ULTIMATE KCET CRASH COURSE 2026

CHEMISTRY

DPP: 1

Redox Reaction

Q1 Oxidation numbers of P in PO_4^{3-} of S in SO_4^{2-} and that of Cr in $Cr_2O_4^{2-}$ are respectively

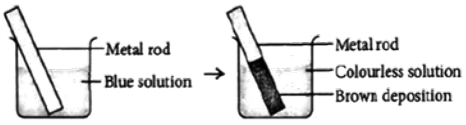
(A) +3, +6 and +5

(B) +5, +3 and +6

(C) –3, +6 and +6

(D) +5, +6 and +6

Q2 A redox reaction is shown in the diagrams. Identify the reaction.



(A) $Zn_{(s)} + Cu^{2+}_{(aq)} \rightarrow Zn^{2+}_{(aq)} + Cu_{(s)}$

(B) $Cu_{(s)} + 2\,Ag^{+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + 2\,Ag_{(s)}$

(C) $2\,Ag_{(s)} + Cu^{2+}_{(aq)} \rightarrow 2\,Ag^{+}_{(aq)} + Cu_{(s)}$

(D) $Cu_{(s)} + Zn^{2+}_{(aq)} \rightarrow Cu^{2+}_{(aq)} + Zn_{(s)}$

Q3 What volume of 3 molar HNO_3 is needed to oxidise 8 g of Fe^{2+} to Fe^{3+}, HNO_3, gets converted to NO ?

(A) 32 mL (B) 8 mL

(C) 16 mL (D) 64 mL

Q4 The oxidation number of sulphur in S_8, S_2F_2, H_2S respectively, are

(A) –2, +1 and –2

(B) 0, +1 and +2

(C) +2, +1 and –2

(D) 0, +1 and –2

Q5 In which of the following, the oxidation number of carbon has been arranged in increasing order?

(A) $CH_3 - CH_3 < (COOH)_2 < C_6H_{12}O_6 < CH \equiv CH$

(B) $CH_3 - CH_3 < CH \equiv CH < C_6H_{12}O_6 < (COOH)_2$

(C) $CH \equiv CH < CH_3 - CH_3 < (COOH)_2 < C_6H_{12}O_6$

(D) $C_6H_{12}O_6 > CH \equiv CH < (COOH)_2 < CH_3 - CH_3$

Q6 In redox reaction, oxidizing agent:

(A) Gets oxidized (B) Loses e

(C) Gains e (D) Donates H

Q7 In which of the following compounds, an element exhibits two different oxidation states.

(A) NH_2OH (B) NH_4NO_3

(C) N_2H_4 (D) N_3H

Q8 Given reaction,

$2\,K_4[Fe(CN)_6](aq) + H_2O_2(aq) \rightarrow 2\,K_3[Fe(CN)_6](aq) + 2\,KOH(aq)$

The above given reaction is oxidation reaction due to

(A) removal of a hydrogen from H_2O_2

(B) addition of electropositive potassium to H_2O_2

(C) removal of electropositive element potassium from potassium ferrocyanide ($K_4[Fe(CN)_6]$)

(D) All of the above are the correct reasons.

Q9 Which of the following is correct for the below given reaction?

$Cd_{(s)} + 2Ni(OH)_{3(s)} \quad CdO_{(S)} + 2Ni(OH)_{2(S)} + H_2O_{(l)}$

(A) Oxidation number of Cd and Ni remains the same in the reactants and in the products.

(B) The oxidation number of Cd increases from 0 to +2 and the oxidation number of Ni increases from +2 to +3.

(C) The oxidation number of Cd increases from 0 to +2 and the oxidation number of Ni decreases from +3 to +2.

(D) The oxidation number Cd decreases from +2 to 0 and the oxidation number of Ni increases from +2 to +3.

Q10 The decreasing order of oxidising powers of halogens is

(A) $F_2 > I_2 > Br_2 > Cl_2$

(B) $Cl_2 > F_2 > I_2 > Br_2$

(C) $F_2 > Cl_2 > Br_2 > I_2$

(D) $I_2 > Br_2 > F_2 > Cl_2$

Q11 The number of moles of $KMnO_4$ that will be needed to eact with one mole of sulphite ion in acidic solution is

(A) 2/5 (B) 4/5

(C) 3/5 (D) 1

Q12 Consider the following reaction occuring in basic medium
$2MnO_4^-(aq) + Br^-(aq) \rightarrow 2MnO_2(s) + BrO_3^-(aq)$
How the above reaction can be balanced further?
(A) By adding 2 OH^- ions on right side
(B) By adding one H_2O molecule to left side
(C) By adding $2H^+$ ions on right side
(D) Both By adding 2 OH^- lons on right side and By adding one H_2O molecule to left side

Q13 Which of the following elements does not show disproportionation tendency ?
(A) Cl (B) Br
(C) F (D) I

Q14 Oxidation number of H in NaH, CaH_2 and LiH, respectively is
(A) +1, +1, –1
(B) –1, +1, +1
(C) +1, +1, +1
(D) –1, –1, –1

Q15 Which of the following arrangements represent increasing oxidation number of the central atom?
(A) CrO_2^-, ClO_3^-, CrO_4^{2-}, MnO_4^-
(B) ClO_3^-, CrO_4^{2-}, MnO_4^-, CrO_2^-
(C) CrO_2^-, ClO_3^-, MnO_4^-, CrO_4^{2-}
(D) CrO_4^{2-}, MnO_4^-, CrO_2^-, ClO_3^-

Q16 The oxidation number of nitrogen in $N_2H_5^+$ is
(A) +3 (B) –2
(C) +2 (D) –3

Q17 Standard electrode potential of three metals X, Y and Z are – 1.2 V, + 0.5 V and – 3.0 V respectively. The reducing power of these metals will be
(A) X > Y > Z
(B) Y > Z > X
(C) Y > X > Z
(D) Z > X > Y

Q18 The oxidation state of the most electronegative element in the products of the reaction between BaO_2 and H_2SO_4 are:
(A) –1 and – 2
(B) –2 and 0
(C) 0 and –1
(D) –2 and +1

Q19 Given the standard reduction potentials :
$Zn^{2+}/Zn = -0.74\ V, Cl_2/Cl^- = 1.36\ V,$
$H^+/\frac{1}{2}H_2 = 0V$ and $Fe^{3+}/Fe^{2+} = 0.77\ V$
The order of increasing strength as reducing agent is
(A) Zn, H_2, Fe^{2+}, Cl^-
(B) H_2, Zn, Fe^{2+}, Cl^-
(C) H_2, Fe^{2+}, Cl^-, Zn
(D) Cl^-, Fe^{2+}, H_2, Zn

Q20 oxidant in the following reaction is $I_{2(g)} + S_{(g)}^{2-} \rightarrow 2I_{(g)} + S_{(g)}$
(A) I_2 (B) S^{2-}
(C) I^- (D) S

Q21 The oxidation states of sulphur in the anions and $SO_3^{2-}, S_2O_4^{2-}$ and $S_2O_6^{2-}$ follow the order:
(A) $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$
(B) $S_2O_6^{2-} < S_2O_3^{2-} < S_2O_4^{2-}$
(C) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$
(D) $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

Q22 In redox reaction, oxidizing agent:
(A) Gets oxidized (B) Loses e
(C) Gains e (D) Donates H

Q23 In the conversion of Br_2 to BrO_3^-, the oxidation number of Br changes from
(A) zero to + 5
(B) + 1 to + 5
(C) zero to – 3
(D) + 2 to + 5

Q24 In the reaction, $2FeSO_4 + H_2SO_4 + H_2O_2$ $Fe_2(SO_4)_3 + 2H_2O$, the oxidizing agent is
(A) $FeSO_4$
(B) H_2SO_4
(C) H_2O_2
(D) both H_2SO_4 and H_2O_2

Q25 In disproportionation:
(A) Same element oxidized & reduced
(B) Two elements oxidized
(C) Two reduced
(D) No redox

Q26 In the reaction, $3Cl_2 + 6OH^- \rightarrow 5Cl^- + ClO_2^- + 3H_2O$ chlorine
(A) Reduced
(B) Oxidized
(C) oxidised as well as reduced
(D) neither oxidised nor reduced

Q27 A gas X at I atm is bubbled through a solution containing mixture of 1M Y^- and IM Z^- at 25°C. If the reduction potentials of Z > Y > X, then
(A) Y will oxidize X but not Z
(B) Y will oxidise both X and Z
(C) Y will oxidise Z but not X
(D) Y will reduce both X and Z

Q28 Which is a redox reaction?
(A) $NaCl + AgNO_3$ (B) $HCl + NaOH$
(C) $Zn + CuSO_4$ (D) $BaCl_2 + Na_2SO_4$

Q29 In the balanced chemical reaction, $aI^-_{(aq)} + bMnO^-_{4(aq)} + cH_2O_{(l)} \rightarrow dI_{2(s)}$ a, b, $+ eMnO_{2(s)} + fOH_{(aq)}$
c, d, e, and f respectively correspond to
(A) 4, 2, 4, 3, 2, 8
(B) 6, 2, 4, 3, 2, 8
(C) 6, 4, 2, 3, 2, 8
(D) 2, 6, 8, 2, 3, 4

Answer Key

Q1	D
Q2	A
Q3	C
Q4	D
Q5	B
Q6	C
Q7	B
Q8	A
Q9	C
Q10	C
Q11	A
Q12	D
Q13	C
Q14	D
Q15	A
Q16	B
Q17	D
Q18	A
Q19	D
Q20	A
Q21	C
Q22	C
Q23	A
Q24	C
Q25	A
Q26	C
Q27	A
Q28	C
Q29	B

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 **Text Solution:**

+5, +6 and +6

Video Solution:

Q2 **Video Solution:**

Q3 **Text Solution:**

meq. of HNO_3 = meq. of Fe^{2+}

$(\text{Eq. mass of } HNO_3 = \frac{M}{3})\ [\because N^{5+} + 3e^{-} \rightarrow N^{2+}]$

or $3 \times 3 \times V = \frac{8}{56} \times 1000$

$\therefore V = 15.87 \text{ mL}$

Video Solution:

Q4 **Text Solution:**

In S_8, oxidation number of S is 0, elemental state.

In S_2F_2, F is in -1 oxidation state, hence S is in +1 oxidation state.

In H_2S, H is in +1 oxidation state, hence S is in -2 oxidation state.

Video Solution:

Q5 **Text Solution:**

$\overset{-3}{C_2}H_6 < \overset{-1}{C_2}H_2 < \overset{0}{C}H_6H_{12}O_6 < \left(\overset{+3}{C}OOH\right)_2$

Video Solution:

Q6 **Text Solution:**

Species which gains electrons and gets reduced, oxidises the other molecule and behaves like oxidising agent

Video Solution:

Q7 **Text Solution:**

NH_4NO_3

nitrogen has -3 and +5 oxidation

Video Solution:

Q8 **Text Solution:**

removal of a hydrogen from H_2O_2

Video Solution:

Q9 Text Solution:

The oxidation number of Cd increases from 0 to +2 and the oxidation number of Ni decreases from +3 to +2 .

This is a redox reaction in which Ni^{3+} is reduced to Ni^{3+} and Cd is oxidized to Cd^{2+}.

Video Solution:

Q10 Text Solution:

The halogens (X_2) have strong electron accepting tendency and have +ve standard reduction potential values. They are therefore, powerful oxidising agents. The decreasing order of oxidising powers of halogens is:

X_2	:	F_2	>	Cl_2	>	Br_2	>	I_2
E°	:	$+2.87V$		$+1.36V$		$+1.09V$		$+0.54V$

Video Solution:

Q11 Text Solution:

Reaction is represented by-

$$2KmNO_2 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5[O]$$

$$\left[MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O\right] \times 2$$

$$\left(SO_3^{2-} + H_2O \rightarrow SO_4^{2-} + 2H^+ + 2e^-\right) \times 5$$

$$2MnO_4^- + 6H^+ + 5SO_3^{2-} \rightarrow Mn^{2+} + SO_4^{2-} + 3H_2O$$

- Moles of MnO_4^- required to oxidise 5 moles of SO_3^- are 2
- Moles of MnO_4^- required to oxidise 1 moles of SO_3^- are 2/5
- Therefore number of moles of that will react with one mole of sulphite ion in acidic solution are 2/5.

Video Solution:

Q12 Text Solution:

For the reaction:

$$2\,MnO_4^-{}_{(aq)} + Br^-_{(aq)} \rightarrow 2\,MnO_2{}_{(s)} + BrO_3^-{}_{(aq)}$$

To balance oxygen water is added on left side.

$$H_2O + 2\,MnO_4^- + Br^- \rightarrow 2\,MnO_2 + BrO_3^-$$

Now to balance Hydrogens and charge add $2OH^-$ on right side.

$$H_2O + 2\,MnO_4^- + Br^- \rightarrow 2\,MnO_2 + BrO_3^- + 2OH^-$$

Video Solution:

Q13 Text Solution:

F is most electronegetive and cannot lose electrons. hence disproportionation is not possible for F

Video Solution:

Q14 Text Solution:

All given species are hydrides and in hydrides, H has an Oxidation number of -1

Video Solution:

Q15 Text Solution:

CrO_2^-, ClO_3^-, CrO_4^{2-}, MnO_4^-

Video Solution:

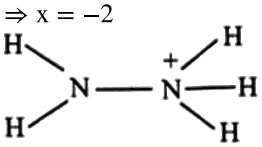
Q16 Text Solution:

$N_2H_5^+$:

$2x + 5 = +1$

$\Rightarrow 2x = -4$

$\Rightarrow x = -2$



Video Solution:

Q17 Text Solution:

More negative the E^o, stronger is the reducing agent. Thus, the reducing power decreases in the order: Z (–3.0 V) > X (–1.2V) > Y (+ 0.5 V).

Video Solution:

Q18 Text Solution:

$BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

The most electronegative element in the product is oxygen.

The oxidation state of oxygen in $BaSO_4$ is –2 and in H_2O_2 is –1.

Note: Oxidation state of hydrogen is always +1 so in H_2O_2 oxidation of oxygen is –1 instead of –2.

Video Solution:

Q19 Text Solution:

Reducing strength increases as the electrode potentials decrease. Now the electrode potentials decrease in the order:

$Cl_2/Cl^-(+1.36\ V) > Fe^{3+}/Fe^{2+}(0.77\ V) > H^+/H_2(0\ V) > Zn^{2+}/Zn(-0.74\ V)$, therefore, their reducing power increases in the same order:

Cl^-, Fe^{2+}, H_2, Zn

Video Solution:

Q20 Text Solution:

$I_{2(g)} \rightarrow 2I^-_{(g)}$

• gained electron
• underwent reduction
• Oxidant / oxidisng agent

$S^{2-}_{(g)} \rightarrow S_{(g)}$

• Lost electron
• underwent oxidation
• reductant / reducing agent

Video Solution:

Q21 Text Solution:

Oxidation state of $S_2O_4^{2-}$

2(x) + 4(−2) = −2

2x = 8 − 2

2x = 6

x = 3

Oxidation state of SO_3^{2-}

x + 3(−2) = −2

x = 6 − 2

x = 4

Oxidation state of $S_2O_6^{2-}$

2(x) + 6(−2) = −2

2x = 12 − 2

2x = 10

x = 5

So the oxidation state of sulphur in the anions $S_2O_4^{2-}$, $S_2O_4^{2-}$ and $S_2O_6^{2-}$ follows the order.

$S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

Video Solution:

Q22 Text Solution:

Species which gains electrons and gets reduced, oxidises the other molecule and behaves like oxidising agent

Video Solution:

Q23 Text Solution:

The oxidation number of Br in Br_2 is zero.

The oxidation number of Br is BrO_3^-

$x + 3 \times (-2) = -1$

$x = -1 + 6$

$x = +5$

Video Solution:

Q24 Text Solution:

H_2O_2 gets reduced to H_2O.

Video Solution:

Q25 Text Solution:

disproportionation refers to oxidation and reduction of the same element.

Video Solution:

Q26 Video Solution:

Q27 Text Solution:

Higher the reduction potential, stronger the oxidi- sing agent. Since reduction potentials decrease in the order Z > Y > X, therefore, their oxidising powers also decrease in the same order. Hence, Y is a stronger oxidising agent than X but weaker than Z. Therefore, Y can oxidise X but not Z.

Video Solution:

Q28 Text Solution:

$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

Video Solution:

Q29 Text Solution:

The balanced chemical reaction is

$6I^-_{(aq)} + 2\,MnO^-_{4(aq)} + 4H_2O_{(l)} \rightarrow 3I_{2(s)} + 2\,MnO_{2(s)} + 8\,OH^-_{(aq)}$

Hence, option (b) is correct.

Video Solution: