

Q1. JEE Main 2026 (24 January Shift 2)

One mole of $\text{Cl}_2(\text{g})$ was passed into 2 L of cold 2 M KOH solution. After the reaction, the concentrations of Cl^- , ClO^- and OH^- are respectively (assume volume remains constant)

- (1) 0.5M, 0.5M, 1M
(2) 0.75M, 0.75M, 1M
(3) 0.5M, 0.5M, 0.5M
(4) 1M, 1M, 1M

Q2. JEE Main 2026 (22 January Shift 2)

Identify the correct statements :

- A. Hydrated salts can be used as primary standard.
B. Primary standard should not undergo any reaction with air.
C. Reactions of primary standard with another substance should be instantaneous and stoichiometric.
D. Primary standard should not be soluble in water.
E. Primary standard should have low relative molar mass.

Choose the correct answer from the options given below :

- (1) A, B, C and E Only
(2) A, B and E Only
(3) A, B and C Only
(4) D and E Only

Q3. JEE Main 2026 (23 January Shift 2)

200 cc of $x \times 10^{-3}\text{M}$ potassium dichromate is required to oxidise 750 cc of 0.6 M Mohr's salt solution in acidic medium. Here $x =$ _____.

Q4. JEE Main 2026 (28 January Shift 1)

500 mL of 1.2 M KI solution is mixed with 500 mL of 0.2M KMnO_4 solution in basic medium. The liberated iodine was titrated with standard 0.1M $\text{Na}_2\text{S}_2\text{O}_3$ solution in the presence of starch indicator till the blue color disappeared. The volume (in L) of $\text{Na}_2\text{S}_2\text{O}_3$ consumed is _____. (Nearest integer)

Q5. JEE Main 2026 (24 January Shift 1)

X and Y are the number of electrons involved, respectively during the oxidation of I^- to I_2 and S^{2-} to S by acidified $\text{K}_2\text{Cr}_2\text{O}_7$. The value of $X + Y$ is _____.

ANSWERS AND SOLUTIONS

1. (1)

2. (3)

3. 375

4. 3

5. 12

1. (1) Cl_2 undergoes disproportionation in cold KOH: $\text{Cl}_2 + 2\text{OH}^- \rightarrow \text{Cl}^- + \text{ClO}^- + \text{H}_2\text{O}$

Initial: 1 mole Cl_2 , 2 L $\times$ 2 M KOH = 4 moles OH^-

Molar ratio $\text{Cl}_2:\text{OH}^- = 1:2$ (stoichiometric)

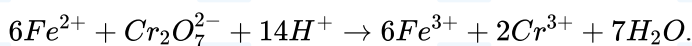
Products formed: 1 mole Cl^- , 1 mole ClO^- ; Excess $\text{OH}^- = 4 - 2 = 2$ moles

In 2 L solution: $[\text{Cl}^-] = 0.5 \text{ M}$, $[\text{ClO}^-] = 0.5 \text{ M}$, $[\text{OH}^-] = 1 \text{ M}$

2. (3) Primary standard must be soluble for standard solution formation

3. (375) Mohr's salt ($\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$) is a source of Fe^{2+} ions.

The redox reaction with potassium dichromate in acidic medium is:



Moles of Fe^{2+} from Mohr's salt solution:

$$n(\text{Fe}^{2+}) = 0.6 \text{ M} \times 0.750 \text{ L} = 0.45 \text{ mol}$$

From the stoichiometry, 6 moles of Fe^{2+} require 1 mole of $\text{Cr}_2\text{O}_7^{2-}$.

Moles of $\text{Cr}_2\text{O}_7^{2-}$ required:

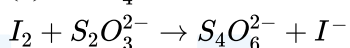
$$n(\text{Cr}_2\text{O}_7^{2-}) = \frac{0.45}{6} = 0.075 \text{ mol}$$

Molarity of potassium dichromate:

$$M = \frac{0.075 \text{ mol}}{0.200 \text{ L}} = 0.375 \text{ M} = 375 \times 10^{-3} \text{ M}$$

Therefore, $x = 375$.

4. (3) $\text{MnO}_4^- + \text{I}^- \rightarrow \text{MnO}_2 + \text{I}_2$



gram eq of KMnO_4 = gram eq of $\text{Na}_2\text{S}_2\text{O}_3$

$$0.2 \times \frac{500}{1000} \times 3 = 0.1 \times V \times 1$$

$$V = 3 \text{ L}$$

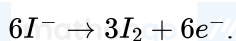
5. (12) In acidic medium, $\text{K}_2\text{Cr}_2\text{O}_7$ acts as a strong oxidizing agent where $\text{Cr}_2\text{O}_7^{2-}$ is reduced to Cr^{3+} .

The reduction half-reaction is: $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$.

For the oxidation of I^- to I_2 :

The balanced oxidation half-reaction is $2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$.

To balance the electrons with the reduction half-reaction (6 electrons), we multiply the oxidation half-reaction by 3:



Thus, the number of electrons involved in the balanced redox reaction for I^- oxidation is $X = 6$.

For the oxidation of S^{2-} to S :

The balanced oxidation half-reaction is $\text{S}^{2-} \rightarrow \text{S} + 2\text{e}^-$.

To balance the electrons with the reduction half-reaction (6 electrons), we multiply the oxidation half-reaction by 3:



Thus, the number of electrons involved in the balanced redox reaction for S^{2-} oxidation is $Y = 6$.

The value of $X + Y = 6 + 6 = 12$.