Q1 - 24 June - Shift 1

The difference in oxidation state of chromium in chromate and dichromate salts is _____

Space for your notes:

Q2 - 24 June - Shift 2

Manganese (VI) has ability to disproportionate in acidic solution. The difference in oxidation states of two ions it forms in acidic solution is_____

Space for your notes:

Q3 - 25 June - Shift 1

Cerium (IV) has a noble gas configuration. Which of the following is correct statement about it?

(A) It will not prefer to undergo redox reactions.

(B) It will prefer to gain electron and act as an oxidizing agent

(C) It will prefer to give away an electron and behave as reducing agent

(D) It acts as both, oxidizing and reducing agent.

Space for your notes:

Q4 - 25 June - Shift 1

Among the following, which is the strongest oxidizing agent ?

(A) Mn^{3+} (B) Fe^{3+}

(C) Ti^{3+} (D) Cr^{3+}

Space for your notes:

Q5 - 25 June - Shift 2

The metal ion (in gaseous state) with lowest spin-only magnetic moment value is

(A) V^{2+} (B) Ni^{2+}

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

Space for your notes:

Q6 - 26 June - Shift 1

The spin–only magnetic moment value of the most basic oxide of vanadium among V_2O_3, V_2O_4 and V_2O_5 is _____ B.M. (Nearest Integer)

Space for your notes:

Q7 - 26 June - Shift 2

The most common oxidation state of Lanthanoid elements is +3. Which of the following is likely to deviate easily from +3 oxidation state?

(1) Ce (At. No. 58) (2) La (At. No. 57)

(3) Lu (At. No. 71) (4) Gd (At. No. 64)

Space for your notes:

Q8 - 27 June - Shift 1

The number of statement(s) correct from the following for copper (at no. 29) is/are _____

(A) Cu(II) complexes are always paramagnetic

(B) Cu(I) complexes are generally colourless

(C) Cu(I) is easily oxidized

(D) In Fehling solution, the active reagent has Cu(I)

Space for your notes:

Q9 - 27 June - Shift 1

Acidified potassium permanganate solution oxidises oxalic acid. The spin-only magnetic moment of the manganese product formed from the above reaction is _____ B.M. (Nearest Integer)

Space for your notes:

Q10 - 27 June - Shift 2

The 'f' orbitals are half and completely filled, respectively in lanthanide ions

(Given: Atomic no. Eu, 63; Sm, 62; Tm, 69; Tb, 65; Yb, 70; Dy, 66]

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

(C) Tb^{4+} and Yb^{2+} (D) Dy^{3+} and Yb^{3+}

Space for your notes:

Q11 - 28 June - Shift 1

Dihydrogen reacts with CuO to give

(A) CuH_2

(B) Cu

(C) Cu_2O

(D) $Cu(OH)_2$

Space for your notes:

Q12 - 28 June - Shift 1

Which one of the lanthanoids given below is the most stable in divalent form?

(A) Ce (Atomic Number 58)

(B) Sm (Atomic Number 62)

(C) Eu (Atomic Number 63)

(D) Yb (Atomic Number 70)

Space for your notes:

Q13 - 29 June - Shift 1

The number of terminal oxygen atoms present in the product B obtained from the following reaction is _____.

$FeCr_2O_4 + Na_2CO_3 + O_2 \rightarrow A + Fe_2O_3 + CO_2$

$A + H^+ \rightarrow B + H_2O + Na^+$

Space for your notes:

Q14 - 29 June - Shift 1

An acidified manganate solution undergoes disproportionation reaction. The spin-only magnetic moment value of the product having manganese in higher oxidation state is _____ B.M. (Nearest integer)

Space for your notes:

Answer Key

Q1 (0) **Q2** (3) **Q3** (B) **Q4** (A)

Q5 (B) **Q6** (3) **Q7** (A) **Q8** (3)

Q9 (6) **Q10** (C) **Q11** (B) **Q12** (C)

Q13 (6) **Q14** (0)

Q1 (0)

$\overset{+6}{Cr}O_4^{2-}, \overset{+6}{Cr_2}O_7^{2-}$ difference is zero

Q2 (3)

MnO_4^{2-} disproportionates in a neutral or acidic solution to give MnO_4^- and Mn^{+4}

$3MnO_4^{2-} + 3H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$

O.S. of Mn in $MnO_4^- = +7$

O.S. of Mn in $MnO_2 = +4$

difference = 3

Q3 (B)

Cerium exists in two different oxidation state +3, +4

$Ce^{+4} + e^- \rightarrow Ce^{3+} \quad E^0 = +1.61\ V$

$Ce^{+3} + 3e^- \rightarrow Ce \quad E^0 = -2.336\ V$

It shows Ce^{+4} acts as a strong oxidising agent & accepts electron.

Q4 (A)

Strongest oxidising agent have highest reduction potential value

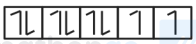
$E^0_{Mn^{+3}/Mn^{+2}} = 1.51V$ (highest)

Q5 (B)

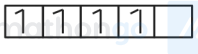
V^{2+} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3$


(3d) (unpaired $e^- = 3$)

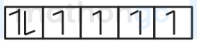
Ni^{2+} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^8$


(3d) (unpaired $e^- = 2$)

Cr^{2+} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4$


(3d) (unpaired $e^- = 4$)

Fe^{2+} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$


(3d) (unpaired $e^- = 4$)

Q6 (3)

Most basic oxide is V_2O_3

$V^{+3} \rightarrow [A_r]\ 3d^2$

$$\mu = \sqrt{2(2+2)} = 2.84\ BM \approx 3$$

Q7 (A)

$Ce = [Xe]\ 4f^1\ 5d^1\ 6s^2$

$Ce^{3+} = [Xe]\ 4f^1\ 5d^0$

$Ce^{+4} = [Xe]\ 4f^0\ 5d^0$ (Noble gas configuration)

Q8 (3)

A,B,C are correct and D is incorrect because Fehling solution has Cu(II)

Q9 (6)

$2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 10CO_2 + 8H_2O$

Mn^{2+} has 5 unpaired electrons therefore the magnetic moment is $\sqrt{35}$ BM

Q10 (C)

$$Tb \rightarrow 4f^9 6s^2$$

$$Tb^{+4} \rightarrow 4f^7$$

$$Yb \rightarrow 4f^{14} 6s^2$$

$$Yb^{+2} \rightarrow 4f^{14}$$

Q11 (B)

$CuO + H_2 \rightarrow Cu + H_2O$ (under hot conditions)

Q12 (C)

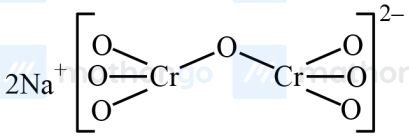
$E^{o}_{M^{3+}/M^{2+}} \Rightarrow \begin{matrix} Eu & Yb \\ -0.35 & -1.05 \end{matrix}$

Hence, due to more reduction potential in Eu as compared to Yb, it can concluded that Eu^{2+} is more stable than Yb^{2+}.

Q13 (6)

$4FeCr_2O_4 + 8Na_2CO_3 + 7O_2 \rightarrow 8Na_2CrO_4 + 2Fe_2O_3 + 8CO_2$

$2Na_2CrO_4 + 2H^+ \rightarrow \underbrace{Na_2Cr_2O_7}_{B} + 2Na^+ + H_2O$



Q14 (0)

$$3MnO_4^{2-} + 4H^+ \longrightarrow 2\overset{+7}{Mn}O_4^- + \overset{+4}{Mn}O_2 + 2H_2O$$

$\overset{+7}{Mn}$ = no. of unpaired electrons is '0'

$\mu = 0$ B.M.