4) $\because K = 2.5 \times 10^{-4}$ mol/ls

Order = 0 order

$\therefore [R] = -kt + [R_0]$

At $t_{1/2}$

$\Rightarrow \frac{[R_0]}{2} = -kt + [R_0]$

$\Rightarrow kt = \frac{[R_0]}{2} \Rightarrow t_{1/2} = \frac{[R_0]}{2k} = \frac{0.4 \text{ mol/l}}{2 \times 2.5 \times 10^{-4} \text{ mol}}$ ls

$= \frac{4}{5} \times 10^3$

$= 0.8 \times 10^3$ sec

$= 800$ sec

---

48)

$C_2H_5Cl \longrightarrow C_2H_4 + HCl$

$t=0$	P_0	0	0
$t=t$	$P_0 - P$	P	P

After t, $P_t = (P_0 - P) + P + P = P_0 + P$

$\Rightarrow P = P_t - P_0$

$\Rightarrow P_0 - P = 2P_0 - P_t$

For 1st

$k = \frac{2.303}{t} \log\left(\frac{P_0}{P_0 - P}\right)$

$= \frac{2.303}{300} \log\left(\frac{P_0}{2P_0 - P_t}\right)$

$= \frac{2.303}{300} \log\left(\frac{0.3\phi}{0.1\phi}\right)$

$= \frac{2.303}{300} \times 0.4771 = \frac{1.098}{3} \times 10^{-2}$

$= 0.366 \times 10^{-2}$

$= 3.66 \times 10^{-3}$/sec

4771 2
2303
14313
6000
4313
9542
10987613

8) a) Due to metal deficiency, some Fe^{3+} occupy the site of Fe^{2+} to maintain electric neutrality, Thus a non-stoichiometric composition is obtained.

b) Due to metal excess defect caused by heating as due to heating ZnO loses oxygen and Zn occupies interstitial sites and corresponding e^- occupy other sites causing yellow colour.

(a) Pure water boils at 95°C.

Let amount of NaCl to be added be q x.

$\therefore \Delta T_b = K_b \cdot m$

$\Rightarrow 5 = 0.52 \times \frac{x/58.5}{2}$

$\Rightarrow x = \frac{5 \times 2}{0.52} \times 58.5$

$= \frac{585}{52} \times 100$

$= 1125\,g$

$= 1.125\,kg$

10. 52)585(11.25
52
65
52
130
104
260
260
0

7) $AgCl + 2NH_3 \longrightarrow [Ag(NH_3)_2]Cl$

The precipitate - AgCl dissolves due to formation of complex diamine silver chloride.

8) i) $[Co(NH_3)_4(H_2O)Cl]Cl_2$

ii) $[Co(en)_3]_2(SO_4)_3$

9) a)

12) fcc lattice $a = 300pm$

$d = 10.89 g/cm^3$

no. of atoms in 108 g of element.

In f.c.c. lattice no. of atoms $= \frac{1}{8} \times 6 + \frac{1}{8} \times 8 = 4.$

∴ No. of atoms in 108g of element

$$= \frac{108}{10.89 g/cm^3} \times \frac{1}{a^3} \times 4$$

$$= \frac{10 cm^3 \times 4}{(300 \times 10^{-10})^3 cm^3} = \frac{40}{27 \times 10^{-24}}$$

$$= \frac{40}{27} \times 10^{24} \text{ atoms}$$

$$= 1.48 \times 10^{24} \text{ atoms}$$

13) In $SO_2 \rightarrow S$ has S^{+4} configuration, thus it can act as oxidising agent by gaining 4 e⁻ or act as reducing agent by leaving 2 e⁻ to make S^{+6} configuration,

But in $SO_3 \rightarrow S$ already has S^{+6} configuration, thus it can only act as oxidising agent.

b) Xe is lower in P.T. than Ar thus having lower IEnthalpy than Ar thus forming XeF_6 is possible but not ArF_6.

c) ~~Both the~~ ~~electronegativity~~ small size of F_2 atoms in F_2 results in electron-electron repulsion making it easier to dissociate than Cl_2.

Thus bond enthalpy of Cl_2 > F_2.

14) a) Transition metals show variable oxidation states because the valence e's of these metals are in 2 orbitals (n-1)d and ns, thus both energy levels are used for bond formation.

b) Due to high electronegativity and small size of O, the highest oxidation state of a metal is exhibited in oxoanions of a metal

c) Mn^{4+} is much more stable than Mn^{3+} due to half-filled d-orbital thus having EO value much more than that of Cr^{+3}/Cr^{+2} or Fe^{+3}/Fe^{+2}

~~15) a) Ethanal to Ethanamine~~

16) a) When glucose is treated with nitric acid, the aldehyde & alcohol group are oxidised to carboxylic acid forming glucaric acid.

b) Glycine

c) thymine BD-2 deoxyribose and phosphoric acid.

17) a) $\Delta G = -nFE^{\circ} = -6 \times 96500 \times 0.89$

$= -515290\ J$

89
6
534 8

965 2
534 2 1
13490
2895 1
4825 3 2
515290

b) $E_{cell} = E^{\circ}_{cell} - \frac{0.0591}{n} \log \frac{C_1}{C_2}$

$= 0.44 - \frac{0.0591}{2} \log \frac{1.3}{10^{-95}}$

$= 0.44 - \frac{0.0591}{2} (\log 13 + 95)$

$= 0.44 - \frac{0.0591}{2} (3.05 \times 10)$

$= 0.44 - 0.18$

$= 0.26\ V.$

591
305 4
2955
1068
17730
0.180255

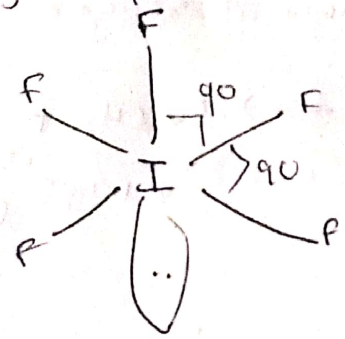
0.44
18
26

18) a) $XeF_2 + PF_5 \longrightarrow [XeF]^+[PF_6]^-$

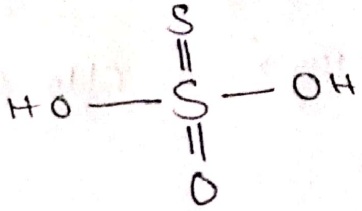
ii) $3Cu + 8HNO_3 \longrightarrow 3Cu(NO_3)_2 + 4H_2O + 2NO$

iii) Due to fluorine's small size and high electronegativity it only forms one oxoacid, HOF as it doesn't have any d-orbitals also.

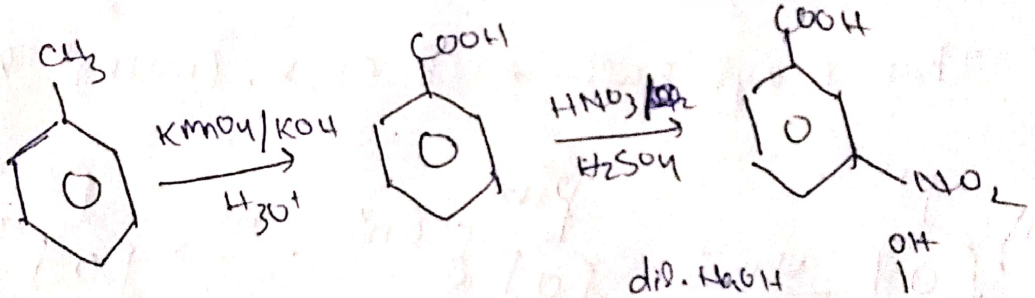
b) i) IF_5 sp^3d^2



ii) $H_2S_2O_3$

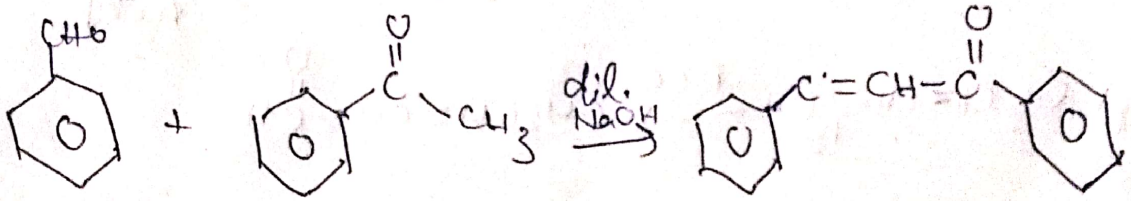


19) a) i)



ii) $CH_3CH_2OH \xrightarrow[573K]{Cu} CH_3CHO \xrightarrow{dil.\ NaOH} CH_3-\underset{OH}{CH}-CH_2CHO$

b)

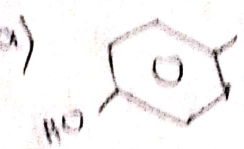


c) ∵ Larger -I effect of Larger acidity

-I effect of F > Cl.

∴ Fluoroacetic acid is stronger acid than chloroacidic acid.

9) b) 

a) 

ii) Let alkyl halide → R–X

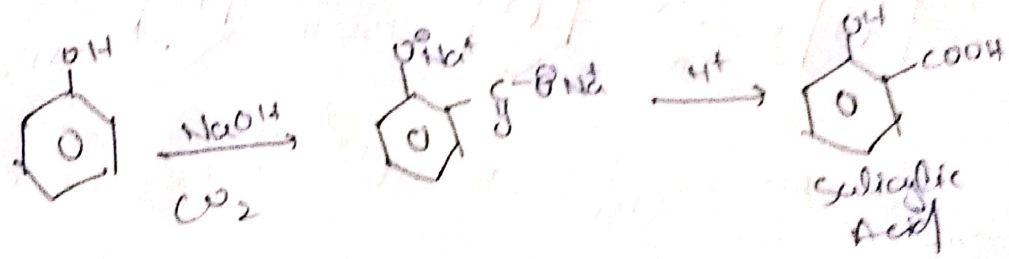
R–X + Mg ⟶ RMgX (Grignard reagent formed)

$RMgX + CH_3-CH_2-OH \longrightarrow CH_3CH_2-R + Mg\langle^{Y}_{OH}$

CH_3CH_2R = $CH_3CH_2CH_3$

∴ R → CH_3

Thus alkyl halide is CH_3X. (methyl halide).

11) a) 

10) b) $CH_3CH=CH-\underset{H_3}{C}OH \xrightarrow{PCC} CH_3CH=CH-\overset{O}{\overset{\|}{C}}H$

15) $CH_3CHO \xrightarrow[KMnO_4]{CrO_3} CH_3COOH \xrightarrow{NH_3} CH_3CONH_2 \xrightarrow[H_2O]{LiAlH_4} CH_3CH_2NH_2$

$CH_3CH_2COOH \xrightarrow[H_2O^+]{LiAlH_4} R-O-CH_3$

i) $CH_3COOH \xrightarrow{NaOH} CH_3COONa + H_2O$

$\xrightarrow[\Delta]{NaOH+CaO} CH_4 + O_2 \xrightarrow{MoO_3} HCHO + H_2O$

b) Due to +R effect of NH_2 group the C–N bond has some double bond character hence shorter in length than C–N in aliphatic amine.