DEGREE-II (HONS.)

20/10/2020

TOPIC - PREPARATION, PROPERTIES & USES OF BENZENE DIAZONIUM CHLORIDE.

~ ARENEDIAZONIUM SALTS ~

* This important class of compounds is characterized by the presence of the functional group $-\overset{+}{N}\equiv N$ (diazonium ion) directly bonded to an aryl group.

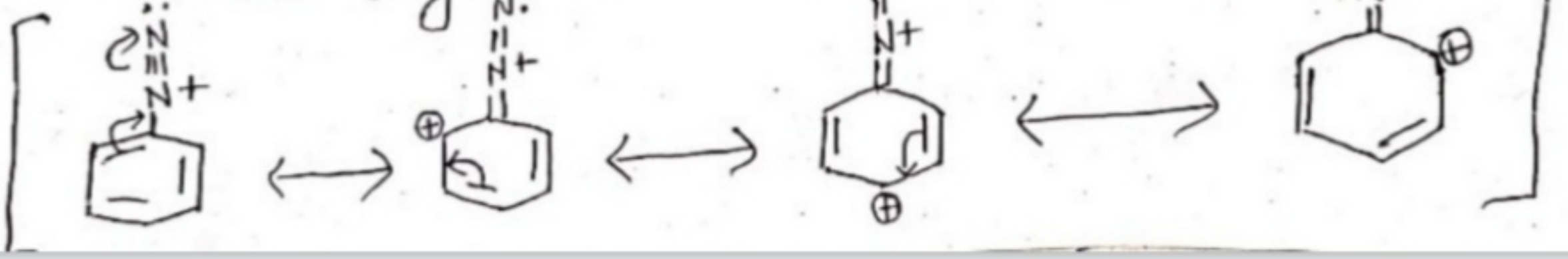
* The arenediazonium ion, $Ar-\overset{+}{N}\equiv N$, forms salts with anions such as Cl^-, Br^-, NO_2^-, HSO_4^-, BF_4^- etc.

These salts are called Arenediazonium salts.

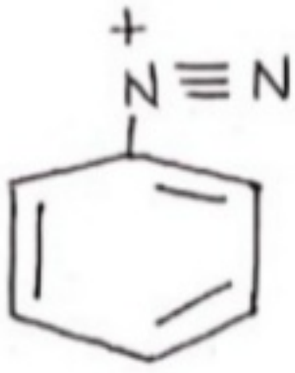
$$[Ar-\overset{+}{N}\equiv N:]\,X^-$$

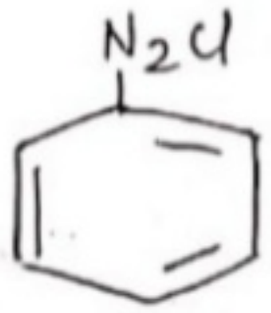
Arenediazonium salt

* Arenediazonium salts are more stable than alkyldiazonium salts ($R-\overset{+}{N_2}\,X^-$) due to resonance involving the benzene ring.



In this section we will study the preparation and properties Of Benzene diazonium chloride.



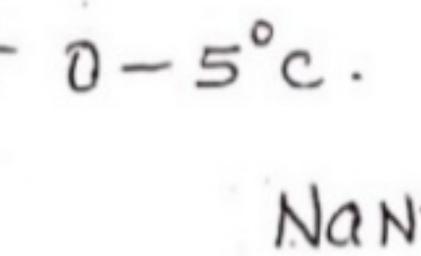
, Generally written as 

PREPARATION OF BENZENE DIAZONIUM CHLORIDE

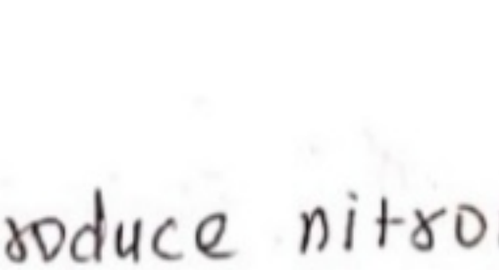
Benzenediazonium Chloride is prepared by treating a solution of aniline in dil. HCl with sodium nitrite solution at 0–5°c.

$NaNO_2$ reacts with HCl to produce nitrous acid (HNO_2). The nitrous acid then reacts with aniline to give the diazonium salt.

$$NaNO_2 + HCl \longrightarrow HNO_2 + NaCl$$



$$+ HNO_2 + HCl \xrightarrow{0-5^\circ C}$$



$$+ 2H_2O$$

Benzene diazonium chloride

* This reaction is called diazotization reaction.

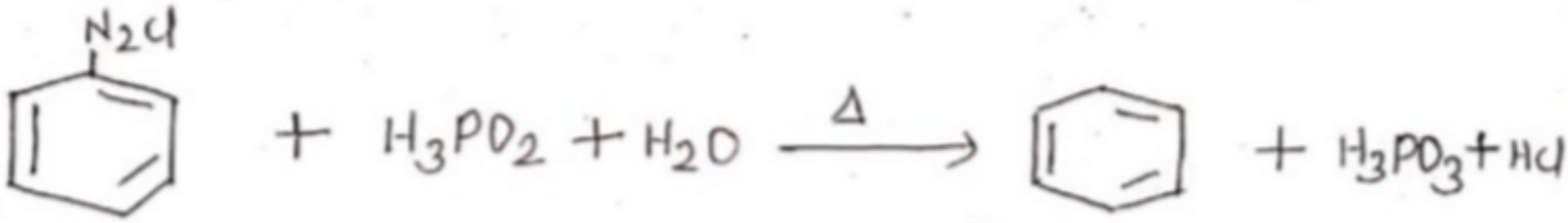
PHYSICAL PROPERTIES

1. It is colourless, crystalline solids which turn brown on exposure to air.
2. Most of them are unstable and explode when warmed.
3. They are soluble in water, sparingly soluble in ethanol and glacial acetic acid.

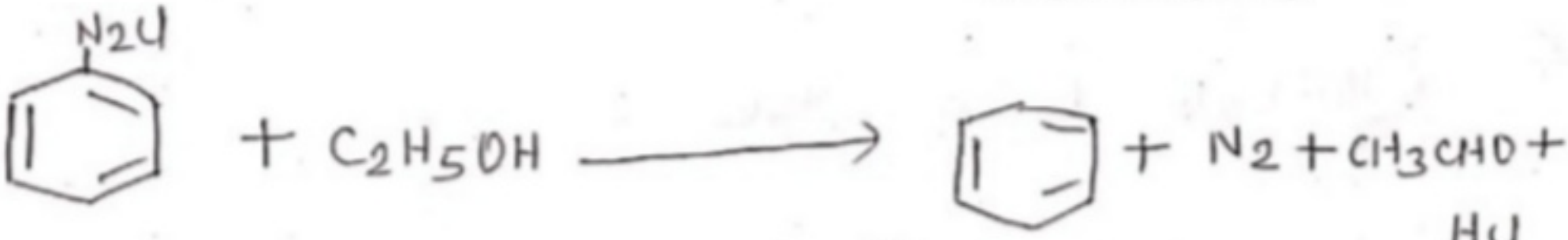
CHEMICAL PROPERTIES

Reaction in which N2X is Replaced

1. Reduction to Benzene

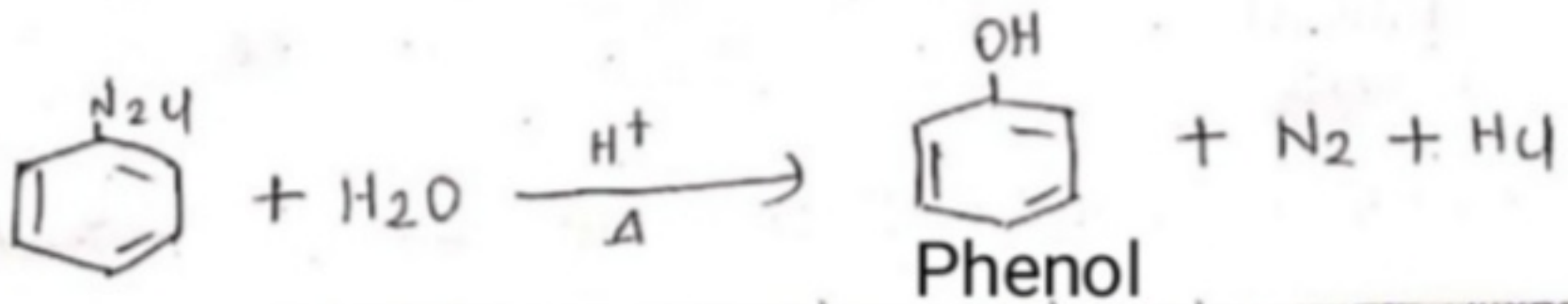


Benzene



Benzene

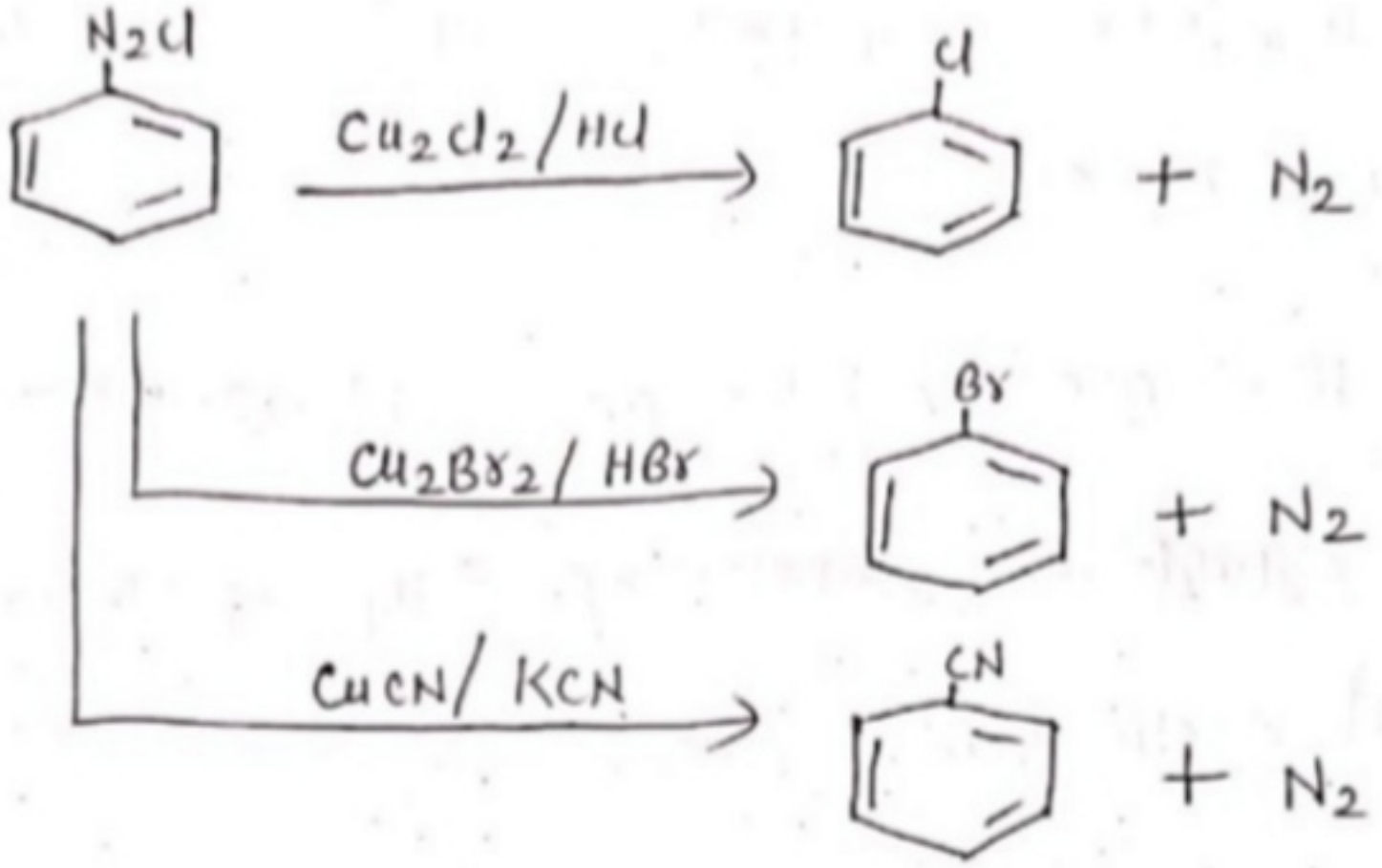
2. Synthesis of Phenol



Phenol

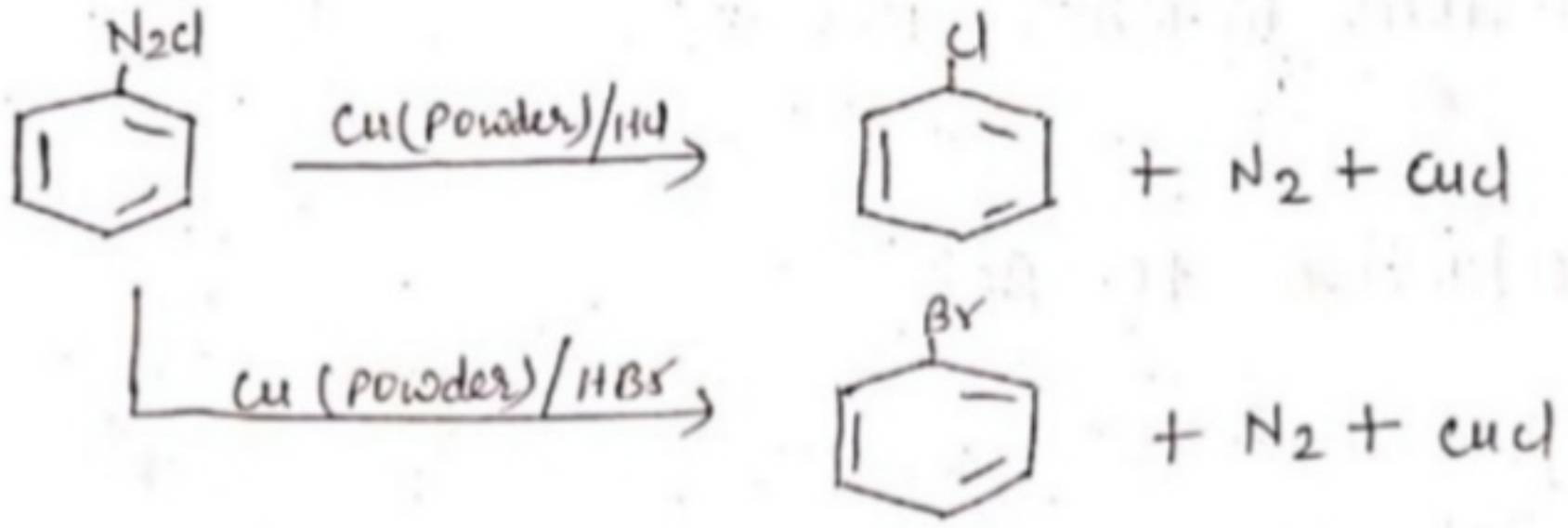
3. Synthesis of aryl chloride ,aryl bromide and aryl nitrile

i)



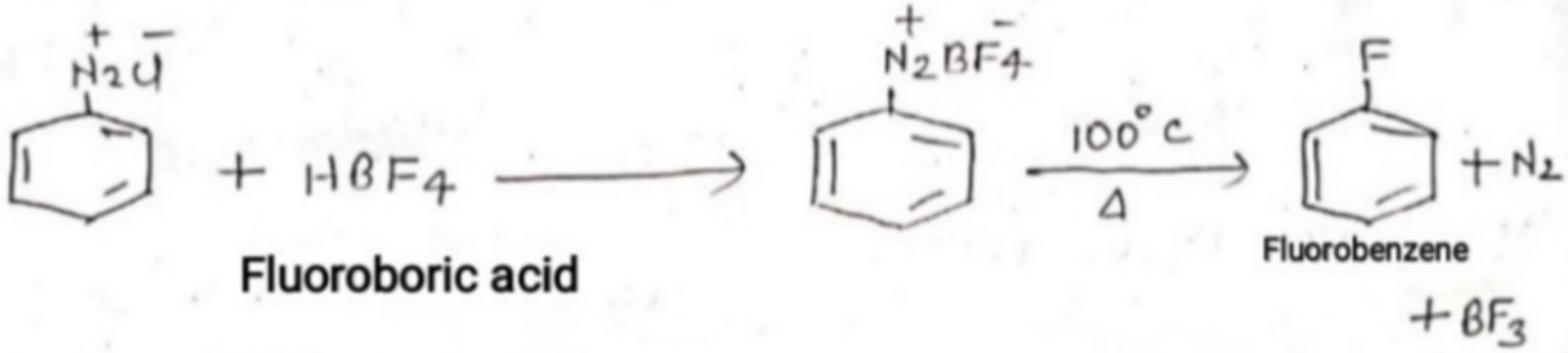
This Reaction is called "Sandmeyer's Reaction".

ii)



This Reaction is called "Gatterman Reaction".

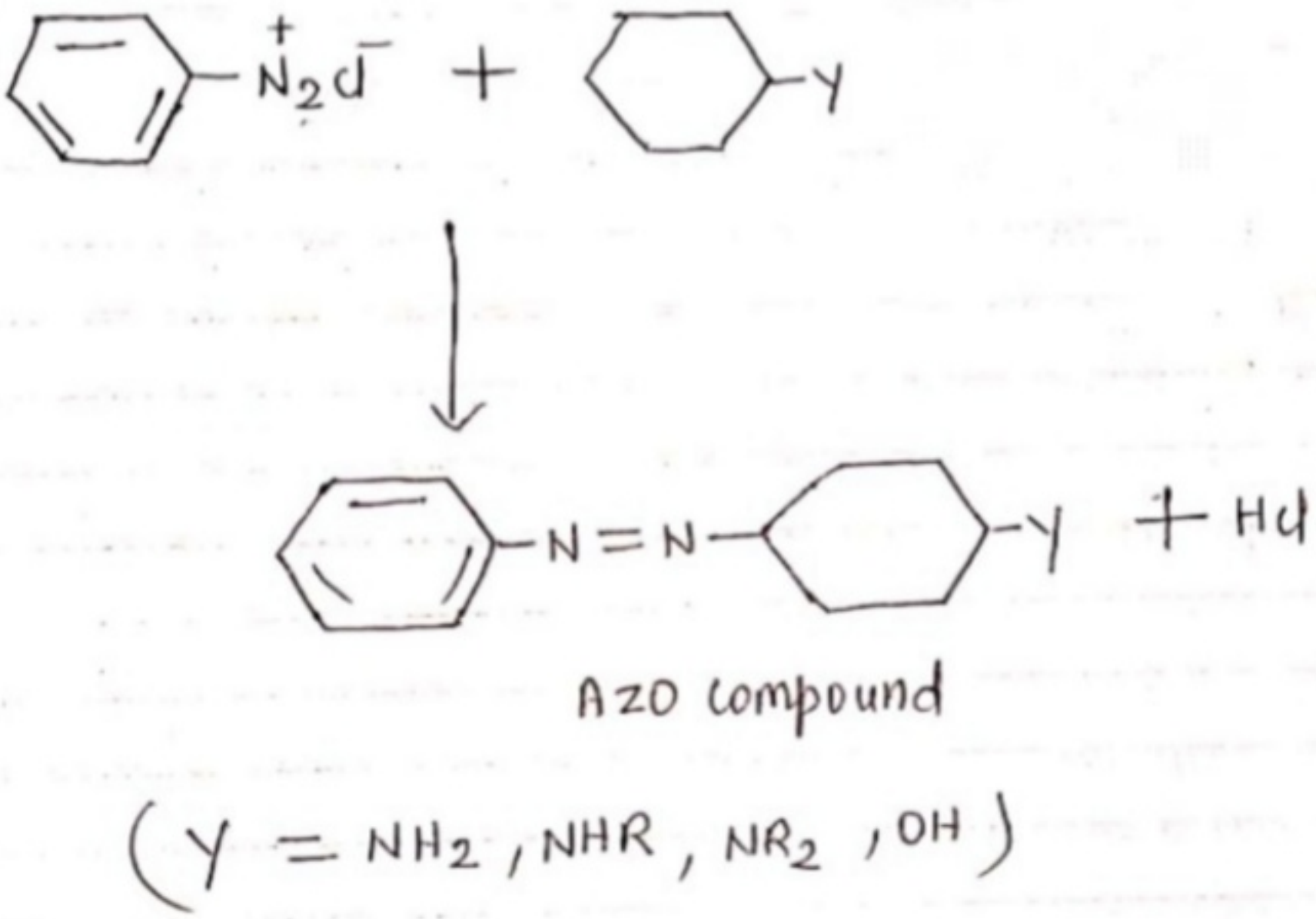
4. Synthesis of Aryl fluoride



This Reaction is called "Schiemann-Balz Reaction".

Reaction in which N-atoms are Retained

5. Azocoupling Reaction



AZO compound

$(Y = NH_2, NHR, NR_2, OH)$

USES

Diazonium salts are very good intermediate for the introduction of $-F, -Cl, -Br, -I, -CN, -OH, -NO_2$ groups into the aromatic ring.

Aryl fluorides and iodides can't be prepared by direct halogenation.//

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