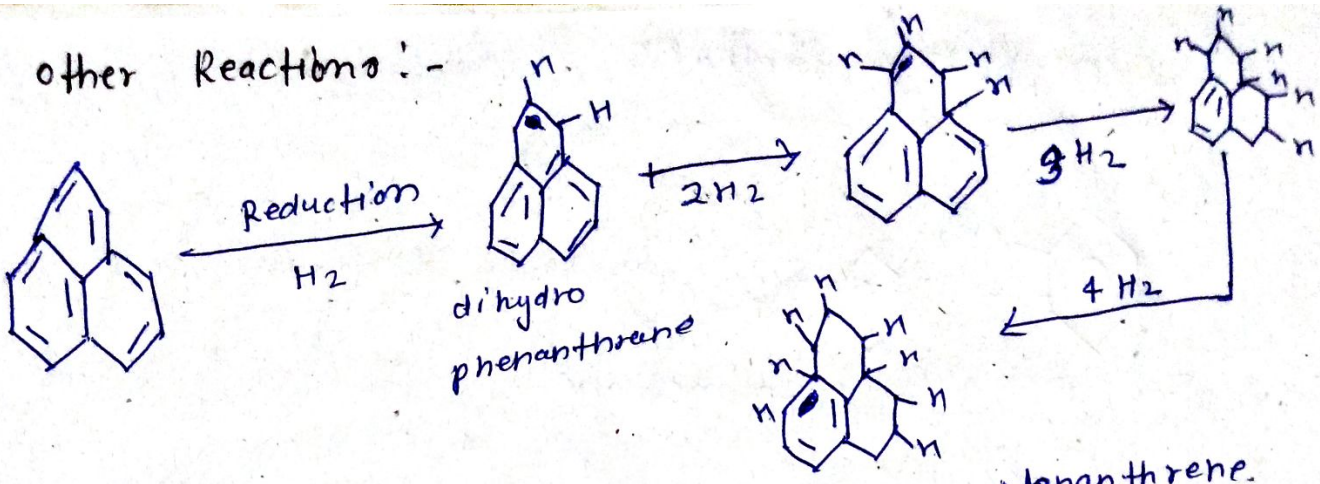


Chemical Reaction of phenantherene:-

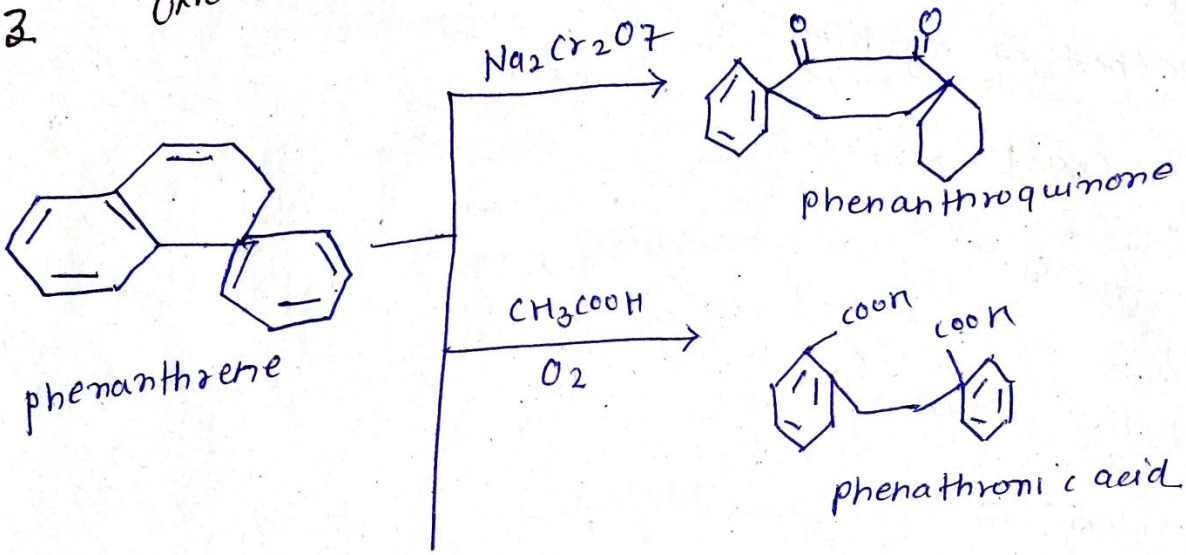
1. Electrophilic substitution Reaction



2. other Reactions :-

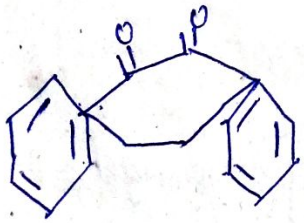


3. Oxidation Reaction



Derivative of phenanthrene :-

Phenanthroquinone

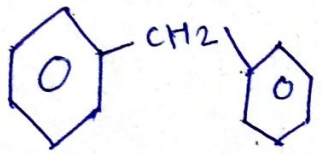


Dihydrophenanthrene di-one.

it is organe solid which is odourless, and not steam volatile. It can be synthesized as follow :-

it is prepared by phenanthrene with $Na_2Cr_2O_7$, CH_3COOH as a catalyst formed phenanthrenequinone.

Di phenyl methane.



diphenyl methane

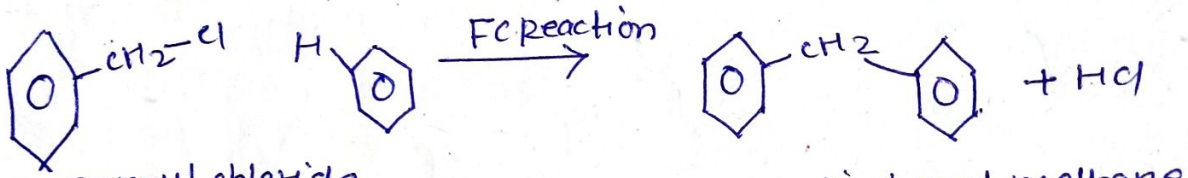
$(C_6H_5)_2CH_2$

m.f. $C_{13}H_{12}$

M.w - 168.0

Method of synthesis :-

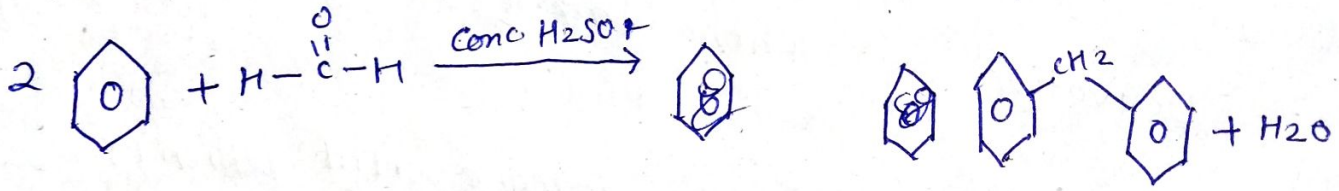
1. Freedle craft reaction :-



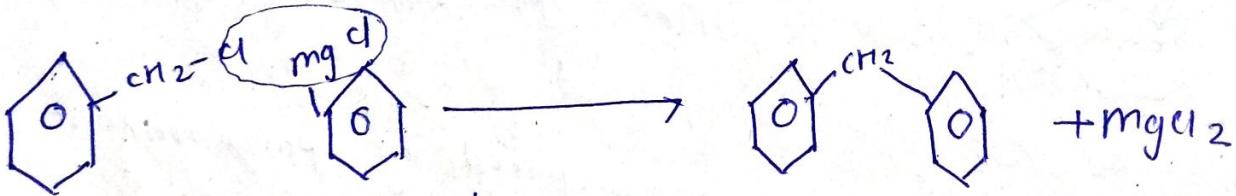
Benzyl chloride

di phenyl methane

2. By condensation of formeldehyde :-

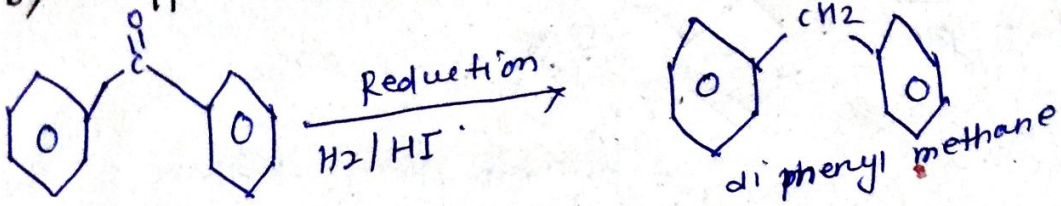


3 From grignard reagent :-



Benzyl chloride grignard reagent di phenyl methane

4. By wolff-kishner Reaction:-

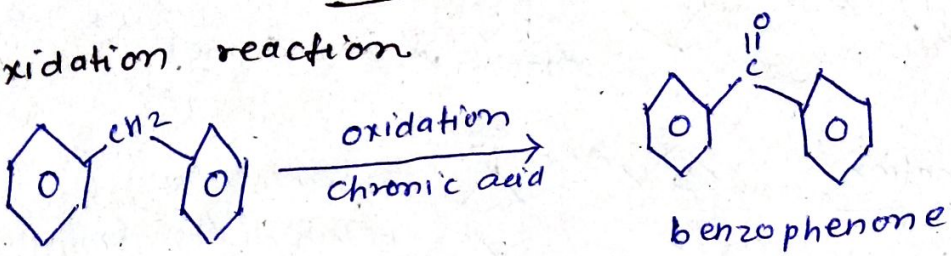


Benzophenone

diphenyl methane

Chemical reaction of diphenyl methane:-

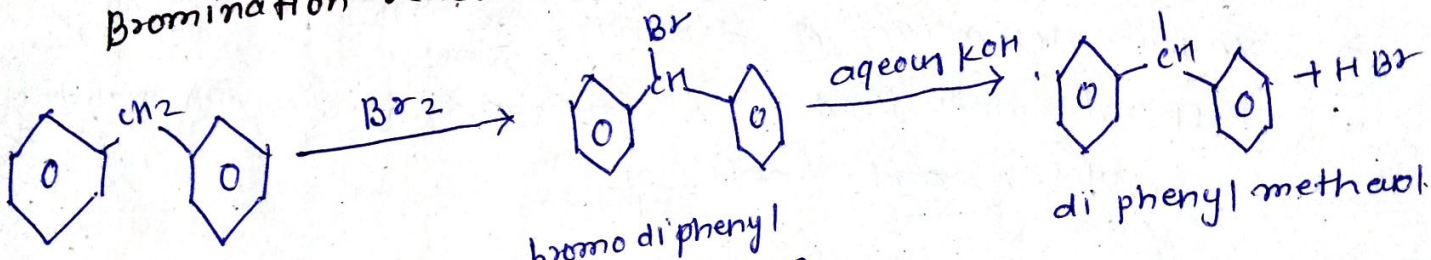
1. oxidation reaction



diphenylmethane.

benzophenone

2. Bromination reaction:-

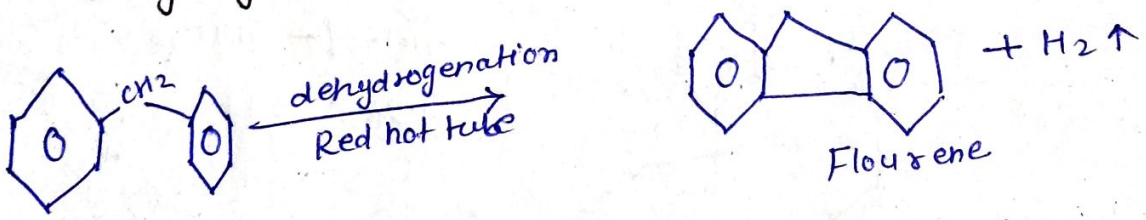


diphenyl methane

bromo diphenyl methane

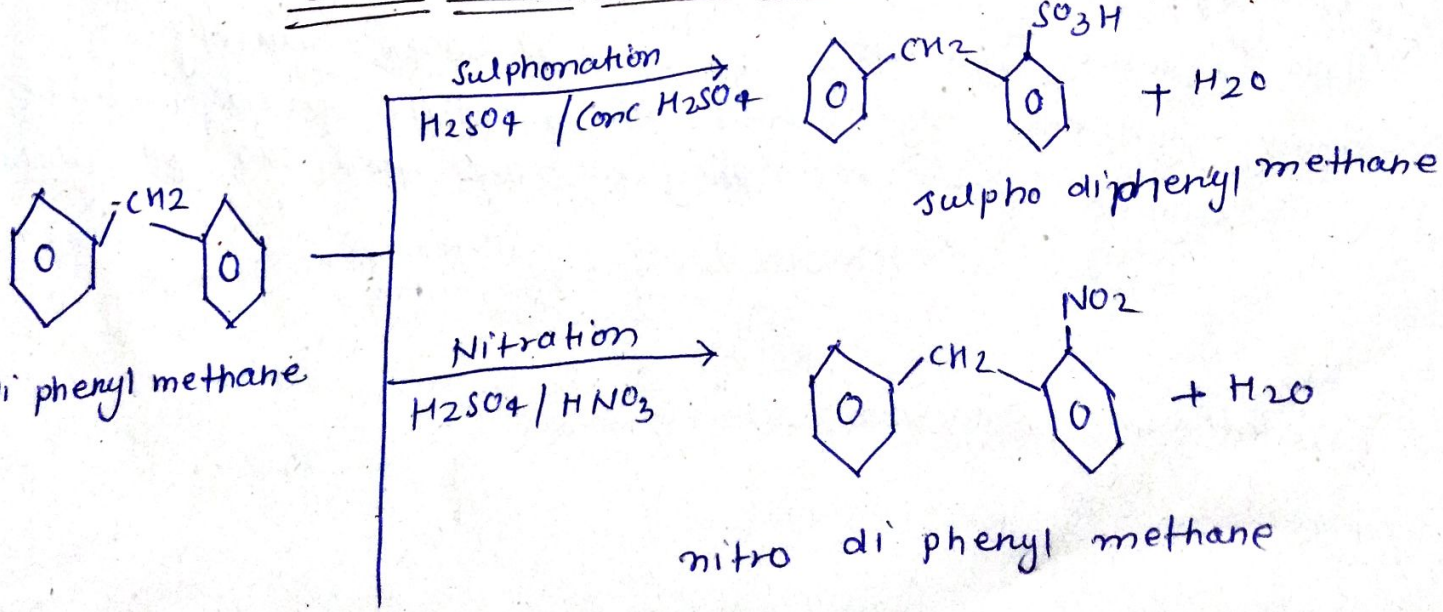
diphenyl methanol

3. Dehydrogenation Reaction:-



Flourene

Electrophilic substitution reaction:-



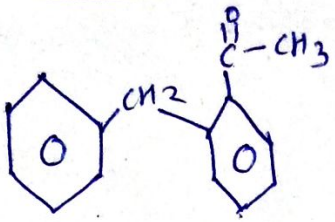
diphenyl methane

sulpho diphenyl methane

nitro diphenyl methane

F.C Acylation

$CH_3-\underset{\underset{O}{\|}}{C}-I / AlCl_3$

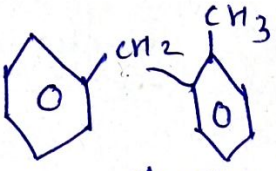


+ HCl

Acylo di phenyl methane

F.C Alkylation

$CH_3-I / AlCl_3$

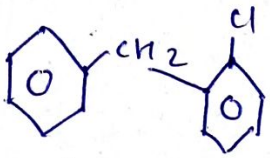


+ HCl

ortho di phenyl methane

Halogenation

Cl_2



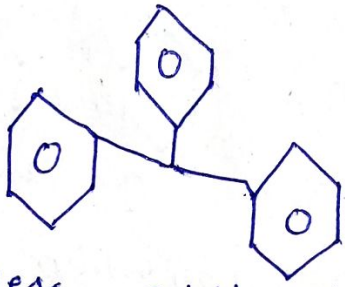
+ HCl

Chloro di phenyl methane

Use of diphenyl methane:-

* Various derivative of diphenyl methane have been prepared and used as antispasmodic (ऐंठन), anti diabetic, ant ulcer. and anti anxiety (चिंता)

Triphenyl methane:-



mol. f- $C_{19}H_{16}$

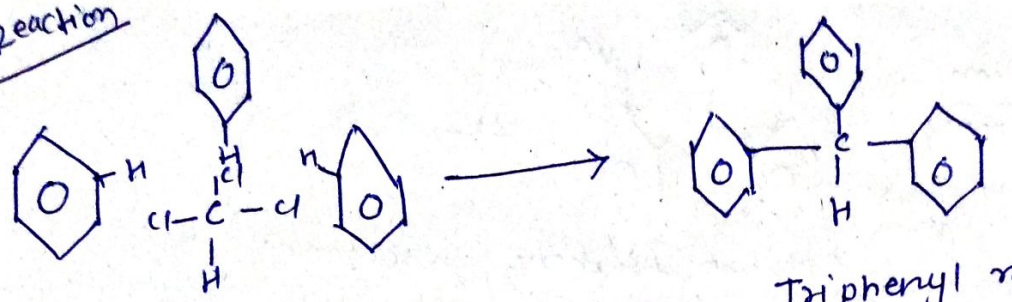
m.w - 244

it is a colourless solid which is solube in non-polar organic solvent. it is the basic moiety of many synthetic dye such as malachite green, magenta, crystal vilot etc. they all are used as pH indicato

Method of synthesis:-

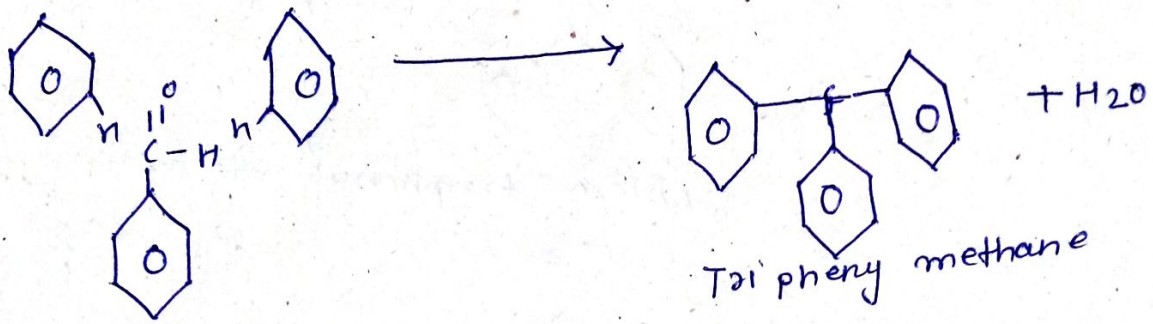
1. Friedal craft reaction:-

F.C. Reaction



Triphenyl methane.

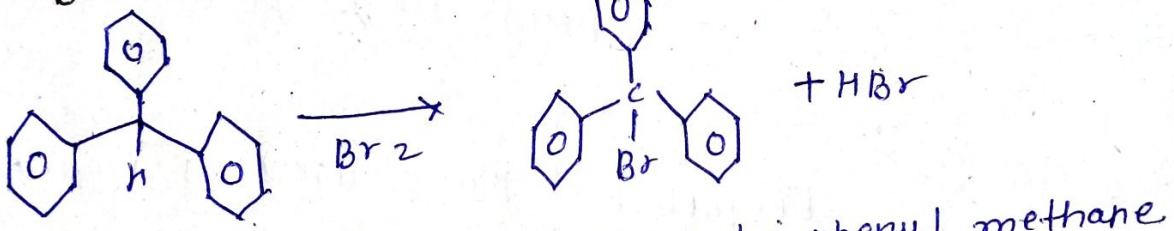
(ii) From benzylaldehyde :-



Triphenyl methane

Chemical reactions of Triphenyl methane

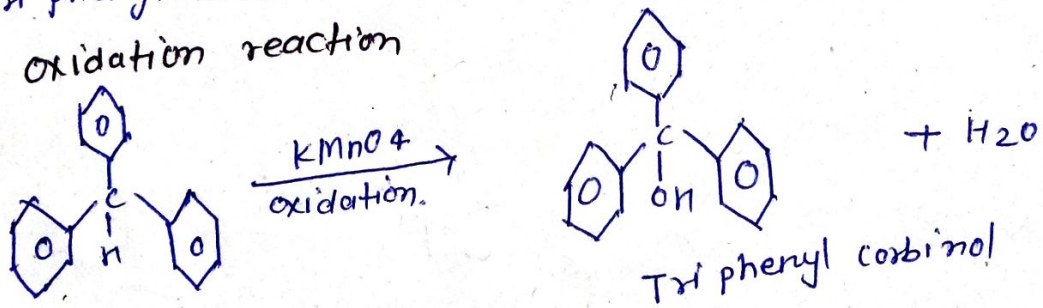
1. Bromination :-



Triphenyl methane

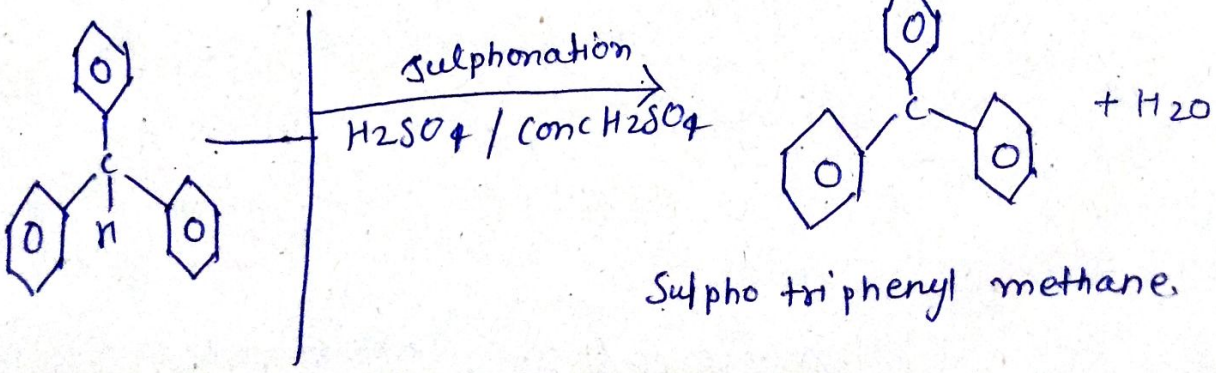
bromo. triphenyl methane

2. Oxidation reaction



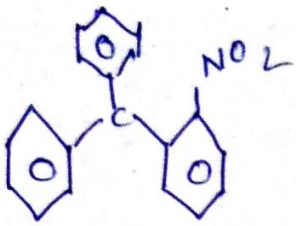
Triphenyl carbinol

3. Electrophilic substitution Reaction



Sulpho triphenyl methane.

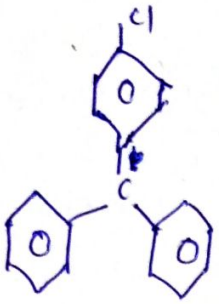
Nitration
H_2SO_4 / HNO_3



+ H_2O

Nitro tri phenyl methane

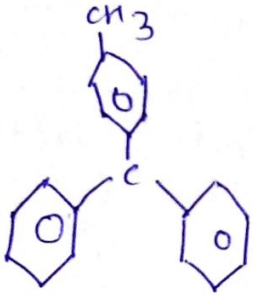
Halogenation
Cl_2



+ HCl

Chloro tri phenyl methane

F.C Alkylation
$CH_3-I / AlCl_3$



metho tri phenyl methane

use :- Tri phenyl methane are used as indicator