CHAPTER

8 Redox Reactions

Normality Vs Molarity

	Molarity (M)		Normality (N)
1.	No. of moles of solute present in one litre of solution.	1.	No. of equivalents of solute present in one litre of solution
2.	No. of moles = $\frac{W}{M}$	2.	No. of equivalents = $\frac{W}{E}$
3.	$\frac{W}{M} \times 1000$ = No. of millimoles	3.	$\frac{W}{E} \times 1000$ = No. of equivalents
4.	Molarity V(in mL) = No. of millimoles	4.	Normality V(in mL) = No. of equivalents
5.	Molarity = $\frac{\text{milli moles}}{\text{Volume of solution in mL}}$	5.	Normality = $\frac{\text{milli equivalents}}{\text{Volume of solution in mL}}$

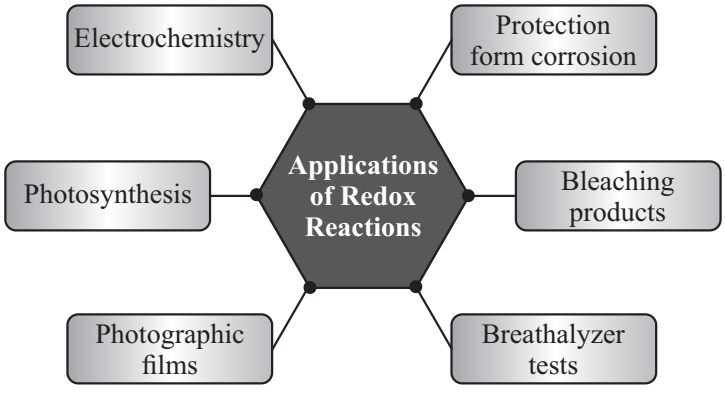

Table: Some Redox Titratrion Excluding Iodometric/ Iodimetric

	Estimation of	By titrating with	Reaction	Relation* between OA and RA
1.	Fe^{2+}	MnO_4^-	$Fe^{2+} \rightarrow Fe^{3+} + e^-$ $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	$5Fe^{2+} \equiv MnO_4^-$ Eq. wt. of Fe^{2+} = M/1
2.	Fe^{2+}	$Cr_2O_7^{2-}$	$Fe^{2+} \rightarrow Fe^{3+} + e^-$ $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$	$6Fe^{2+} \equiv Cr_2O_7^{2-}$ Eq. wt. of $Cr_2O_7^{2-}$ = M/6
3.	$C_2O_4^{2-}$	MnO_4^-	$C_2O_4^{2-} \rightarrow 2CO_2 + 2e^-$ $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	$5C_2O_4^{2-} \equiv 2MnO_4^-$ Eq. wt. of $C_2O_4^{2-}$ = M/2
4.	H_2O_2	MnO_4^-	$H_2O_2 \rightarrow 2H^+ + O_2 + 2e^-$ $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	$5H_2O_2 \equiv 2MnO_4^-$ Eq. wt. of H_2O_2 = M/2
5.	As_2O_3	MnO_4^-	$As_2O_3 + 5H_2O \rightarrow 2AsO_4^{3-} + 10H^+ + 4e^-$ $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	Eq. wt. of As_2O_3 = M/4
6.	AsO_3^{3-}	BrO_3^-	$AsO_3^{3-} + H_2O \rightarrow AsO_4^{3-} + 2H^+ + 2e^-$ $BrO_3^- + 6H^+ + 6e^- \rightarrow Br^- + 3H_2O$	Eq. wt of AsO_3^{3-} = M/2 Eq. wt. of BrO_3^- = M/6

Iodimetric Titrations

Estimation of	Reaction	Relation between O.A. and R.A.
H_2S (in acidic medium)	$H_2S + I_2 \rightarrow S + 2I^- + 2H^+$	$H_2S \equiv I_2 \equiv 2I^-$ Eq. wt. of H_2S = M/2
SO_3^{2-} (in acidic medium)	$SO_3^{2-} + I_2 + H_2O \rightarrow SO_4^{2-} + 2I^- + 2H^+$	$SO_3^{2-} \equiv I_2 \equiv 2I^-$ Eq. wt. of SO_3^{2-} = M/2
Sn^{2+}	$Sn^{2+} + I_2 \rightarrow Sn^{4+} + 2I^-$	Sn^{2+} $I_2 \equiv 2I^-$ Eq. wt. of Sn^{2+} = M/2
As (III) (at pH = 8)	$H_2AsO_3^- + I_2 + H_2O \rightarrow HAsO_4^{2-} + 2I^{-1} + 2H^+$	$H_2AsO_3^- \equiv I_2 \equiv 2I^-$ Eq. wt. of $H_2AsO_3^-$ = M/2
N_2H_4	$N_2H_4 + 2I_2 \rightarrow N_2 + 4H^+ + 4I^-$	$N_2H_4 \equiv 2I_2 \equiv 4I^-$ Eq. wt. of N_2H_4 = M/4
I_2	$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6$ or $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$	$I_2 = 2I \equiv 2Na_2S_2O_3$
$CuSO_4$	$2CuSO_4 + 4KI \rightarrow 2Cu_2I_2 + 2K_2SO_4 + I_2$ $Cu^{2+} + 4I^- \rightarrow Cu_2I_2 + I_2$ (White ppt.) $CaOCl_2 + H_2O \rightarrow Ca(OH)_2 + Cl_2$	$2CuSO_4 \equiv I_2 \equiv 2I^- \equiv 2Na_2S_2O_3$ Eq. wt. of $CuSO_4$ = M/1
$CaOCl_2$	$Cl_2 + 2KI \rightarrow 2KCl + I_2$ $Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$ $MnO_2 + 4HCl\ (conc) \xrightarrow{\Delta} MnCl_2 + Cl_2 + 2H_2O$ $Cl_2 + 2KI \rightarrow 2KCl + I_2$	
MnO_2	$MnO_2 + 4H^+ + 2Cl^- \rightarrow Mn^{2+} + 2H_2O + Cl_2$ $Cl_2 + 2I^- \rightarrow I_2 + 2Cl^-$	$MnO_2 \equiv Cl_2 \equiv I_2 \equiv 2I^- \equiv 2Na_2S_2O_3$ Eq. wt. of MnO_2 = M/2
IO_3^-	$IO_3^- + 5I^- + 6H^+ \rightarrow 3I_2 + 3H_2O$	$IO_3^- \equiv 3I_2 \equiv 6I \equiv 6Na_2S_2O_3$ Eq. wt. of IO_3^- = M/6