1. Reduction of the metal centre in aqueous permanganate ion involves - **[JEE-2011]**

(A) 3 electrons in neutral medium

(B) 5 electrons in neutral medium

(C) 3 electrons in alkaline medium

(D) 5 electrons in acidic medium

$MnO_4^- \xrightarrow{H^+} Mn^{2+}$

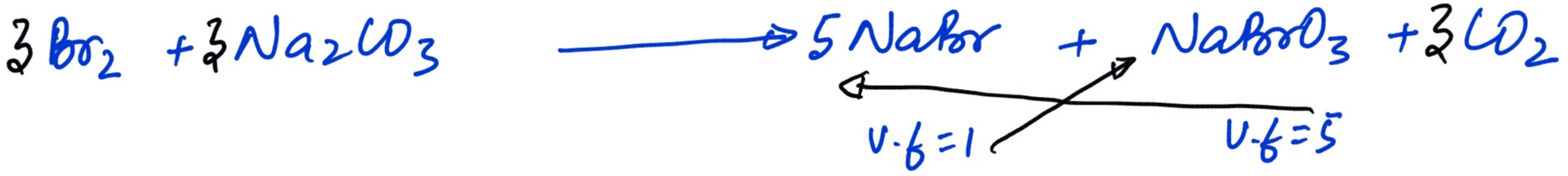
$V.f = 1(7-2) = \boxed{5}$

$MnO_4^- \xrightarrow{H_2O/OH^-} MnO_2$

$V.f = 1(7-4) = \boxed{3}$

2. Reaction of Br_2 with Na_2CO_3 in aqueous solution gives sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is.

[JEE- 2011]



Coefficient of NaBr = 5

Ans.

3. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen-

(A) HNO_3, NO, NH_4Cl, N_2 (B) HNO_3, NO, N_2, NH_4Cl

(C) HNO_3, NH_4Cl, NO, N_2 (D) NO, HNO_3, NH_4Cl, N_2 **[JEE- 2012]**

(+5) (+2) (-3) (0)

(A) HNO_3, NO, NH_4Cl, N_2

(+5) (+2) (0) (-3)

(B) HNO_3, NO, N_2, NH_4Cl

(+5) (-3) (+2) (0)

(C) HNO_3, NH_4Cl, NO, N_2

(+2) (+5) (-3) (0)

(D) NO, HNO_3, NH_4Cl, N_2

4. 25 mL of household bleach solution was mixed with 30 mL of 0.50 M KI and 10 mL of 4 N acetic acid. In the titration of the liberated iodine, 48 mL of 0.25 N $Na_2S_2O_3$ was used to reach the end point. The molarity of the household bleach solution is **[JEE- 2012]**

(A) 0.48 M (B) 0.96 M (C) 0.24 M (D) 0.024 M

House hold bleach soln = soln of bleaching powder ($CaOCl_2$).

Let molarity of $CaOCl_2$ = M.

$CaOCl_2 + 2CH_3COOH \longrightarrow Ca(CH_3COO)_2 + H_2O + Cl_2$

25 mL, M — excess — 25M mmole

25×M mmole

$Cl_2 + 2KI \longrightarrow 2KCl + I_2$

25M mmole — excess — 25M mmole

$I_2 + 2Na_2S_2O_3 \longrightarrow 2NaI + Na_2S_4O_6$.

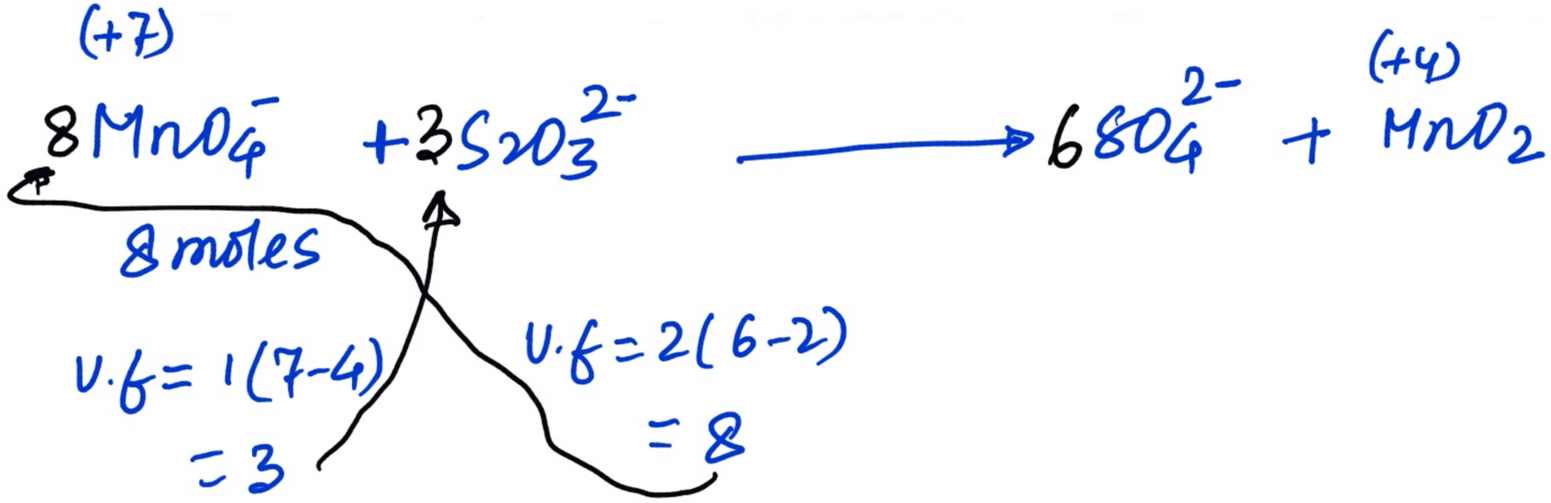
25M mmole

V.f = 1, ∴ Molarity = Normality.

48 mL, 0.25 M

$2 \times 25M \text{ mmole} = 0.25 \times 48 \Rightarrow M = \boxed{0.24 \text{ Molar}}$.

5. In neutral or faintly alkaline solution, 8 moles permanganate anion quantitatively oxidize thiosulphate anions to produce X moles of a sulphur containing product. the magnitude of X is**[JEE- 2016]**



$\therefore$ $\boxed{X=6}$ Ans.

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6. To measure the quantity of $MnCl_2$ dissolved in an aqueous solution, it was completely converted to $KMnO_4$ using the reaction, **[JEE- 2018]**

$MnCl_2 + K_2S_2O_8 + H_2O \rightarrow KMnO_4 + H_2SO_4 + HCl$ (equation not balanced).

Few drops of concentrated HCl were added to this solution and gently warmed. Further, oxalic acid (225 g) was added in portions till the colour of the permanganate ion disappeard. The quantity of $MnCl_2$ (in mg) present in the initial solution is _____.

(Atomic weights in g mol^{-1} : Mn = 55, Cl = 35.5)

$2\times158g \qquad 5\times90g$

$2KMnO_4 + 5H_2C_2O_4 + 6H^+ \longrightarrow 2K^+ + 2Mn^{2+} + 10CO_2 + 8H_2O$

$\frac{2\times158}{5\times90}\times225g \qquad 225g$

$= 158g = 1$ mole.

Now, $MnCl_2 + K_2S_2O_8 + H_2O \longrightarrow KMnO_4 + H_2SO_4 + HCl$.

By applying POAC on Mn, we can say that,

moles of $MnCl_2$ = moles of $KMnO_4$ = 1 mole.

$\therefore$ mass of $MnCl_2 = 1\times126g = \boxed{126g}$ Ans.