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Type - IV Rxns : Rxns in which an elements undergoes partial oxidn or Redn

$$KMnO_4 + \underset{-1}{HCl} \longrightarrow MnCl_2 + \overset{0}{Cl_2} + KCl + H_2O$$

$$\left[KMnO_4 \longrightarrow MnCl_2 \quad (5)\right] \times 2 \qquad \left[2HCl \longrightarrow Cl_2 \quad (2)\right] \times 5$$

$$2KMnO_4 + 16HCl \longrightarrow 2MnCl_2 + 5Cl_2 + 2KCl + 8H_2O$$

$\eta_f = \frac{10}{2} = 5$; $\eta_f = \frac{10}{16}$; $\eta_f = 10/2 = 5$; $\eta_f = 10/5$; $\eta_f = 10/2$; $\eta_f = 10/8$

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Type-I Rxn Substance involved in redox rxn but does not undergo any redn or oxidn

$$Cl_2 + NaOH \longrightarrow \underline{NaCl} + NaClO_3 + H_2O$$

$n_f = 1$ $\quad$ $n_f = 5$

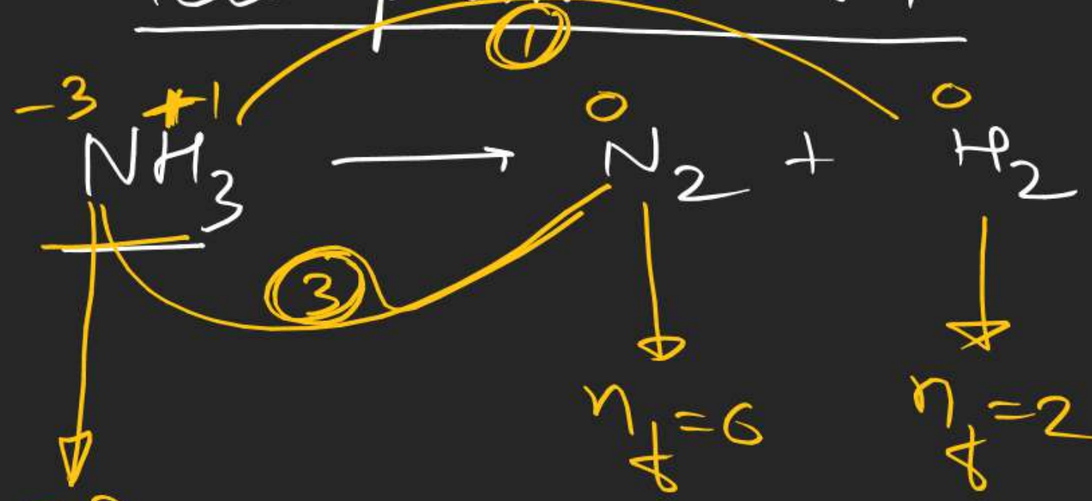
$Cl_2 \longrightarrow 2NaCl$ (2) $\quad$ $Cl_2 \longrightarrow 2NaClO_3$ (10)

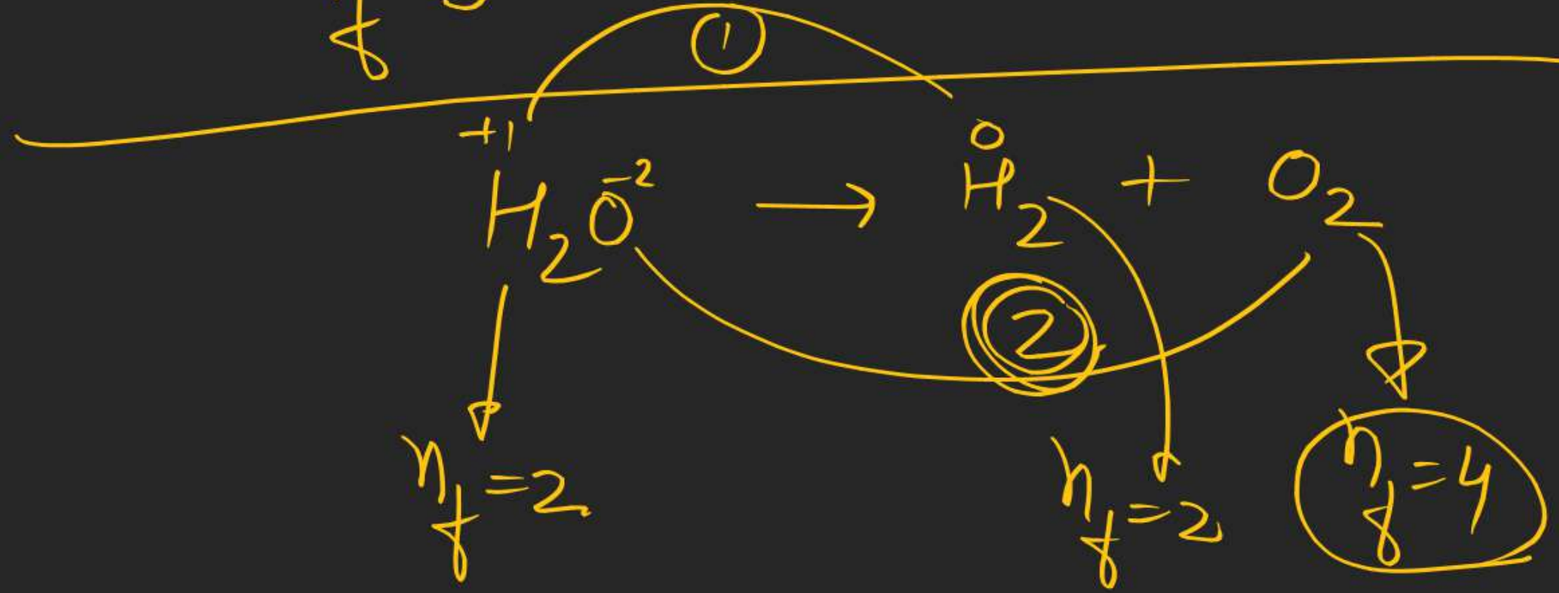
$$6Cl_2 + 12NaOH \longrightarrow \underline{10NaCl} + 2NaClO_3 + 6H_2O$$

$n_f = 10/12 = 5/6$ $\quad$ $10/6 = n_f$

Type-6 Rxn

decomposition Rxn





S-II 1 — 5

J-Mains

S-II (1)

0.96 gm Fe_2O_3 50% mass of Fe_2O_3 = $\frac{0.48\ gm}{160}$

$Fe_2O_3 = x$

$Fe^{3+} = 2x$

$Fe^{3+} + Zn(s) \rightarrow Zn^{2+} + Fe^{2+}$

$Fe^{2+} + O.A \longrightarrow Fe^{3+}$

eq of Fe^{3+} = eq of O.A

$\frac{1}{4} \times \left(\frac{0.48}{160} \times 2\right) \times 1 = \frac{10}{30} \times 0.01 \times \eta$ $\quad \eta = 5$

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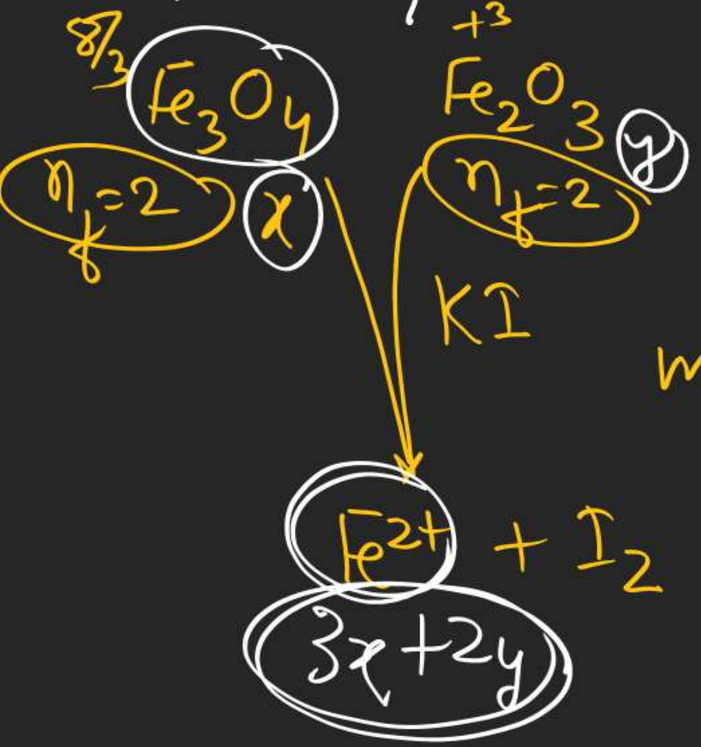
Q. A solution containing mixture of Fe_3O_4 (x mmol) & Fe_2O_3 (y mmol) is mixed with excess KI to produce Fe^{2+} & I_2. liberated I_2 required 100 ml 0.2 M $Na_2S_2O_3$ soln. The solution containing Fe^{2+} was titrated with $K_2Cr_2O_7$ and required 45 ml 0.1 M $K_2Cr_2O_7$. Find moles of each in initial mixture.



$Fe_2O_3 + KI \rightarrow I_2 + Fe^{2+}$

$Fe_3O_4 + KI \rightarrow I_2 + Fe^{2+}$

meq of Fe_2O_3 + meq of Fe_3O_4 = meq of I_2 = meq of $Na_2S_2O_3$

$2xy + 2x = 100 \times 0.2 \times 1 = 20$

$x + y = 10$ ——— (1)

$Fe^{2+} + K_2Cr_2O_7 \rightarrow Fe^{3+} + Cr^{3+}$

3x + 2y

$(3x + 2y) \times 1 = 45 \times 0.1 \times 6$

$3x + 2y = 27$ ... (2)

$2x + 2y = 20$

$x = 7$

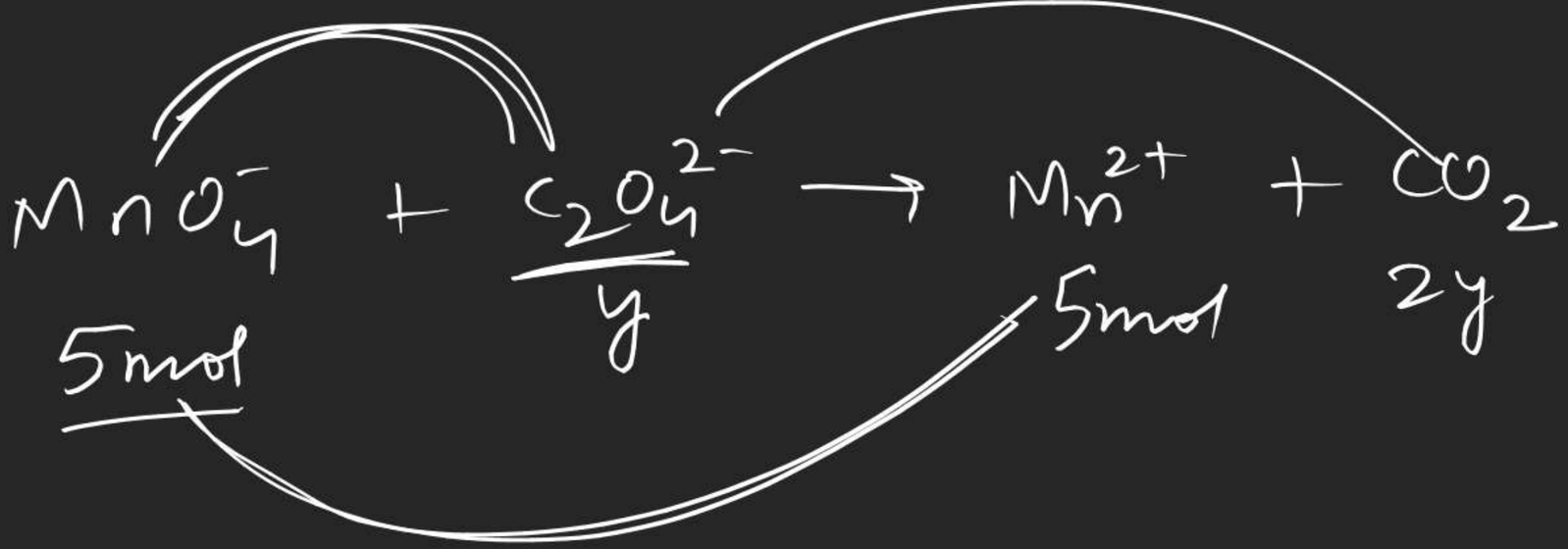
$y = 3$

Q. A chromate ore (x mol) $(Cr_2O_3 \cdot FeO)$ is dissolved in acid to produce Cr^{3+} & Fe^{2+}. resultant solution required 50 ml 0.25 M $K_2Cr_2O_7$. find moles of $(Cr_2O_3 \cdot FeO)$ in initial sample.

$$Fe^{2+} + K_2Cr_2O_7 \longrightarrow Fe^{3+} + Cr^{3+}$$

$$x \times 1 = \frac{50}{4} \times 0.25 \times 6 = 75$$

$$x = 75$$



$$As_2O_5 + HCl \longrightarrow AsCl_3 + Cl_2 + H_2O$$

$$As_2O_5 + \underset{(LR)}{10\,HCl} \longrightarrow 2\,AsCl_3 + 2Cl_2 + 5H_2O$$

$$\frac{230\ gm}{230} \qquad \frac{1825}{365}\ 5$$

$$= 1 \qquad = 5$$

30

Fe^{2+} + $K_2Cr_2O_7$

$x \times 1$ meq

Fe^{2+} + $K_2Cr_2O_7 \longrightarrow Fe^{3+}$

$7.5 \times 0.01 \times 1$ mg

$x \times 1 + 7.5 \times 0.01 = 25 \times 0.002 \times 6$

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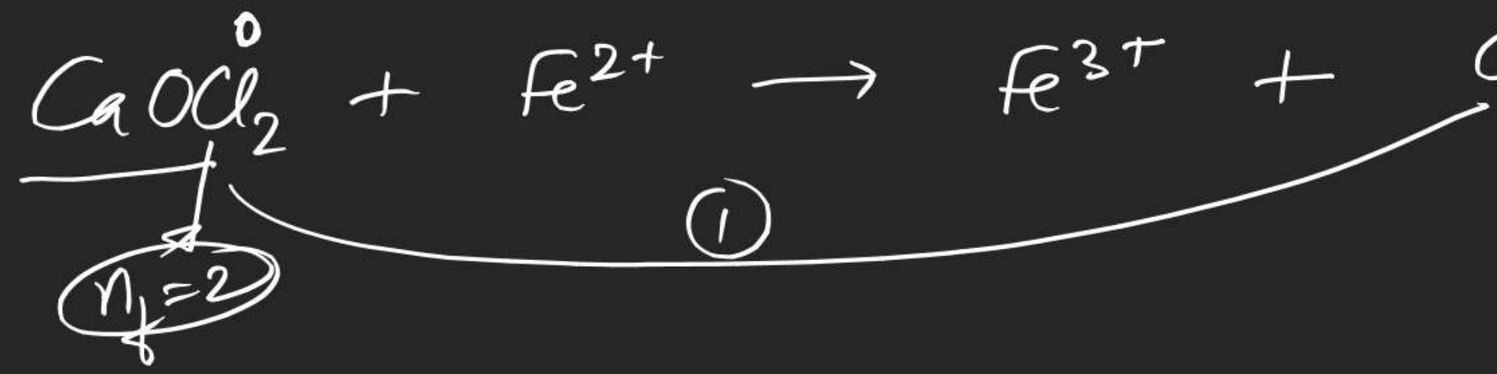
(31)



$KMnO_4$ + Fe^{2+}

meq of $CaOCl_2$ + meq of $KMnO_4$ = meq of Fe^{2+}

$n \times 2 + 30 \times 0.1 \times 5 = 35 \times 1 \times 1$

$n = 10$ = mmoles of $CaOCl_2$

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(34) Na_2CO_3 $NaHCO_3$ (HCl)

(x) (x)

$Na_2CO_3 + HCl \longrightarrow H_2CO_3 + 2NaCl$

$n_f = 2$

$106x + 84x = 19$

$NaHCO_3 + HCl \longrightarrow H_2CO_3 + NaCl$

$n_f = 1$

$x \times 2 + x \times 1 = V \times 0.1 \times 1$

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(37) meq of HCl = meq of $Ca(OH)_2$ + meq of NaOH