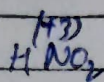


A Oxidising & Reducing agent.

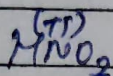


~~$x + 3 \times 0 = 0$~~ Always

— Reducing agent



— Both (R.A., & O.A.)



Always — Oxidising agent

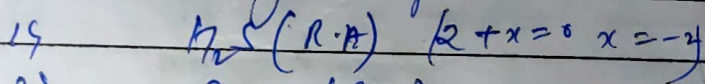
1) If an element is present in its lowest oxidation no. then it behaves as reducing agent only.

2) If an element is present in b/w lowest and highest oxidation no. then it behaves as oxidising as well as reducing agent.

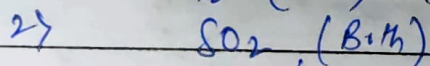
3) If an element is present in its highest oxidation no. then it behaves as oxidising agent only.



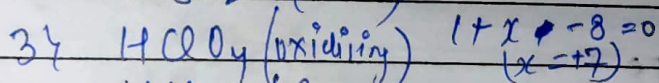
Decide which acts as oxidising agent or reducing agent or both?



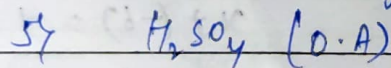
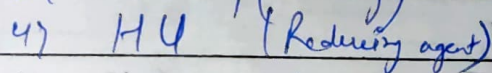
(-2), (+6)



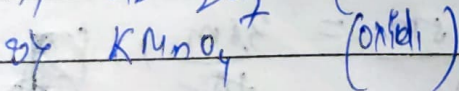
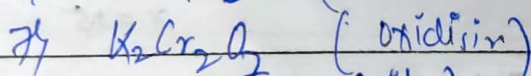
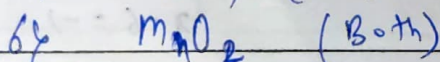
$$x - 4 = 0$$



$$x = +7$$



$$2 + x + 8 = 0$$



★ Note :- In case of KMnO_4

→ In acidic medium $\overset{(+7)}{\text{KMnO}_4}$ converted into Mn^{2+}
equivalent weight = $m/5$

→ In neutral medium $\overset{(+7)}{\text{KMnO}_4} \longrightarrow \overset{(+4)}{\text{MnO}_2}$ eq. wt = $m/3$

→ In alkaline medium $\overset{(+7)}{\text{KMnO}_4} \longrightarrow \overset{(+6)}{\text{K}_2\text{MnO}_4}$ eq. wt = $m/1$
weight

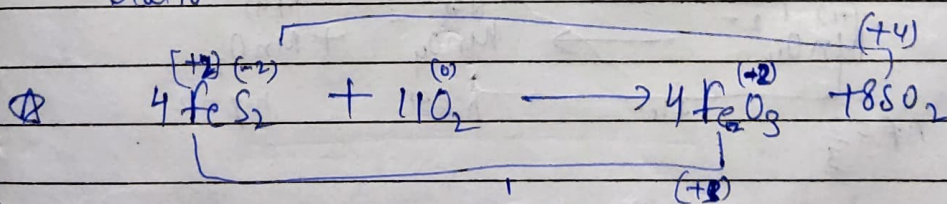
★ In case of $\text{K}_2\text{Cr}_2\text{O}_7$

(Acidic) $\overset{(+6)}{\text{K}_2\text{Cr}_2\text{O}_7} \longrightarrow \text{Cr}^{3+}$ eq weight = $m/6$

Note :- $\text{K}_2\text{Cr}_2\text{O}_7$ does not behave as an oxidising agent in neutral as well as in alkaline but in alkaline medium it shows the colour change (orange to yellow).

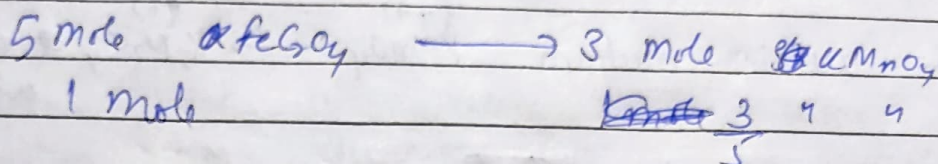
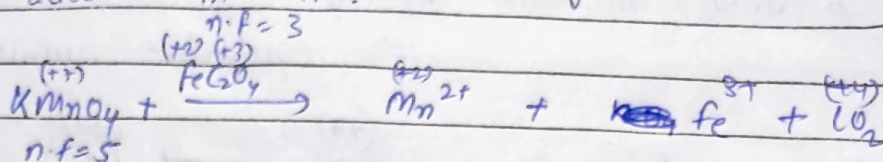
★ Balancing of equation by n-factor. as valence factor.

→ Inverse of n-factor ratio is the mol ratio.

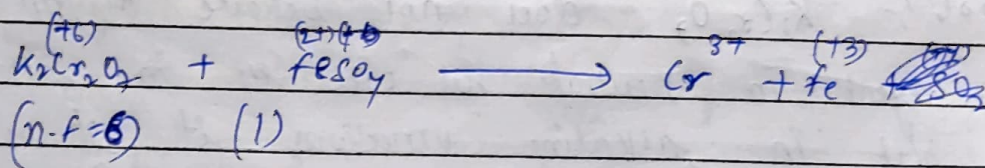


~~$m/5 + m/5$~~

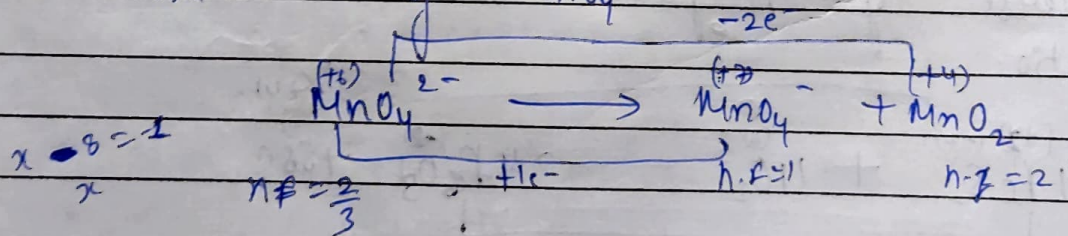
Q How many moles of KMnO_4 are required to oxidise one mole of FeSO_4 in acidic medium.



Q How many moles of $\text{K}_2\text{Cr}_2\text{O}_7$ are required to oxidise one mole of FeSO_4 in acidic medium

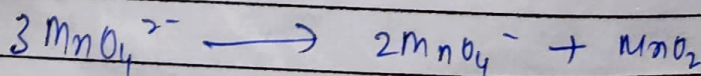


Q How many moles of MnO_4^- and MnO_2 are obtained after the disproportionation of one mole of MnO_4^{2-}



$$= \frac{m}{1} + \frac{m}{2} =$$

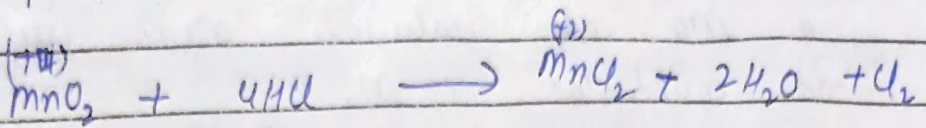
$$= \frac{3m}{2} = \frac{2}{3}$$



$$\frac{2}{3}$$

$$1 \frac{1}{3}$$

Q Calculation of n-factor from the balanced equation

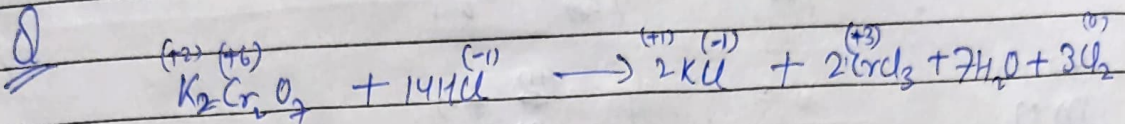


mole ratio 1 : 4

n.f = 4 : 1

$4 \times \frac{1}{2} : 1 \times \frac{1}{2}$

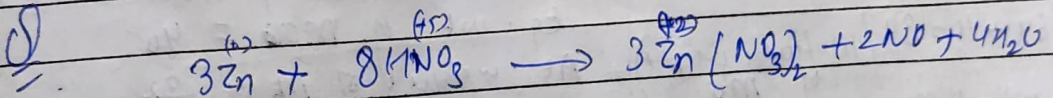
\therefore n.f of HCl = $0.5 \times \frac{1}{2}$



Mole ratio 1 : 14

$\frac{14 \times 6}{14} : \frac{1 \times 6}{14}$

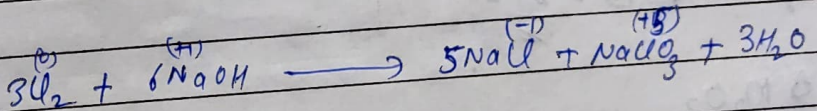
$-1 + 6$
5
 $2x + 12$
 $x = 6$



mole ratio = 3 : 8

n.f = $\frac{2 \times 1}{4} : \frac{3 \times 1}{4}$

Q



mole ratio 3 : 1

of 20

6440

2568

at 80

~~2568~~ ~~2568~~ ~~n.f~~

$\frac{m + m}{2}$

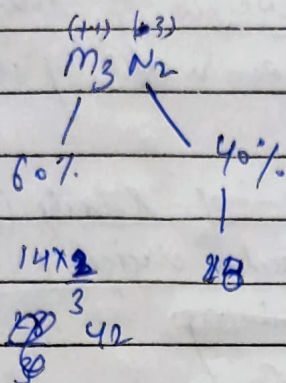
$= \frac{3m}{5} = n.f \times \frac{1}{3}$

$\frac{2568}{6} \times \frac{1 \times 5}{6} \rightarrow$ N.f of NaOH

Q 2 M_3N_2 (A metallic nitride) contains 40% Nitrogen. Then calculate molecular weight of eq. weight of metallic nitride also calculate atomic weight & equivalent weight of Metal.

Q 1

$$3x + 3 = 0$$



100 — 40%
60% — $\frac{40 \times 60}{100} = 24\%$
 $\frac{40 \times 60}{24} = 100$
 $\frac{14 \times 2}{28} = 1$
 $\frac{3 \times 42}{126} = 1$
 $\frac{14}{28} = 0.5$
 $\frac{3}{126} = 0.0238$
 $\frac{14}{28} = 0.5$
 $\frac{3}{126} = 0.0238$

molecular weight of $M_3N_2 = 70$

Equivalent weight of $M_3N_2 = \frac{70}{6}$

At weight of $M_3 = \frac{42}{6}$

Equivalent weight of $M_3 = \frac{42}{6}$

$\frac{12}{42} = 0.2857$
 $\frac{80}{112} = 0.7142$

Q 1 Equivalent Weight of metallic oxide is 40. Calculate the equivalent weight of its Carbonate and Sulphate.

$MOCO_3 = 32 + 64 + 92 = 188$

$MOSO_4 = 32 + 64 + 80 = 176$

$x + 6 = 0$
 $x = -6$

★ Normality

no. of equivalents of solute dissolved in 1 litre of solution is the normality of the solution.

$$N = \frac{\text{weight of solute}}{\text{eq. weight of solute} \times \text{Volume of soln (l)}}$$

$$N = \frac{\text{weight of solute (g)} \times n.f}{\text{molecular weight} \times \text{Volume of solution (l)}}$$

$$N = M \times n.f$$

★ Normality of mixed solution

→ Case I:- If two or more acids or bases are mixed together then normality of mixed solution can be calculated as

$$N_1 V_1 + N_2 V_2 + N_3 V_3 \dots = N \cdot V \rightarrow \begin{array}{l} \text{Volume of} \\ \text{resulting solution} \end{array}$$

↓
Normality resulting solution

→ Case II:- If acid & base are mixed together then normality of resulting soln can be calculated as

$$\begin{array}{c} N_1 V_1 - N_2 V_2 = N \cdot V \\ \text{(Acid)} \quad \text{(Base)} \end{array} \rightarrow \begin{array}{l} \text{Volume} \\ \text{resulting} \\ \text{solution} \end{array}$$

↓
Normality resulting solution

Q 200 ml $\frac{N}{10}$ HCl is mixed with 150 ml $\frac{N}{8}$ NaOH and resulting solution is made upto 1 l. calculate the normality of resulting solution

$$200 \times \frac{N}{10} - 150 \times \frac{N}{8} = N \times 1000 \text{ ml}$$

$$20N - 30N = N \times 1000$$

$$N(-10) = N \times 1000 \Rightarrow 0.01 N = N_r, \text{ basic}$$

~~Volume of solution~~ ~~350 ml~~

$$\text{Cent} = \frac{1}{100}, \text{ fermi} = \frac{1}{10^2}, \text{ deci} = \frac{1}{10}$$

Q 150 ml $\frac{M}{30}$ H_2PO_4 , 200 ml $\frac{M}{10}$ H_2SO_4 & 150 ml $\frac{N}{5}$ HNO_3 are mixed together. Calculate normality of resulting solution.

HNO_3 are mixed together. Calculate normality of resulting solution.

$$\frac{m \times 2 \times 150}{30} + \frac{m \times 2 \times 200}{10} + \frac{N \times 150}{5} = N \times V$$

$$15N + 40N + 30N = N \times 500$$

$$1785 = N \times 500 \Rightarrow N = 3.57$$

★ Equivalent Concept