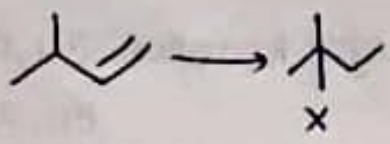
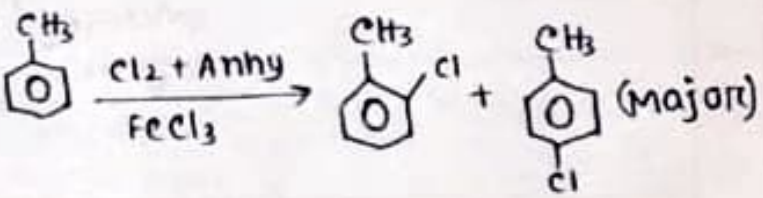
~ Haloalkanes & Haloarenes ~

	Reagents	Funcⁿ	spl. point
1) H-X/ZnCl₂ Reaction	$HX/ZnCl_2$	R-OH → R-X	substituition Reaction.
2) Lucas's test	Lucas Reagents Conc. HCl/Anhy $ZnCl_2$	3° alcohol → Cl 2° alcohol → Cl 1° alcohol → NO Reactⁿ or long time	TO distinguish b/w 1°, 2°, 3°
3) Darzen's Reaction	$SOCl_2$ (Thionyl chloride)	R-OH → R-Cl	Best MOP of R-Cl. because SO_2 & HCl & gases & can easily escape out.
4) Reaction with PX_3 and Red P/X_2	PX_3 Red P/X_2	R-OH → R-X	
5) Reaction with PCl_5	PCl_5	R-OH → R-Cl	
6) From alkanes by free radical halogenation	$Cl_2/h\nu$ $Br_2/h\nu$	$Cl_2/h\nu$ → Cl $Br_2/h\nu$ → Br	
7) From halogenation of Alkenes (Already Done)	X_2, CCl_4 X-X' $X_2 + H_2O$	$>C=C<$ $\xrightarrow[CCl_4]{X_2}$ $>C(X)-C(X)<$	

Reagents	Funcⁿ	Special points
8) From Hydrohalogenation of Alkenes. (Already done)	HX (classical ¿ wali)	
9) Allylic & Benzylic substituition	X	$CH_2=CH-\overset{\downarrow}{C}H_3 \xrightarrow{\dot{X}} CH_2=CH-CH_2-X$ Reagents - (Light, high temp) FRAR HBr/peroxide
10) Finkelstein Reaction (X = Cl, Br)	NaI acetone or DMSO } solvent	$R-X \longrightarrow R-I$ For prep. of Alkyl iodide.
11) Swarts reaction	AgF Other reagents → Inorganic Fluoride (Pad) Hg_2F_2 CoF_2 SbF_3	$R-X \longrightarrow R-F$ For Alkyl Fluoride
12) By electrophilic substituition	X_2 Anhy. $FeCl_3$	 

Reagents	Funct^{n}	spel. point

13) Sandmeyer Reaction Cu_2Cl_2/HCl ; Cu_2Br_2/HBr ; $CuCN/KCN$ — $Ph-N_2^+-\bar{C}l$

$Ph-N_2^+Cl^-$ Benzene diazonium chloride

$Ph-N_2^+Cl^- \xrightarrow{CuCN/HCN} Ph-CN$

$Ph-N_2^+Cl^- \xrightarrow{CuBr/HBr} Ph-Br$

$Ph-N_2^+Cl^- \xrightarrow{Cu_2Cl_2/HCl} Ph-Cl$

$[Ph-\overset{\oplus}{N}\equiv N\,Cl^-] \xrightarrow{Nu^-} Ph-Nu + N_2 + Cl^-$

14) Gattermann Reaction Cu/HCl ; Cu/HBr

$Ph-N_2^+Cl \xrightarrow[HCl]{Cu} Ph-Cl$

$Ph-N_2^+Cl \xrightarrow[HBr]{Cu} Ph-Br$

15) Sizzi's Reaction KI

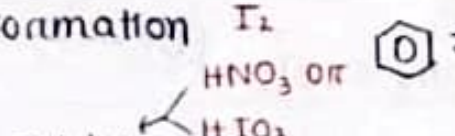
$Ph-N_2^+-Cl^- \longrightarrow Ph-I$

16) Balz-Schiemann Reaction HBF_4, Δ

$Ph-N_2^+Cl^- \xrightarrow{HBF_4} Ph-N_2^+BF_4^-$

$Ph-N_2^+BF_4^- \xrightarrow[\Delta]{HCl} Ph-F$

17) For Iodobenzene Formation I_2



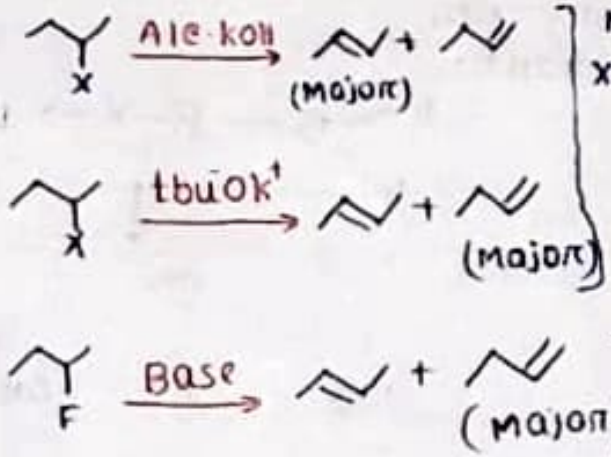
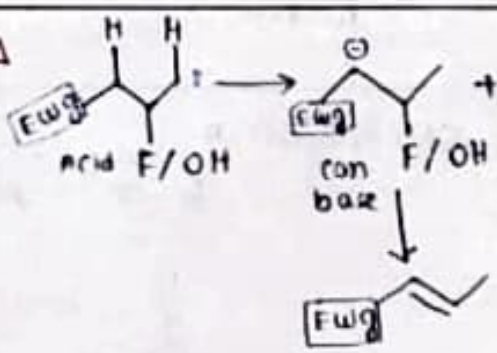
$HI + HNO_3 \rightarrow I_2 + NO_2 + H_2O$

$HI + HIO_3 \rightarrow I_2 + H_2O$

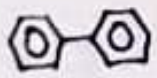
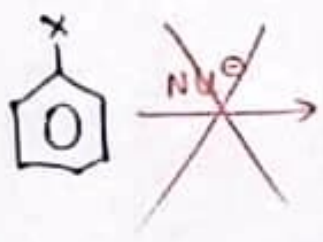
18) Formation of BDC Benzene diazonium chloride

$NaNO_2 + HCl$, $0-5^\circ C$

$Ph-\ddot{N}H_2 \longrightarrow PhN_2^+Cl^-$

	Reagents	Funct^n	Spl. point
19) Formation of Aniline	H_2+Cat or Sn/HCl or Fe/HCl (Best)	$Ph-NO_2 \longrightarrow Ph-NH_2$	
20) E^1 elimination of Alkyl Halide	pps, Δ	$R-X \rightleftharpoons$ Alkene	Polar protic solvent ↓ 'O' se H juda ho H_2O, ROH, RCOOH etc. Dipole moment ≠ 0
21) E^1 elimination of Alcohol	H^+/Δ conc H_2SO_4 or, conc H_3PO_4	$R-OH \longrightarrow$ Alkene	
22) Elimination Reaction E_2	Alc·KOH → (less bulky) tbuOK → (Bulky base)		Mama mami(E_2) X = Cl, Br, I (Good L.G.) Anion like character ↑ Buaji (E_2a) X = F (bad LG) Chane kaise bhi base ho
23) E^1cb elimination	OH/Δ		E_2a vs. E^1cb Aankh dikhane se kam ho jayega. Kalesh ewg Support $c^\ominus$

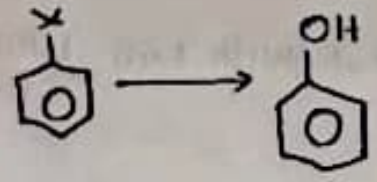
Reagents	Funct^{n}	spl. point
24) Nucleophilic Substitution Reaction	$Nu^{\ominus}$ (General NSR) $R-X \longrightarrow R-Nu + X^{\ominus}$ (X: leaving group)	Nucleophile (L.P wale)
25) Unimolecular Nucleophilic substitution Reaction	Step-1 (Slow, RDS) $R-X \rightleftharpoons R^{\oplus} + X^{\ominus}$ (Rearrange ib POS) Step-2 (Fast) $R^{\oplus} \xrightarrow{Nu^{\ominus}} R-Nu$	
26) Bimolecular Nucleophilic substitution Reaction S_N2	1 step (RDS): $Nu^{\ominus} + R-X \longrightarrow Nu\cdots R\cdots X \longrightarrow Nu-R + X^{\ominus}$ bf, bb Transition state	
27) pps favours S_N1 Reactions :	S_N1 ← Solvolysis when solvent itself act as Nu # pps solvate $R^{\oplus}$ # pps solvate $X^{\ominus}$ $R-X \rightarrow R^{\oplus} + X^{\ominus}$; $R^{\oplus} + H_2O \rightarrow R-OH_2 \xrightarrow{-H^+} ROH + H^+$ $R^{\oplus} + Nu^{\ominus} \rightarrow R-Nu$	
28) PAS favour S_N2 Reaction	$R-X \longrightarrow Nu-R + X^{-}$ $\longleftrightarrow Nu^{\ominus}$ Repulsion	

Reagent	Functⁿ	Spl. point
29) Reaction with LAH	LAH, SN^2	$CH_3-CH_2-Br \rightarrow CH_3CH_3$ ($1^\circ R-X$ & $2^\circ R-X$) $CH_3-\underset{Cl}{CH}-CH_2-CH_3 \rightarrow CH_3-CH_2-CH_2-CH_3$ $>X \longrightarrow \gg$ or $>=$ ($3^\circ R-X$ E^2)
30) Reactⁿ with Aq. KOH	aq. KOH, SN^2	$R-X \rightarrow R-OH$
31) Wurtz Reaction	Na/dry ether	$R-X \longrightarrow R-R$
32) Wurtz-Fitig-Reaction	Na/dry ether	$R+X+X-Ph \longrightarrow R-Ph$ (2Na)
33) Fitig Reaction	Na/dry ether	$Ph-X+X-Ph \rightarrow Ph-Ph$ (2Na) 
34) Grignard Reagent	Mg/dry ether	$R-X \longrightarrow RMgX$
35) Zerewitinoff's Reaction	Acid $H^\oplus$	$\overset{\ominus}{R}Mgx \longrightarrow R-H$ (Base)
36) Nucleophilic substitution Reactions		 Generally Aromatic NSR do not occurs

Reagents	Function	spl. point

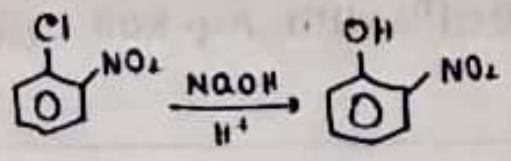
37) Dows process ($ArSN^1$)

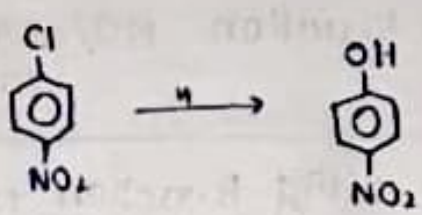
i. Molten Fused NaOH
623K, 300-320 atm
2. H^+

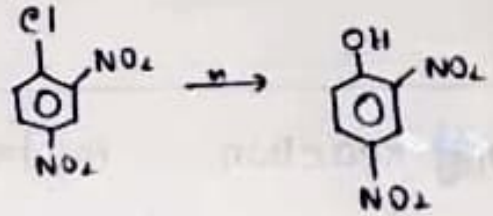


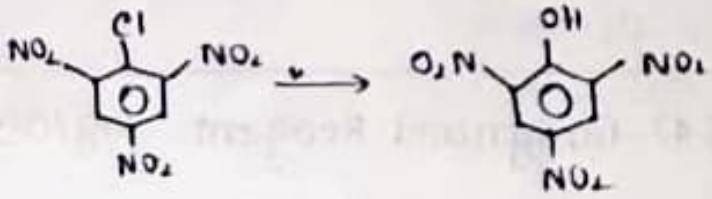
38) Nitro Halobenzene can give $ArSN^2$ (O & P)

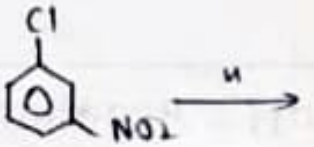
$NaOH$, H^+











No Reaction

39) Benzene Mechanism (SN_{EA})

↙ Elimination Addition

$NaNH_2$
liq. NH_3