Q1 - 25 July - Shift 1

The reaction of H_2O_2 with potassium permanganate in acidic medium leads to the formation of mainly:

(A) Mn^{2+} (B) Mn^{4+}
(C) Mn^{3+} (D) Mn^{6+}

Space for your notes:

Q2 - 25 July - Shift 1

Among Co^{3+}, Ti^{2+}, V^{2+} and Cr^{2+} ions, one if used as a reagent cannot liberate H_2 from dilute mineral acid solution, its spin-only magnetic moment in gaseous state is ……B.M. (Nearest integer)

Space for your notes:

Q3 - 26 July - Shift 2

The products obtained from a reaction of hydrogen peroxide and acidified potassium permanganate are

(A) Mn^{4+}, H_2O only (B) Mn^{2+}, H_2O only
(C) Mn^{4+}, H_2O, O_2 only (D) Mn^{2+}, H_2O, O_2 only

Space for your notes:

Q4 - 26 July - Shift 2

The spin-only magnetic moment value of the compound with strongest oxidizing ability among MnF_4, MnF_3 and MnF_2 is _____ B.M. [nearest integer]

Space for your notes:

Q5 - 27 July - Shift 1

Given below are two statements:

Statement I : Iron (III) catalyst, acidified $K_2Cr_2O_7$ and neutral $KMnO_4$ have the ability to oxidise I^- to I_2 independently.

Statement II: Manganate ion is paramagnetic in nature and involves $p\pi - p\pi$ bonding.

In the light of the above statements, choose the ***correct*** answer from the options.

(A) Both statement I and Statement II are ture

(B) Both statement I and Statement II are false

(C) Statement I is true but Statement II is false

(D) Statement I is false but Statement II is true

Space for your notes:

Q6 - 27 July - Shift 1

The total number of Mn = O bonds in Mn_2O_7 is _____

(A) 4 (B) 5

(C) 6 (D) 3

Space for your notes:

Q7 - 27 July - Shift 1

In the titration of $KMnO_4$ and oxalic acid in acidic medium, the change in oxidation number of carbon at the end point is_____

Space for your notes:

Q8 - 27 July - Shift 2

In neutral or alkaline solution, MnO_4^- oxidises thiosulphate to:

(A) $S_2O_7^{2-}$ (B) $S_2O_8^{2-}$

(C) SO_3^{2-} (D) SO_4^{2-}

Space for your notes:

Q9 - 27 July - Shift 2

The oxidation state of manganese in the product obtained in a reaction of potassium permanganate and hydrogen peroxide in basic medium is_____.

Space for your notes:

Q10 - 28 July - Shift 1

Which of the following has least tendency to liberate H_2 from mineral acids ?

(A) Cu (B) Mn

(C) Ni (D) Zn

Space for your notes:

Q11 - 28 July - Shift 1

The disproportionation of MnO_4^{2-} in acidic medium resulted in the formation of two manganese compounds A and B. If the oxidation state of Mn in B is smaller than that of A, then the spin-only magnetic moment (μ) value of B in BM is _____. (Nearest integer)

Space for your notes:

Q12 - 28 July - Shift 2

Which of the following pair is not isoelectronic species?
(At. no. Sm, 62; Er, 68: Yb, 70: Lu, 71; Eu, 63: Tb, 65; Tm, 69)

(A) Sm^{2+} and Eu^{3+} (B) Yb^{2+} and Lu^{3+}

(C) Eu^{2+} and Tb^{4+} (D) Tb^{2+} and Tm^{4+}

Space for your notes:

Q13 - 29 July - Shift 1

The reaction of zinc with excess of aqueous alkali, evolves hydrogen gas and gives :

(A) $Zn(OH)_2$ (B) ZnO

(C) $[Zn(OH)_4]^{2-}$ (D) $[ZnO_2]^{2-}$

Space for your notes:

Q14 - 29 July - Shift 1

In following pairs, the one in which both transition metal ions are colourless is :

(A) Sc^{3+}, Zn^{2+}

(B) Ti^{4+}, Cu^{2+}

(C) V^{2+}, Ti^{3+}

(D) Zn^{2+}, Mn^{2+}

Space for your notes:

Q15 - 29 July - Shift 1

In neutral or faintly alkaline medium, $KMnO_4$ being a powerful oxidant can oxidize, thiosulphate almost quantitatively, to sulphate. In this reaction overall change in oxidation state of manganese will be :

(A) 5 (B) 1 (C) 0 (D) 3

Space for your notes:

Q16 - 29 July - Shift 2

Which of the following 3d-metal ion will give the lowest enthalpy of hydration ($\Delta_{hyd}H$) when dissolved in water ?

(A) Cr^{2+} (B) Mn^{2+}

(C) Fe^{2+} (D) Co^{2+}

Space for your notes:

Answer Key

Q1 (A)	**Q2** (5)	**Q3** (D)	**Q4** (5)
Q5 (B)	**Q6** (C)	**Q7** (1)	**Q8** (D)
Q9 (4)	**Q10** (A)	**Q11** (4)	**Q12** (D)
Q13 (C)	**Q14** (A)	**Q15** (D)	**Q16** (B)

Q1 (A)

$H_2O_2 + MnO_4^- \rightarrow Mn^{2+} + O_2$ (unbalanced)

Q2 (5)

Co^{3+} can't liberate H_2.

It has d^6 configuration,

Number of unpaired electrons $= 4$

$\mu = \sqrt{4 \times 6} = 4.92$ B.M.

Q3 (D)

$6H^+ + 2MnO_4^- + 5H_2O_2 \longrightarrow 2Mn^{+2} + 8H_2O + 5O_2$

Q4 (5)

MnF_4 MnF_3 MnF_2

$+4$ $+3$ $+2$

E.C $= [Ar]3d^3$ $[Ar]3d^4$ $[Ar]3d^5$

Hence $MnF_3 \Rightarrow$ strongest O.A

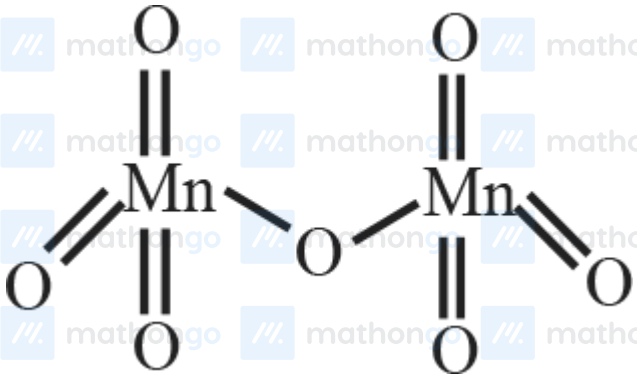
$\mu = \sqrt{4(4+2)} = \sqrt{24} = 4.89 = 5$

Q5 (B)

Neutral $KMnO_4$ oxidises I^- to IO_3^-

Manganate ion has dπ-pπ bonding.

Q6 (C)



Q7 (1)

Oxidation state of carbon changes from +3 to +4.

$$2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4(dil.) \rightarrow$$

$$K_2SO_4 + 2MnSO_4 + 10CO_2 + 8H_2O$$

Q8 (D)

$$8MnO_4^- + 3S_2O_3^{2-} + H_2O \xrightarrow[\text{alk. solution}]{\text{neutral or}} 8MnO_2 + 6SO_4^{2-} + 2OH^-$$

Q9 (4)

$$2KMnO_4 + 3H_2O_2 \xrightarrow{\text{basic medium}} 2\overset{+4}{MnO_2} + 3O_2 + 2H_2O + 2KOH$$

Q10 (A)

Copper is least electropositive among the given metals and it lies below H in reactivity series

Q11 (4)

$$MnO_4^{2-} \xrightarrow{H^+} MnO_4^- + MnO_2$$

No. of unpaired $\bar{e} = 3$

$$\therefore \ \mu = \sqrt{15} = 3.877$$

Nearest Integer $= 4$

Q12 (D)

$Sm^{2+} \rightarrow$ electron $= 60$

$Er^{3+} \rightarrow$ electron $= 65$

$Tb^{2+} \rightarrow$ electron $= 63$

$Tm^{4+} \rightarrow$ electron $= 65$

} (not isoelectronic)

Q13 (C)

Zinc dissolves in excess of aqueous alkali

$$Zn + 2OH^- + 2H_2O \rightarrow \underset{\text{Tetrahydroxozincate(II) ion}}{[Zn(OH)_4]^{2-}} + H_2 \uparrow$$

However, this reaction in NCERT is given as

$$Zn + 2NaOH \rightarrow Na_2ZnO_2 + H_2 \uparrow$$

ZnO_2^{2-} is anhydrous form of $[Zn(OH)_4]^{2-}$

So in aqueous medium best answer of this question is $[Zn(OH)_4]^{2-}$

Q14 (A)

(A) Sc^{3+}, Zn^{2+} (B) Ti^{4+}, Cu^{2+}

$3d^0$ $3d^{10}$ $3d^0$ $3d^9$

(C) V^{2+}, Ti^{3+} (D) Zn^{2+}, Mn^{2+}

$3d^3$ $3d^1$ $3d^{10}$ $3d^5$

No d-d transitions in ions with d^o & d^{10} configuration. Therefore they are colourless.

Q15 (D)

$$8\overset{+7}{Mn}O_4^- + 3S_2O_3^{2-} + H_2O \rightarrow 8\overset{+4}{Mn}O_2 + 6SO_4^{2-} + 2OH^-$$

Change in oxidation state of Mn is from +7 to +4 which is 3.

Q16 (B)

Enthalpy of hydration increases with increase in charge density. Mn^{+2} has least charge density (as Mn has highest size among the given options) so it will have least enthalpy of hydration.