CHEMISTRY

SECTION–I : (i) Only One option correct Type

This section contains **11 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct. **3(–1)**

1. X gm of metal gave 'Y' gm of its oxide so equivalent mass of metal is :

(A) $\left(\frac{X}{Y-X}\right) \times 8$ (B) $\left(\frac{Y-X}{X}\right) \times 8$ (C) $\left(\frac{Y+X}{X}\right) \times 8$ (D) $\frac{X}{Y} \times 8$

2. What will be the equivalent weight of H_3PO_4 in the reaction :

$Ca(OH)_2 + H_3PO_4 \rightarrow CaHPO_4 + 2H_2O$

(A) 98 (B) 49 (C) 138 (D) 28

3. An element 'X' having equivalent man 'E' forms a general oxide $X_m O_n$, its atomic mass should be

(A) $\frac{2En}{m}$ (B) 2m En (C) $\frac{E}{n}$ (D) $\frac{ME}{2n}$

4. The following redox reaction occurs in basic medium : $NO_3^- + Zn(s) \rightarrow Zn^{2+} + NH_4^+$, when the above reaction is balanced such that the stoichiometric coefficients are in smallest whole number ratio, then the difference of stoichiometric coefficient of Zn(s) and OH^- ion will be -

(A) 4 (B) 10 (C) 6 (D) None of these

5. 1 mole of $H_2C_2O_4$ is oxidised by X mole of MnO_4^- in strong basic medium and 1 mole of $NaHC_2O_4$ is oxidised by y mole of MnO_4^- in acidic medium. Ratio of x/y is-

(A) 2 : 1 (B) 5 : 1 (C) 3 : 1 (D) 1 : 3

6. 0.8 M $FeSO_4$ solution requires 160ml, 0.2M $Al_2(Cr_2O_7)_3$ in acidic medium, Calculate volume of $FeSO_4$ consumed -

(A) 480 ml (B) 240 ml (C) 720 ml (D) 40 ml

7. In a titration of H_2O_2 certain amount is treated with 'y' mole of $KMnO_4$ in acidic medium. The mole of H_2O_2 in solution will be -

(A) 2y (B) $\frac{5y}{2}$ (C) 5y (D) 2y

8. What volume of 0.2M - $KMnO_4$ solution is required for complete reaction with 20 ml 0.4 M -FeC_2O_4 solution in presence of H_2SO_4 ?

(A) 24 ml (B) 8 ml (C) 16 ml (D) 120 ml

10. In the reduction of PbO_2 by Pb in presence of H_2SO_4, products being $PbSO_4$ and H_2O, the equivalent weight of H_2SO_4 is

(A) 49 (B) 98 (C) 196 (D) 147

11. In the reaction

$C_2H_5OH + xI_2 + 6OH^- \rightarrow CHI_3 + HCO_2^- + yI^- + 5H_2O$

the value of x and y respectively are -

(A) 2, 1 (B) 3, 3 (C) 4, 5 (D) 5, 7

(ii) One or more options correct Type

This section contains **2 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONE or MORE** are correct. **4(–1)**

12. Choose the **incorrect** statement(s)-

(A) 1 mole of MnO_4^- ion can oxidized 10 moles of Fe^{2+} ion in acidic medium

(B) 1 mole of $Cr_2O_7^{2-}$ ion can oxidized 12 moles of Fe^{2+} ion in acidic medium

(C) 2 mole of Cu_2S can be oxidized by 2.6 moles of MnO_4^- ion in acidic medium ($Cu_2S \rightarrow Cu^{2+} + SO_2$)

(D) 2 mole of Cu_2S can be oxidized by 8/3 moles of $Cr_2O_7^{2-}$ ion in acidic medium ($Cu_2S \rightarrow Cu^{2+} + SO_2$)

13. x mol of oxalate FeC_2O_4. $Fe_2(C_2O_4)_3 .2H_2O$ on reaction with $Al_2(Cr_2O_7)_3$ requires 500 ml 0.4M of it.

, select the correct statement(s) -

(A) n-factor of $Al_2(Cr_2O_7)_3$ is 6

(B) n-factor of $Al_2(Cr_2O_7)_3$ is 18

(C) Moles of oxalate which react with $Al_2(Cr_2O_7)_3$ is 0.4

(D) Moles of oxalate which react with $Al_2(Cr_2O_7)_3$ is 0.65

SECTION–II : Matrix-Match Type

This Section contains **2 question**. Question has **four statements** (A, B, C and D) given in **Column I** and five statements (P, Q, R, S and T) in **Column II**. Any given statement in Column I can have correct matching with **ONE** or **MORE** statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in Q and R, then for the particular question, against statement B, darken the bubbles corresponding to Q and R in the ORS. **8(0)**

1.

Column-I		**Column-II**	
(A)	$K_3[Fe(CN)_6] + KOH + H_2O_2 \rightarrow K_4[Fe(CN)_6] + H_2O + O_2$	(P)	Eq. wt of R.A. = M/2
(B)	$Cr(OH)_3 + NaOH + H_2O_2 \rightarrow Na_2CrO_4 + H_2O$	(Q)	Eq. wt of O.A. = M/2
(C)	$CaSO_4 + NH_3 + CO_2 + H_2O \rightarrow CaCO_3 \downarrow + (NH_4)_2SO_4$	(R)	Non redox reaction
(D)	$3XeF_4 + H_2O \rightarrow 2Xe + XeO_3 + O_2 + HF$	(S)	Redox reaction
		(T)	Eq. wt of O.A. = M

(O.A = oxidising agent , R.A = Reducing agent , M = Molecular weight)

2. A sample of raw material contain $NaNO_3$ also contains $NaIO_3$. The $NaIO_3$ can be used as a source of iodine, produced in the following reactions :

$$IO_3^- + HSO_3^- \longrightarrow I^- + SO_4^{2-} \text{..... (A)}$$
$$I^- + IO_3^- \longrightarrow I_2 + H_2O \text{ ..... (B)}$$

One litre of sample solution containing 396 g of $NaIO_3$ is treated with stoichiometric quantity of $NaHSO_3$. Now a substantial amount of same solution is added to reaction mixture to bring about the reaction (B) to completion

Column-I		**Column-II**	
(A)	n-factor of IO_3^- in reaction (B)	(P)	6
(B)	Number of moles of HSO_3^- used in reaction (A)	(Q)	1.2
(C)	Moles of I_2 produced	(R)	2
(D)	Equivalents of IO_3^- used in reaction (B)	(S)	5
		(T)	10

SECTION-III : (Integer Value Correct Type)

This section contains **7 questions**. The answer to each question is **a single digit Integer**, ranging from **0 to 9** (both inclusive) **4(–1)**

1. 10 ml of CO is mixed with 25 ml air (20% O_2 by volume) in a container at 1 atm. Find final volume (in ml) of container at 1 atm after complete combustion. (Assume that temperature remain constant).
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

2. An aq. solution of 0.5M $KMnO_4$ is divided into two parts. One part of it requires 125 ml of 1.5M aq. solution of oxalate ions in acidic medium, while another part requires 270 ml of 0.5M aq. solution of iodide ions in neutral medium which are converted into I_2 only. Calcualte total volume (mL) of the initial $KMnO_4$ solution.
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

3. A sample of 280 ml H_2O_2(aq) solution required 50 ml 0.1 M $Ba(MnO_4)_2$ under acidic conditions for complete reaction. Volume strength of H_2O_2 will be.

4. For the reaction

$$x\ I^- + y\ ClO_3^- + z\ H_2SO_4 \rightarrow Cl^- + w\ HSO_4^- + 3I_2$$

The value of w is -

5. The number of species(s) which can react with acidified $KMnO_4$ out of the following specie(s) is/ are -

$FeSO_4$, $Fe_2(SO_4)_3$, O_3, FeC_2O_4, $CuSO_4$, Cu_2S, H_2O_2, NO_2^- ,NO_3^-, SO_3^{2-}

6. A 1 litre solution containing equal moles of FeO and $Fe_{0.8}O$ was titrated with 70 ml 0.3M $KMnO_4$ in acidic medium. Millimoles Fe^{3+} produced are -
Fill your answer as sum of digits (excluding decimal places) till you get the single digit answer.

7. On being heated in oxygen, 3.12 gm of a metal M convert to 4.56 gm of oxide, Find the valency of metal (At. wt. of metal = 52)