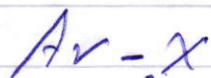


CHAPTER THREE ...

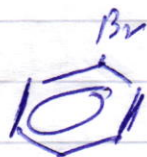
ARYL HALIDES

Chapter - Aryl Halides

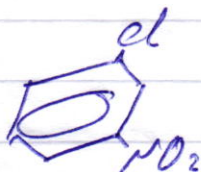
Aryl halides are compounds containing halogen attached directly to an aromatic ring. They have the general formula:



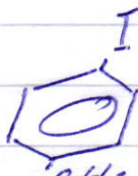
where: Ar = phenyl or substituted phenyl or a group derived from some other aromatic system.



Bromobenzene



m-chloronitrobenzene



p-Iodotoluene



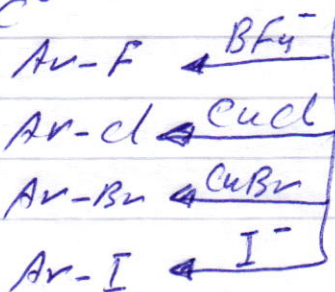
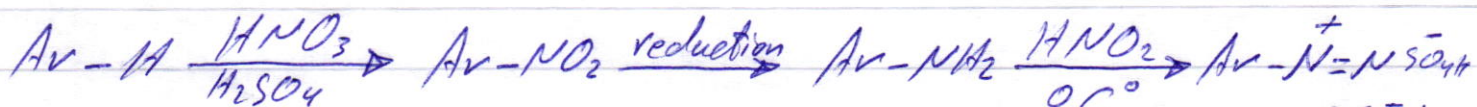
O-chlorobenzoic acid

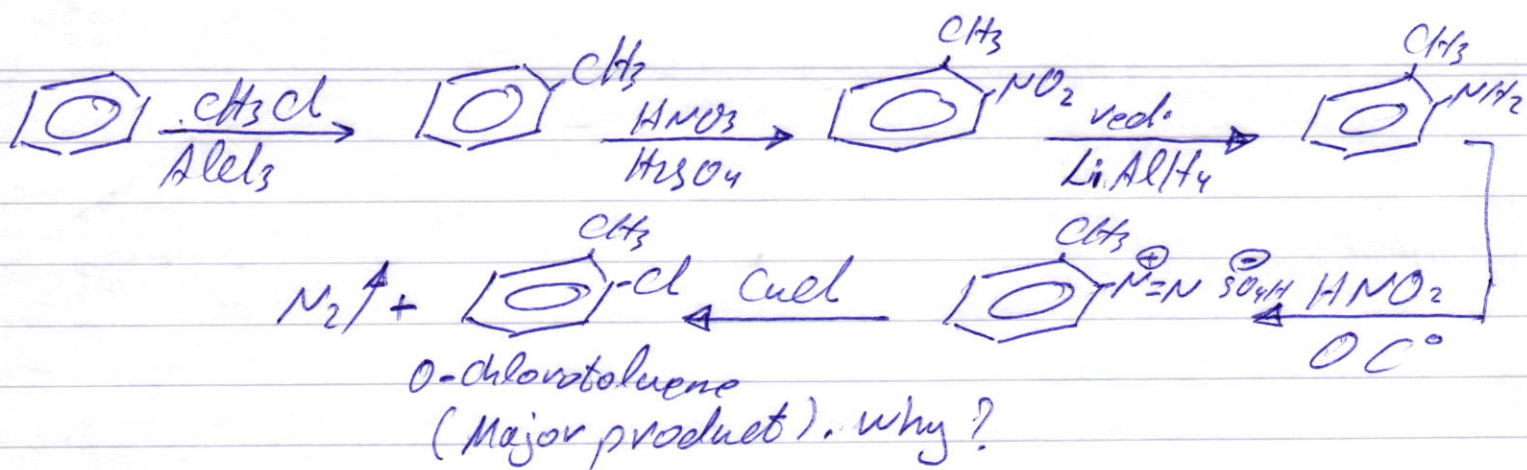
A / Physical Properties

The physical properties of the aryl halides are much like those of the corresponding alkyl halides; for example, chlorobenzene has boiling point very nearly the same as those of n-hexyl chloride. Like the alkyl halides, the aryl halides are insoluble in water and soluble in organic solvents.

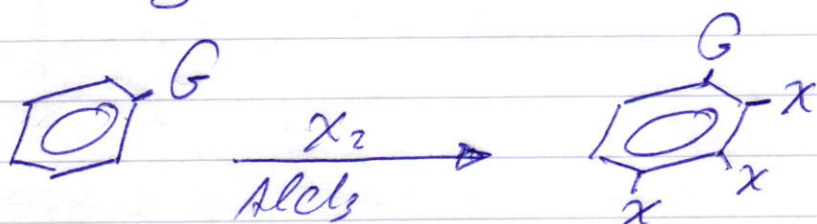
B / Preparation

① From diazonium salts:



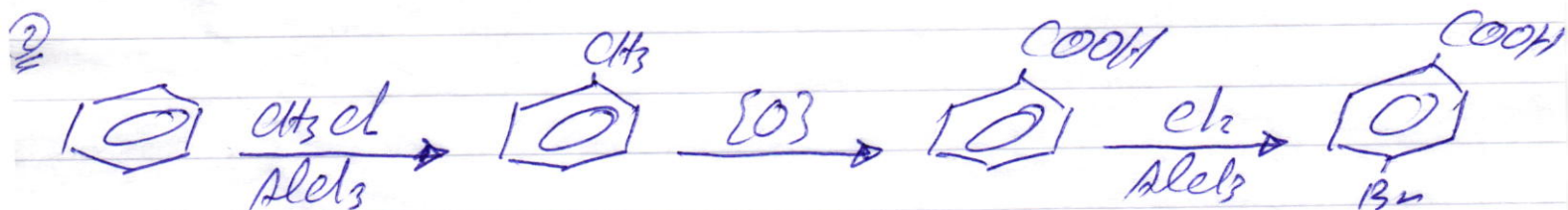
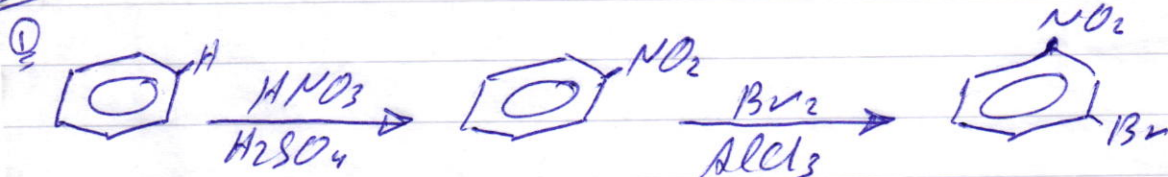


② Halogenation :



Ortho or meta or para

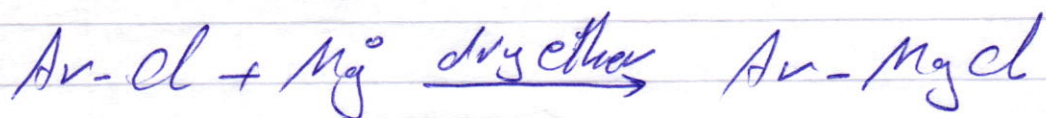
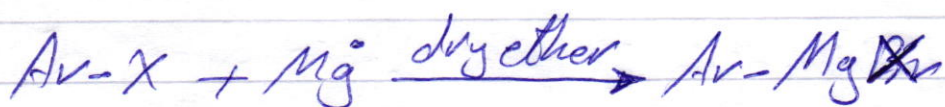
ex.



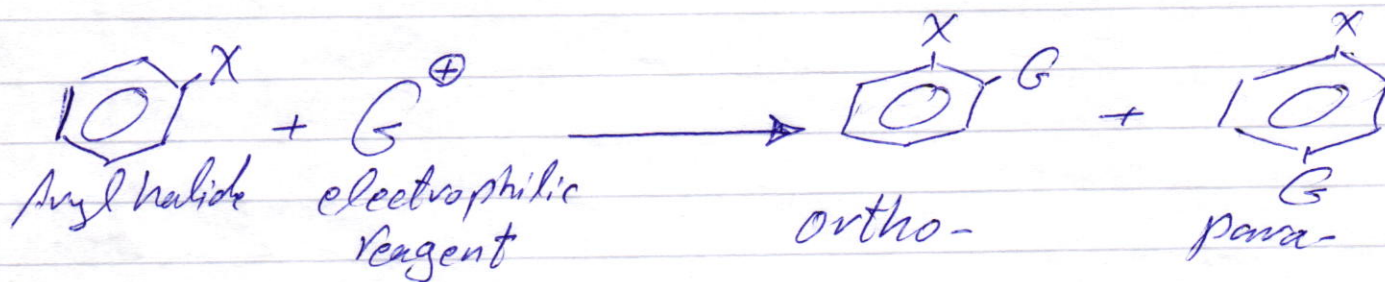
(major product)
why?

C/ Reactions :

① Formation of Grignard reagent :



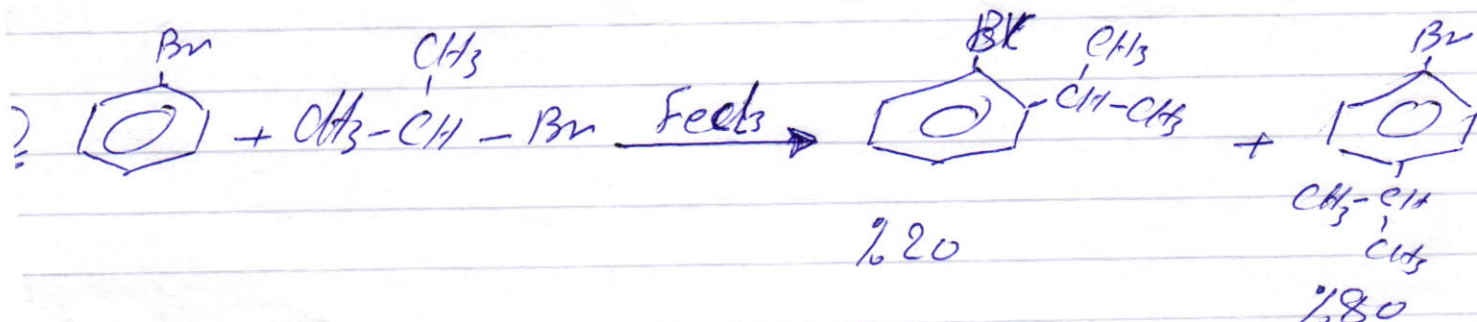
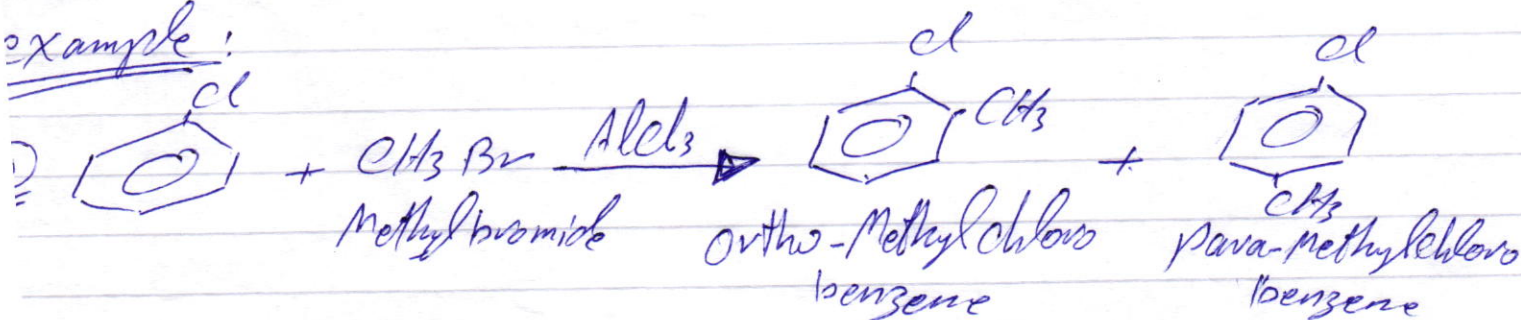
② Substitution in the ring (Electrophilic aromatic subs.) :



Where: $X = \text{Halogen}$.

$G^{\oplus} = \text{Any compound gives electrophilic reagent}$.

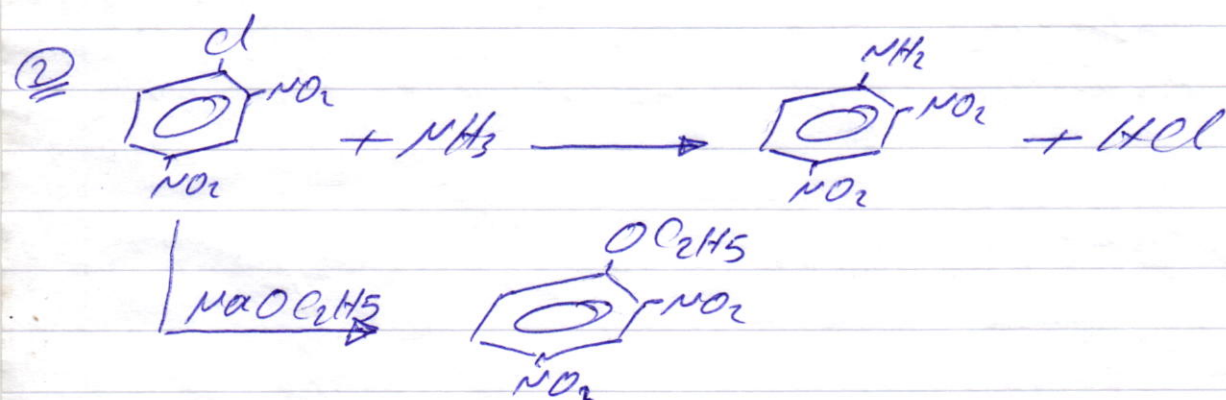
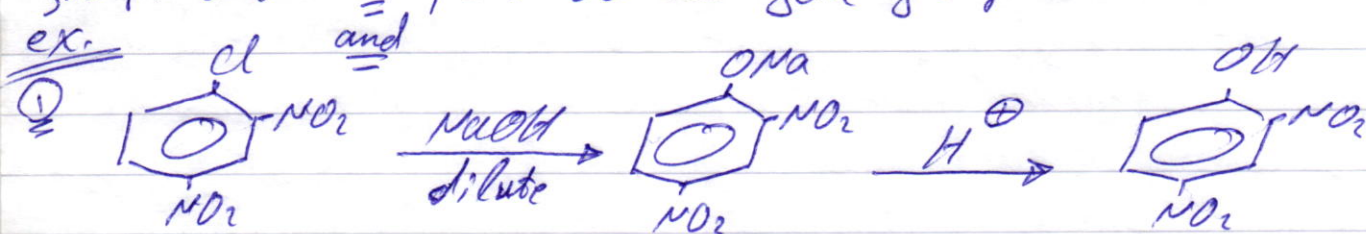
example :



③ Nucleophilic aromatic substitution:

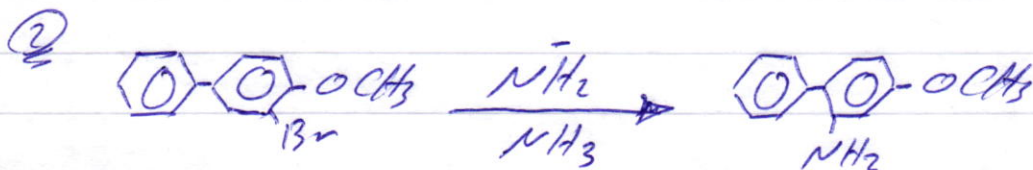
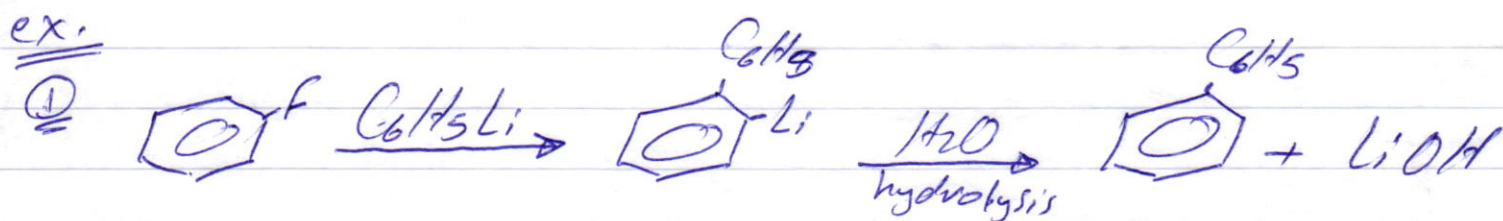
Ⓐ Bimolecular displacement reaction:

In this reaction, we must contain strongly electron-withdrawing groups ortho or para to halogen group.



Ⓑ Elimination-Addition reaction:

In this reaction, ring not activated toward bimolecular displacement.



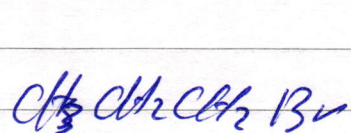
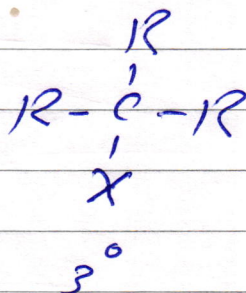
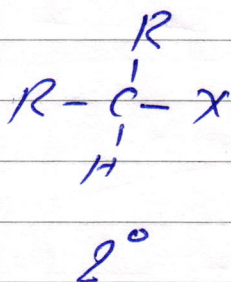
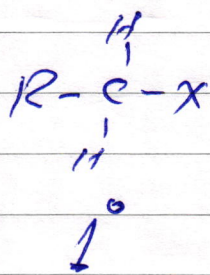
CHAPTER FOUR ...

ALKYL HALIDES

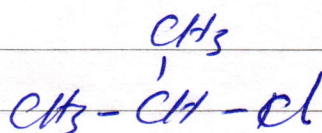
1. Structures and nomenclature:

The functional group of alkyl halide is $-X$, where X is F, Br, Cl or I . Alkyl halide have the general formula $R-X$, in which R is an alkyl or substituted alkyl group.

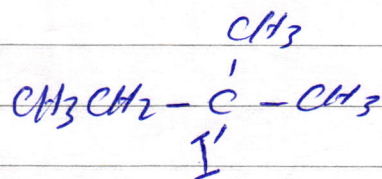
We classify a carbon atom as primary, secondary and tertiary, according to the number of other carbon atoms attached to it.



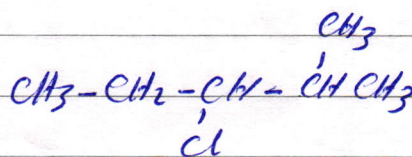
1-Bromopropane
or n-propane



Isopropyl chloride



2-Iodo-2-methylbutane
or Tert-Pentyl iodide



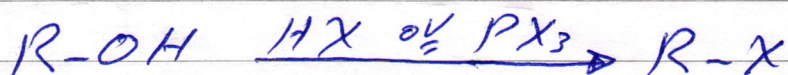
3-Chloro-2-methylpentane

2. Physical properties :

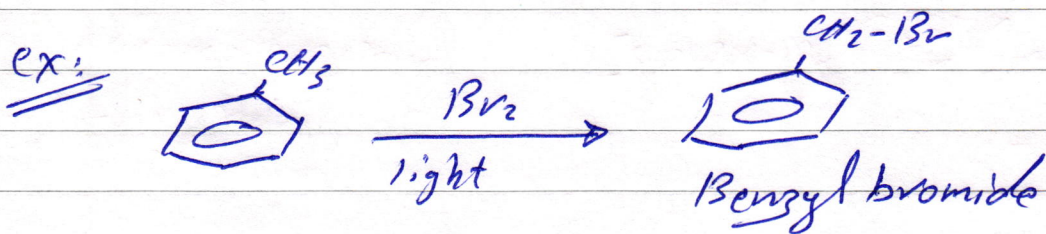
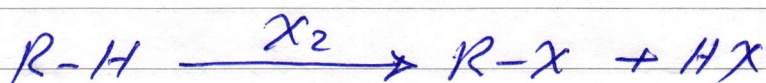
Haloalkanes have a higher boiling point than alkanes with the same number of carbons and the boiling point increases with increasing atomic weight of the halogen, so that a fluoride is the lowest boiling and iodide the highest boiling.

3. Preparation of the alkyl halide :

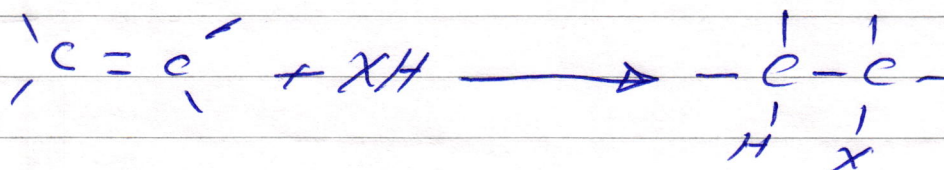
1. From alcohol :



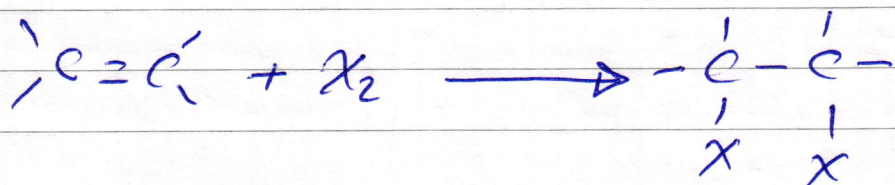
2. Halogenation :



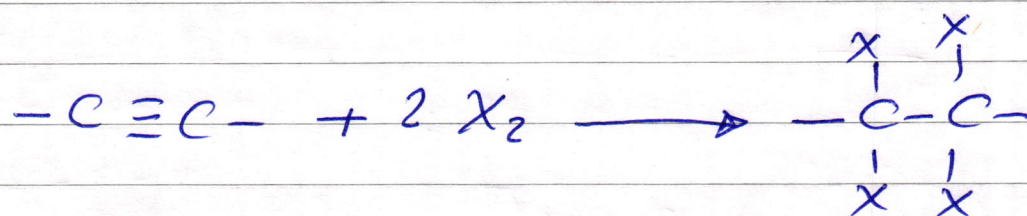
3. Addition of hydrogen halide to alkenes :



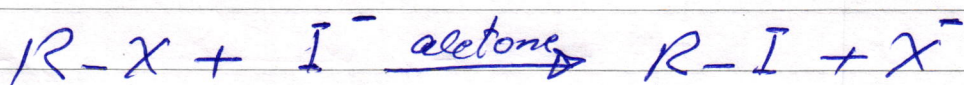
4- Addition of halogens to alkenes:



5- Addition of halogens to alkynes:

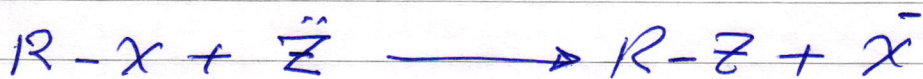


6- Halide exchange:



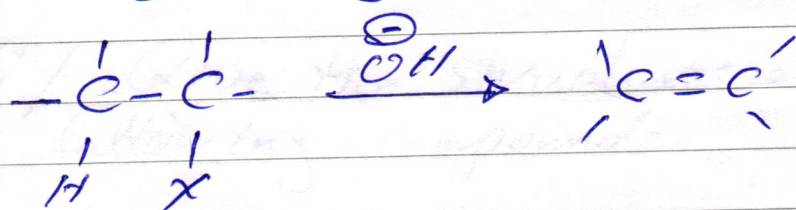
4. Reaction of alkyl halides:

1- Nucleophilic substitution:

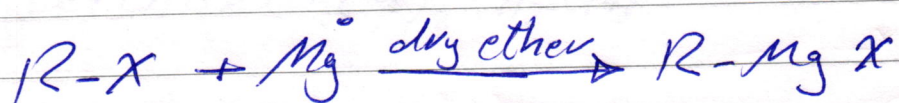


where $\ddot{\text{Z}}^-$ is any group like: OH^- , OR^- , X^- , CN^- ,
 SH^- , NH_3 , RCOO^- , SR^- etc.

2- Dehydrohalogenation (elimination) :



3- preparation of Grignard reagent :



4- Reduction :



ex:

