ORGANIC REAGENTS

S.No.	Reagent	Function
1	PCl_3, PBr_3, PI_3	Alcohols into Alkyl halides
2	$SoCl_2$, PCl_5	Alcohols into Alkyl chlorides & Carboxylic acids into Acid Chlorides
3	HCl/$ZnCl_2$,HBr,HI	Alcohols into alkyl halides
4	Cl_2/Fe or $FeCl_3$	Cl group substituting on Benzene
5	$NaNO_2$ /HCl 0-5^{0}C	Diazotisation
6	CuCl,CuBr,CuCN,KI,H_2O, H_3PO_2	Diazonium Cholride into Chlor Benzene, Bromo Benzene, Benzo nitrile, Iodo Benzene , Phenol,Benzene respectively
7	HBF_4 or $NaBF_4$	Diazonium Chloride into Floro Benzene
8	AgF or Hg_2F_2 or SbF_3 or CoF_2	Alkyl halides into alkyl florides
9	Na / dry ether	Alkyl halides into alkanes
10	NaOH 623/443/368K	Chloro benzene to phenol
11	Br_2 /$FeBr_3$	Bromination of Benzene
12	Cl_2 /$FeCl_3$	Chlorination of Benzene
13	CH_3Cl /$AlCl_3$	alkylation of benzene and its derivatives
14	CH-CO-Cl /$AlCl_3$	Acylation on benzene
15	H_2SO_4 /HNO_3	Nitration of benzene
16	$(CHCO)_2O$ /$AlCl_3$	O Acylation of Phenol
17	H_2SO_4	Sulphonation on Benzene
18	H_2O/ H_2SO_4	alkenes into alcohols
	Aq KOH	Alkyl halide into alcohol
19	BH_3/H_2O_2/OH^-	Alkenes into alcohols (Anti Markownikoff product)
20	$NaBH_4$/ $LiAlH_4$(LAH)	Aldehydes, ketones, acids into alcohols, Nito & Cynides , Isocyanides into amines
21	H_2/ Ni or H_2/Pd	reduction of aldehydes, ketones and cynides
22	RMgX/H_3O^+	Aldehydes, ketones into alcohls
23	O_2/H^+	Cumene to phenol
24	Na	Alcohol or phenol into Sodium alkoxide/Phenoxide
25	$(CHCO)_2O$/ CH-CO-Cl	O acylation on phenol or N acylation on Aneline or amine
26	Conc.H_2SO_4/443K	Conversion of primary alcohols into Alkenes
27	Conc.H_2SO_4/410K	Conversion of alcohols into Ethers
28	85% H_3PO_4/ 440K	Secondary alcohol into alkene
29	20% H_3PO_4/358K	Tertiary alcohol into alkene
	Alcoholic KOH	Alkyl halide into alkene

ORGANIC REAGENTS

30	$CrO_3/KMnO_4$ or $K_2Cr_2O_7$ in acidic medium	oxidation of alcohols into acids
31	Cu /573k	dehydrogenation of alcohols gives 1^0 alcohols into aldehydes and 2^0 alcohols into ketones & 3^0 alcohos into alkenes
32	Dil. HNO_3	Mono nitration of Phenol
33	Conc.HNO_3	tri nitration of phenol
34	Br_2/H_2O	tri bromination of phenol
35	Br_2/Cs_2	mono bromination of phenol
36	$NaOH/CO_2$	Phenol to salicilic acid
37	$CHCl_3$/NaOH	Phenol to salcilaldehyde
38	Zn dust	Phenol to Benzene
39	$Na_2Cr_2O_7/H_2SO_4$ or air	Phenol to Benzo quinone
40	Zn/Cr_2O_3 200to 300 atm 573 673K	CO & H into methanol
41	Invertase	Sucrose into Glucose or Fructose
42	Zymase	Glucose or Fructose into ethanol
43	HI	Ether into alcohol & alkyl halide
44	PCC	alcohol to aldehyde
45	Pd /$BaSO_4$,H_2	acid chloride into aldehyde
46	$SnCl_2/HCl/H_3O^+$	Cyanides into aldehydes
47	$AlH(i\text{-}Bu)_2/H_2O$	Cyanides into aldehydes
48	DIBAL-H/H_2O	Esters into aldehydes
49	CrO_2Cl_2/H_2O	Toluene to aldehyde
50	$CrO_3/(CH_3CO)_2O$	Toluene into Benzaldehyde
51	Cl_2/hv	Chlorination on alkyl group of Benzene or alkane
52	CO, HCl anhydrous $AlCl_3$	Benzene to Benzaldehyde
53	$(CH_3)_2Cd$	acid chloride into ketones
54	$RMgX/H_3O^+$	Cyanides into ketones
55	HCN	Carbonyl compound into cyanohydrin
56	$NaHSO_3$	addition to aldehyde and ketone
57	H_2NOH	carbonyl compound into oxime
58	$H_2N\text{-}NH_2$	carbonyl compound into hydrazone
59	$H_2N\text{-}NH\text{-}Ph$	carbonyl compound into Phenyl hydrazone
60	2,4DNP	carbonyl compound into 2,4 dinitro phynyl hydrazone
61	$H_2N\text{-}NH\text{-}CO\text{-}CH_3$	carbonyl compound into semi carbazide
62	ROH/HCl	Aldehydes & ketones into hemiacetal and acetal
63	$HO\text{-}CH_2\text{-}CH_2\text{-}OH$/HCl	Aldehyde or ketone into ethelene glycol

ORGANIC REAGENTS

		ketone
64	Zn-Hg/HCl	carbonyl compound into alkane
65	H_2N-NH_2/KOH	carbonyl compound into alkane
66	$KMnO_4/OH^-$/ $K_2Cr_2O_7$ /H_2SO_4 or HNO_3	Ketones into mixture of carboxylic acids on prolonged oxidation
67	$(Ag(NH_3)_2)NO_3$+NaOH	Tollen s test
68	$Cu(OH)_2$	Fehiling s test
69	NaOH+I_2	Iodoform
70	NaOH or $Ba(OH)_2$	aldal condensation
71	Conc KOH or NaOH	Cannizaro s reaction
72	$KMnO_4$ /KOH	Toluene/alkyl Benzene into Benzoic Acid
73	H_2O/H^+	Cyanides into carboxylic acids, amides into carboxylic acids, esters into carboxylic acis and alcohols, acid chlorides or anhydrides into carboxylic acids
74	NaOH	Saponificaiton of ester, acid into salt of acid
75	Na_2CO_3 or $NaHCO_3$	Carboxylic acid test
76	P_4O_{10} or P_2O_5	Dehydration of acids into anhydride, amides into nitriles
77	ROH/conc H_2SO_4	Caroxylic acids into esters
78	PCl_3, $SoCl_2$, PCl_5	Carboxylic acids into acid chlorides
79	NH_3 heating	Carboxylic acids into amides
80	NaOH/CaO	Decarboxylation (acids into alkanes)
81	$LiAlH_4$	Carboxylic acids into alcohols, amides into amines
82	Cl_2 /red.P_4	HVZ reaction
83	Sn /HCl or Fe /HCl, H_2/Pd	Reduction of nitro compounds into amines
84	NH_3	Alkyl halides into amines
85	H_2/ Ni or H_2/Pd $LiAlH_4$	Amides into cyanindes
86	KOH/R-X	Phthalamide into amine
87	NaOH /Br_2	Hoffman bromamide, amide into amine with one C less
88	KOH,$CHCl_3$	Amines into Carbyl amines
89	$NaNO_2$/HCl	1^0 aliphatic amines into alcohols
90	$NaNO_2$/HCl 0 5^0C	Aniline into diazonium chloride
91	$C_6H_5SO_2Cl$	Distinguishing 1^0,2^0 & 3^0 amines
92	Br_2/H_2O	Aneline into tri bromo aniline
93	Br_2/ CH-CO-Cl /$(CHCO)_2O$	Aniline into Bromo Aniline

94	HNO_3/ CH-CO-Cl /$(CHCO)_2O$	Nitro aniline
95	H_2SO_4	Sulphonation on aniline
96	CuCl,CuBr,CuCN,KI,H_2O, H_3PO_2 or CH_3-CH_2-OH	Diazonium Cholride into Chlor Benzene, Bromo Benzene, Benzo nitrile, Iodo Benzene , Phenol,Benzene respectively

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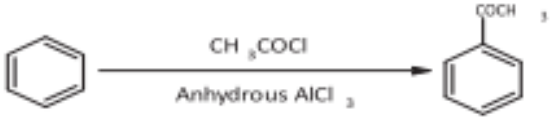
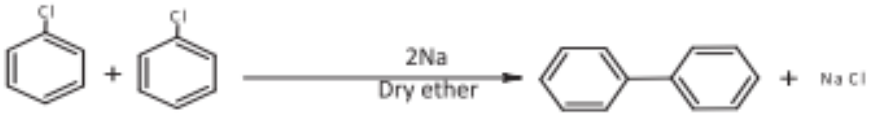
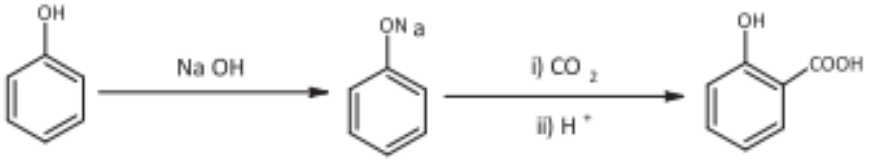
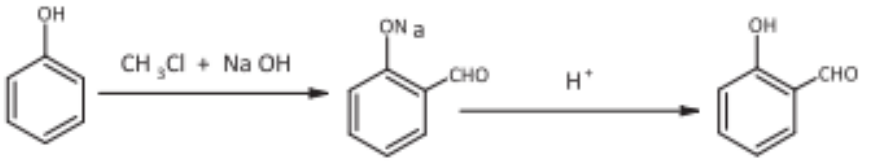
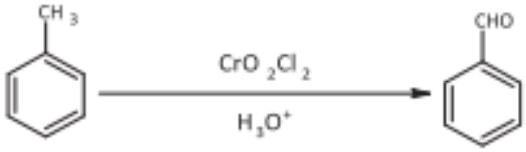
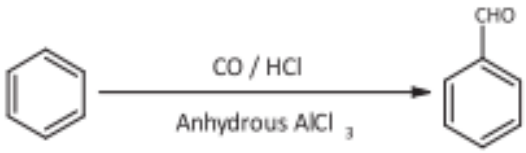
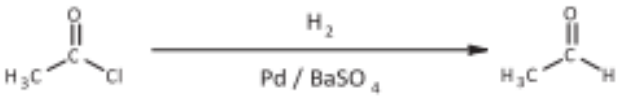
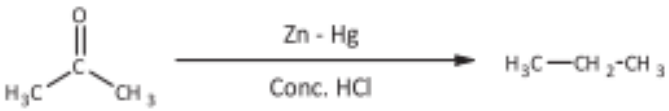
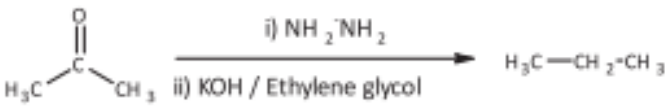
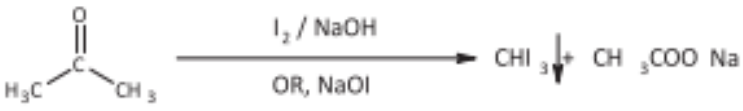
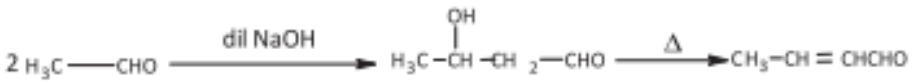
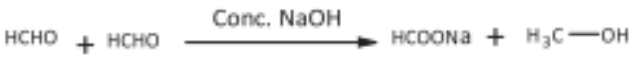
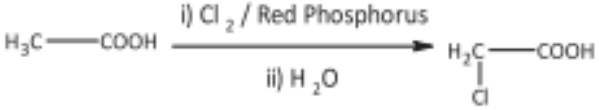
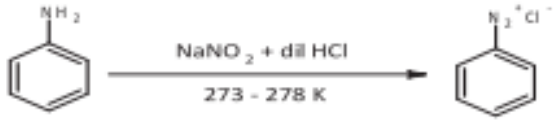
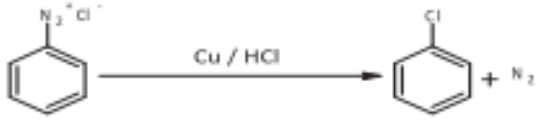
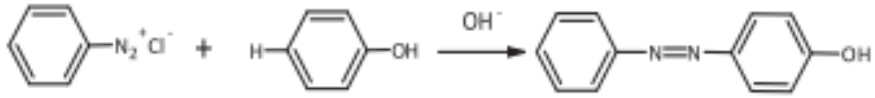
APPENDIX –B

NAME REACTIONS

1.	Finkelstein	$CH_3Br + NaI \xrightarrow{\text{Acetone}} CH_3\text{-}I + NaBr$
2.	Swarts	$CH_3Br + AgF \longrightarrow CH_3F + AgBr$
3.	Friedel-Crafts Alkylation	
4.	Friedel-Crafts Acylation	
5.	Wurtz	$H_3C\text{—}Cl + Cl\text{—}CH_3 \xrightarrow[\text{Dry ether}]{2Na} H_3C\text{—}CH_3 + NaCl$
6.	Fittig	
7.	Wurtz-Fittig	
8.	Kolbe	
9.	Reimer-Tiemann	
10.	Williamson	$CH_3\text{-}Br + CH_3\text{-}ONa \longrightarrow CH_3\text{-}O\text{-}CH_3 + NaBr$
11.	Stephen	$H_3C\text{—}CN + SnCl_2 + HCl \longrightarrow H_3C\text{—}CH{=}NH \xrightarrow{H_3O^+} H_3C\text{—}CHO$

12.	Etard	
13.	*Gatterman – Koch*	
14.	Rosenmund reduction	
15.	Clemmensen reduction	
16.	Wolff-Kishner reduction	
17.	*Tollens' test*	$R\text{-}CHO + 2\,[Ag(NH_3)_2]^+ + 3\,OH^- \longrightarrow R\text{-}COO^- + 2Ag\downarrow + 2H_2O + 4\,NH_3$
18.	*Fehling's test*	$R\text{-}CHO + 2\,Cu^{2+} + 5\,OH^- \longrightarrow R\text{-}COO^- + Cu_2O\downarrow + 3H_2O$
19.	*Iodoform*	
20.	*Aldol condensation*	
21.	*Cannizzaro*	
22.	Hell-Volhard-Zelinsky (HVZ)	
23.	*Hoffmann bromamide degradation*	

24.	*Carbylamine*	$R\text{-}NH_2 + CHCl_3 + 3\,KOH \xrightarrow{\Delta} R\text{-}NC + 3\,KCl + 3\,H_2O$
25.	*Diazo*	
26.	*Sandmeyer.*	
27.	*Gatterman*	
28.	*Coupling*	

Distinguish By a Single Chemical Test

1. All aldehydes (R-**CHO**) give **Tollens' Test** and produce silver mirror.
   $RCHO + 2\,[Ag(NH_3)_2]^+ + 3\,OH^- \rightarrow RCOO^- + 2\,Ag\downarrow + 2H_2O + 4\,NH_3$
   Tollens' Reagent — silver ppt

   Note: HCOOH(methanoic acid) also gives this test, ketones (RCOR) do not give this test

2. All aldehydes (R-**CHO**) and ketones(R**CO**R) give **2,4-DNP test**
   $RCOR + 2,4\text{-DNP} \rightarrow$ Orange ppt
   $R\text{-}CHO + 2,4\text{-DNP} \rightarrow$ Orange ppt

3. Aldehydes and ketones having **CH_3CO**- (keto methyl) group give Iodoform Test. Alcohols having CH_3CH- OH group also give **Iodoform Test**.
   $CH_3CHO + 3I_2 + 4\,NaOH \rightarrow CHI_3\downarrow + HCOONa + 3\,NaI + 3H_2O$
   Yellow ppt

4. The following compounds give Iodoform Test: ethanol (C_2H_5OH), propan-2-ol ($CH_3CH(OH)CH_3$), ethanal(CH_3CHO), propanone(CH_3COCH_3), butanone ($CH_3COCH_2CH_3$), pentan-2-one ($CH_3COCH_2\,CH_2CH_3$), acetophenone ($PhCOCH_3$)

5. All carboxylic acids (R-**COOH**) give **Bicarbonate Test**
   $RCOOH + NaHCO_3 \rightarrow RCOONa + CO_2\uparrow + H_2O$
   effervescence

6. **Phenol** gives **$FeCl_3$** Test
   $C_6H_5OH + FeCl_3 \rightarrow (C_6H_5O)_3Fe + 3\,HCl$
   (neutral) (violet color)

7. All primary amines (R/Ar -**NH_2**) give **Carbyl Amine Test**
   $R\text{-}NH_2 + CHCl_3 + KOH(alc) \rightarrow R\text{-}NC + KCl + H_2O$
   offensive smell

8. Aniline gives Azo Dye Test (Only for aromatic amines)
   $C_6H_5NH_2 + NaNO_2 + HCl \rightarrow C_6H_5N_2^+Cl^-$; then add β-naphthol orange dye

9. All alcohols (R**OH**) give **Na-metal test**
   $R\text{-}OH + Na \rightarrow R\text{-}ONa + H_2$
   bubbles

10. For esters (RCOOR) : Hydrolyses first. Then see the products (acid & alcohol) and give a test to identify them.

11. All alkenes (C=C) and alkynes (C≡C) decolorizes Br_2 – water from red to colourless

12. **Lucas Test to distinguish primary, secondary and tertiary alcohols**
    Lucas reagent: $ZnCl_2/HCl$
    3^0-alcohol + Lucas reagent → immediate turbidity
    2^0-alcohol + Lucas reagent → turbidity after sometime
    1^0-alcohol + Lucas reagent → no turbidity