NEET REVISION SERIES

REDOX REACTION

Revise Most Important Questions to Crack NEET 2020

Q-1 - 12226786

The oxidation number of I in HIO_4 is

(A) $+7$

(B) $+6$

(C) $+3$

(D) $+14$

CORRECT ANSWER: A

SOLUTION:

$HIO_4,$

$$(+1)+x+4(-2)$$
$$=0$$

$$\Rightarrow x=+7$$

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Q-2 - 12226790

In the following reaction,

$$4P+3KOH+3H_2O \rightarrow 3KH_2PO_2+PH_3$$

(A) P is oxidised as well as reduced

(B) P is reduced only

(C) P is oxidised only

(D) None of these

CORRECT ANSWER: A

SOLUTION:

P is oxidised as well as reduced (as in option a).

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Q-3 - 60007127

In the chemical reaction $Cl_2 + H_2S \rightarrow 2HCl + S$, the oxidation number of sulphur changes from

(A) 0 to 2

(B) 2 to 0

(C) -2 to 0

(D) -2 to -1

CORRECT ANSWER: C

SOLUTION:

Oxidation state of sulphur in H_2S is -2, white it is zero in

'S' i.e. in this reaction oxidation of sulphur and reduction of chlorine takes place.

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Q-4 - 12226797

Equaiton $H_2S + H_2O_2 \rightarrow S + 2H_2O$ represents

(A) Acidic nature of H_2O_2

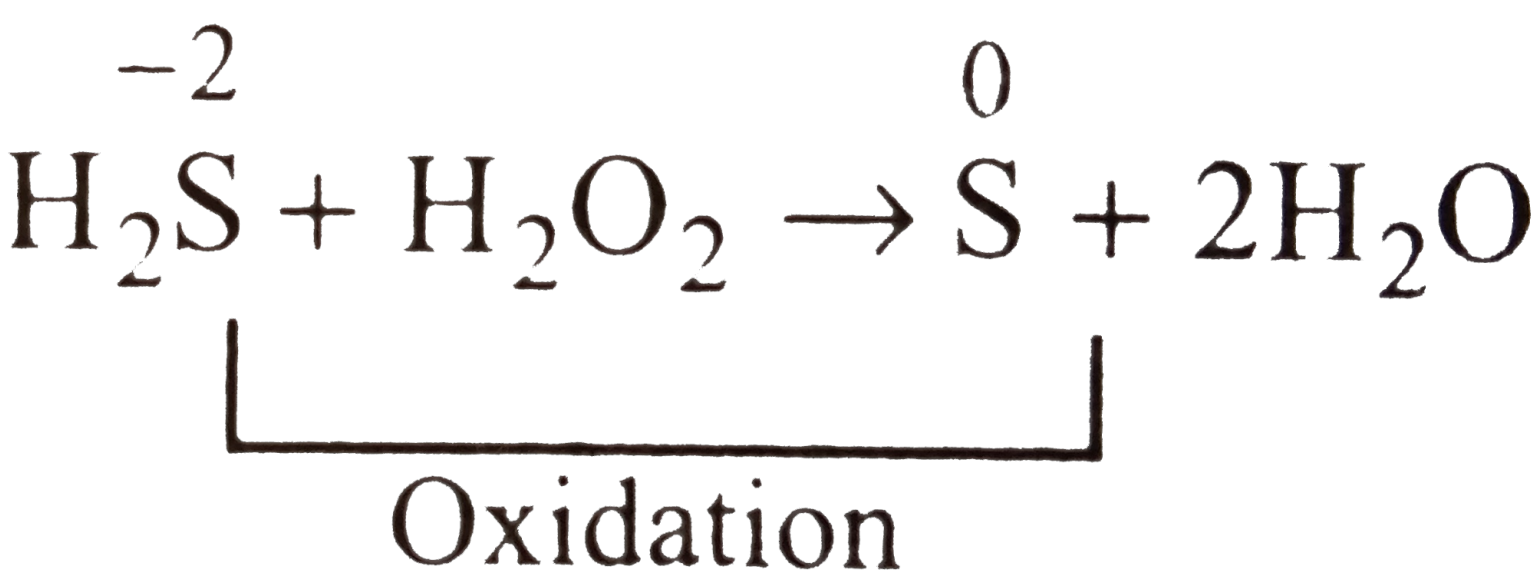
(B) Basic nature of H_2O_2

(C) Oxidising nature of H_2O_2

(D) Reducing nature of H_2O_2

CORRECT ANSWER: C

SOLUTION:



The oxidation of S shows oxidising nature of H_2O_2.

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Q-5 - 12226807

Oxidation number of N in $(NH_4)_2SO_4$ is

(A) -3

(B) -1

(C) $+1$

(D) $-1/3$

CORRECT ANSWER: A

SOLUTION:

$(NH_4)_2SO_4 \Leftrightarrow 2NH_4^+ + SO_4$

$\dot{N}(H_4^+)$

$x + 4 = +1, x = 1$

$-4 = -3$

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Q-6 - 12226813

The oxidation number of Mn in MnO_4^{-1} is

(A) $+6$

(B) -5

(C) $+7$

(D) $+5$

CORRECT ANSWER: C

SOLUTION:

Mn shows $+7$ oxidation state in MnO_4^{-1}

$\dot{M}nO_4^{-1}$

$x + (-2 \times 4) = -1$

$x - 8 = -1$

$x = -1 + 8 = +7$

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Q-7 - 12226821

Oxidation number of carbon in $CH_3 - Cl$ is

(A) -3

(B) -2

(C) -1

(D) 0

CORRECT ANSWER: B

SOLUTION:

$\dot{C}H_3 - Cl$

$x + 3(+1) + (-1)$

$\times 1 = 0$

$x + 3 - 1 = 0, x + 2 = 0$

$x = -2$

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Q-8 - 60007094

What is the oxidation number of Co in $\left[Co(NH_3)_4ClNO_2\right]$

(A) $+2$

(B) $+3$

(C) $+4$

(D) $+5$

CORRECT ANSWER: A

SOLUTION:

$$\left[\overset{*}{C}o(NH_3)_4ClNO_2\right]$$

$$x + 4(0) + 1(-1) + 1(-1) = 0$$

$$x + 0 - 1 - 1 = 0$$

$$x - 2 = 0, x = +2$$

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Q-9 - 60007181

When $KMnO_4$ acts as an oxidising agent and ultimately forms $[MnO_4]^{-2}$, MnO_2, Mn_2O_3, Mn^{+2}

the the number of electrons transferred in each case respectively is

(A) 4,3,1,5

(B) 1,5,3,7

(C) 1,3,4,5

(D) 3,5,7,1

CORRECT ANSWER: C

SOLUTION:

Number of e^- transferred in each case is 1, 3, 4, 5.

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Q-10 - 12226860

Oxidation number of carbon in $H_2C_2O_4$ is

(A) $+4$

(B) $+3$

(C) $+2$

(D) -2

CORRECT ANSWER: B

SOLUTION:

$H_2\dot{C}_2O_4$

$2 + 2x - 2 \times 4 = 0, 2x = 8 - 2 = 6$

$x = \frac{6}{2} = +3.$

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Q-11 - 12226872

$2MnO_4^- + 5H_2O_2 + 6H^-$
$\rightarrow 2Z + 5O_2 + 8H_2O$
. In this reaction Z is

(A) Mn^{+2}

(B) Mn^{+4}

(C) MnO_2

(D) Mn

CORRECT ANSWER: A

SOLUTION:

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

.

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Q-12 - 12226890

The reaction

$$5H_2O_2 + XClO_2 + 2OH^- \rightarrow XCl^- + YO_2 + 6H_2O$$

is balanced if

(A) $x = 5, y = 2$

(B) $x = 2, y = 5$

(C) $x = 4, y = 10$

(D) $x = 5, y = 5$

CORRECT ANSWER: B

SOLUTION:

$$5H_2O_2 + 2ClO_2 + 2OH^- \rightarrow 2Cl^- + 5O_2 + 6H_2O$$

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Q-13 - 12226934

The molar ration of Fe^{++} to Fe^{+++} in a mixture of $FeSO_4$ and $Fe_2(SO_4)_3$ having equal number of sulphate ions in both ferrous

and ferric sulphate is:

(A) $1:2$

(B) $3:2$

(C) $2:3$

(D) can't be determined

CORRECT ANSWER: B

SOLUTION:

$FeSO_4$

1 mole of $SO_4^{2-} = 1 mole Fe^{2+}$

In $Fe_2(SO_4)_3$

3 moles of $SO_4^{2-} = 2 moles Fe^{3+}$

1 mole of

SO_4^{2-}

$= \frac{2}{3} moles Fe^{3+}$

$$\text{ratio} = \frac{Fe^{2+}}{Fe^{3+}} = \frac{1}{2} = \frac{3}{2}$$

Q-14 - 11882155

The number of mole of oxalate ions oxidised by one mole of

MnO_4^- ion is:

(A) $1/5$

(B) $2/5$

(C) $5/2$

(D) 5

CORRECT ANSWER: C

SOLUTION:

$$\left[Mn^{7+} + 5e \rightarrow Mn^{2+}\right] \times 2$$

$$\left[\left(C^{3+}\right)_2 \rightarrow 2C^{4+} + 2e\right] \times 5$$

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Q-15 - 11032672

The equivalent weight of FeC_2O_4 in the change

$FeC_2O_4 \rightarrow Fe^{3+} + CO_2$ is

(A) $M/3$

(B) $M/6$

(C) $M/2$

(D) $M/1$

CORRECT ANSWER: A

SOLUTION:

$$Fe^{2+} \rightarrow Fe^{3+} + e^-$$

$$C_2O_4^{2-} \rightarrow 2CO_2 + 2e^-$$

$$\left.\right] n = 3$$

Equivalent weight of $FeC_2O_4 = \frac{M}{3}$

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Q-16 - 12226944

Equivalent weight of $K_2Cr_2O_7$ in the following reaction is

$Cr_2O_7^{2-}\ Fe^{2+} \rightarrow Fe^{3+}\ Cr^{3+}$

($M = molarmass$ of $K_2Cr_2O_7$)

(A) $\frac{M}{3}$

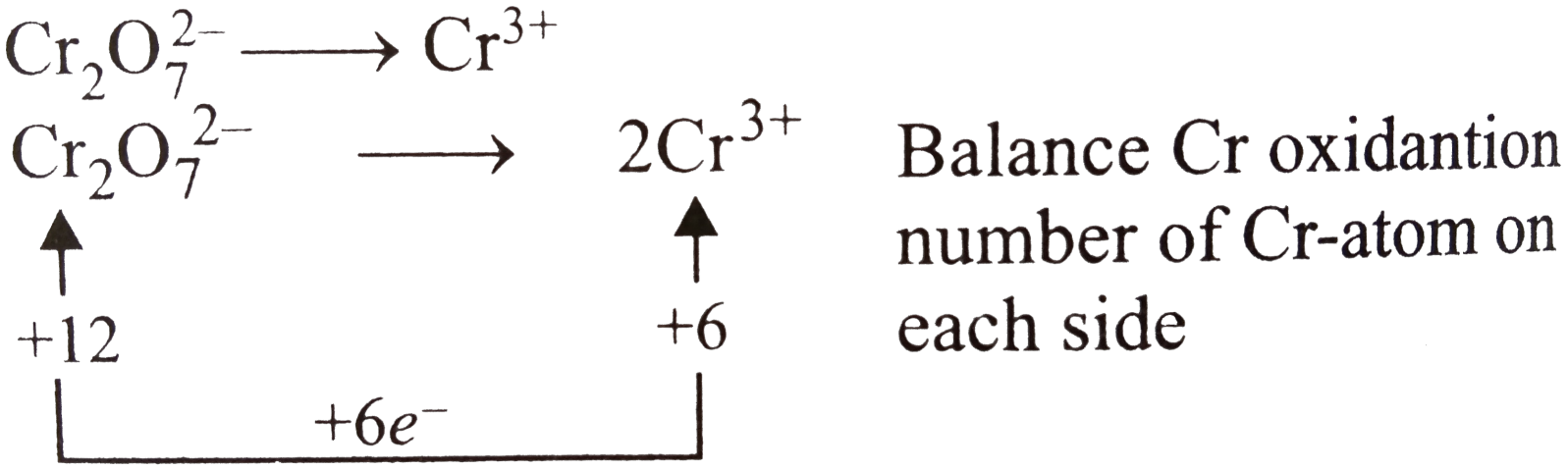
(B) $\frac{M}{6}$

(C) $\frac{M}{5}$

(D) $\frac{M}{4}$

CORRECT ANSWER: B

SOLUTION:



Thus, equivalent weight of

$K_2Cr_2O_7$

$= \frac{molarmass}{changeInON}$

$= \frac{M}{6}$

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Q-17 - 13169051

The equivalent mass of $MnSO_4$ is half its molecular mass when it is converted to

(A) MnO_4^{2-}

(B) Mn_{O_3}

(C) MnO_2

(D) MnO_1^-

CORRECT ANSWER: 3

SOLUTION:

$$\overset{+2}{M}nSO_4 \rightarrow \overset{+6}{M}nO_4^{2-}$$

$$\overset{+2}{M}nSO_4 \rightarrow \overset{+3}{M}n_2O_3$$

$$\overset{+2}{M}nSO_4 \rightarrow \overset{+4}{M}nO_2$$

$$\overset{+2}{M}nSO_4 \rightarrow \overset{+6}{M}nO_4^-$$

Only in 3^{rd} option, change in oxidation number (ON) of

Mn per formula unit of $MnSO_4 = 2$. Thus,

Equivalent mass of

$MnSO_4$

$$= \frac{\text{Formula mass}}{2}$$

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Q-18 - 12226892

Oxidation of thisulphate $\left(S_2O_3^{2-}\right)$ ion by iodine gives

(A) SO_2^{3-}

(B) SO_4^{2-}

(C) $S_4O_6^{2-}$

(D) $S_2O_6^{2-}$

CORRECT ANSWER: C

SOLUTION:

$$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$$

Q-19 - 12226896

$50mL$ of $0.1M$ solution of a salt reacted with $25mL$ of $0.1M$ solution of sodium sulphite. The half reaction for the oxidation of sulphite ion is:

$$SO_3^{2-}(aq) + H_2O(l) \rightarrow (aq) + 2H^+(aq) + 2e^-$$

If the oxidation number of metal in the salt was 3, what would be the new oxidation number of metal:

(A) zero

(B) 1

(C) 2

(D) 4

CORRECT ANSWER: C

SOLUTION:

No. of equivalent

$= mole \times n$

$- fact$ or

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Q-20 - 12226898

One gram of Na_3AsO_4 is boiled with excess of solid KI in presence of strong HCl. The iodine evolved is absorbed in KI solution and titrated against $0.2N$ hyposolution. Assuming the reaction to be

$AsO_4^{3-} + 2H^+ + 2I^-$

$\rightarrow AsO_3^{2-} + H_2O + I_2$

,

calculate the volume of thiosilphate hypo consumed. [Atomic weight of $As = 75$]

(A) $48.1mL$

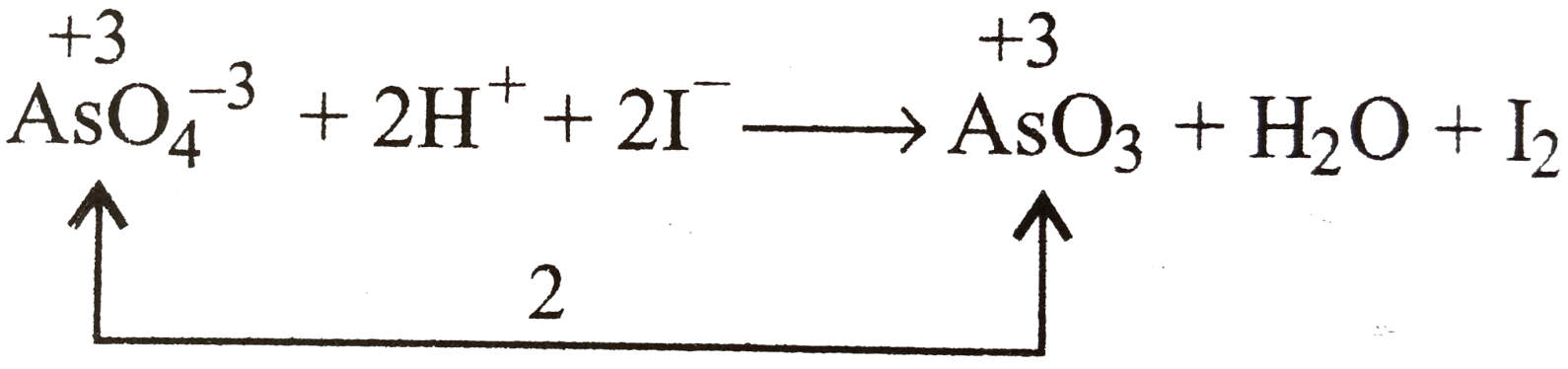
(B) $38.4mL$

(C) $24.7mL$

(D) $30.3mL$

CORRECT ANSWER: A

SOLUTION:



molar mass Na_3AsO_4

$= 23 \times 3 + 75 + 16$

$\times 4$

molar mass $= 208$

eq. of

$$AsO_4^- = \frac{1}{\left(\frac{208}{2}\right)}$$

$$= \left(\frac{1}{104}\right)$$

equivalent of Na_3AsO_4= equivalent of I_2

$=$ equivalent of $Na_2S_2O_3$

$$\frac{1}{104} = .2 \times V$$

$$\frac{1}{104 \times .2} L = V$$

$$= 48.1mL$$

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Q-21 - 12226910

The number of moles of $K_2Cr_2O_7$ that will be needed to react completely with one mole of ferric sulphite in acidic medium is

(A) 0.4

(B) 0.6

(C) 1.0

(D) 0.8

CORRECT ANSWER: C

SOLUTION:

$$\underset{1mol}{Fe_2(SO_3)_2} \Leftrightarrow 2Fe^{3+} + \underset{3mol}{3SO_3^{2-}}$$

Fe^{3+} is already in oxidised state hence $Cr_2O_7^{2-}$ is not required by Fe^{3+}

$3SO_3^{2-}$ is oxidised to SO_4^{2-} by $Cr_2O_7^{2-}$ in acidic medium

$$3\underset{+4}{SO_3^{2-}} + \underset{+12}{Cr_2O_7^{2-}} + 8H^+ \rightarrow \underset{+6}{2Cr^{3+}} + \underset{+6}{3SO_4^{2-}} + 4H_2O$$

1 mol e

$Fe_2(SO_3)_3$

$\rightarrow 3moleSO_3^{2-}$

$= 1moleCr_2O_7^{2-}$

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Q-22 - 11882138

$25mL$ of $0.50MH_2O_2$ solution is added to $50mL$ of $0.20MKMnO_4$ is acid solution. Which of the following statements is true?

(A) 0.010 mole of oxygen is liberated

(B) 0.005 mole of $KMnO_4$ are left

(C) $0.030g$ atom of oxygen is liberated

(D) 0.0025 mole of H_2O_2 does not react with $KMnO_4$

CORRECT ANSWER: B

SOLUTION:

Meq.of

$$H_2O_2 = 25 \times 0.5 \times 2$$
$$= 25$$

,

Meq.of

$$KMnO_4 = 50 \times 0.2$$
$$\times 5 = 50$$

,

$\therefore 25\text{Meq. or } 5$ milli-mole of $KMnO_4$ are left.

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Q-23 - 12226907

If $25.8ml$ of $0.101MK_2Cr_2O_7$ is required to titrate $10.0ml$ of a liquid iron supplement, calculate the concentration of iron in vitamin solution

(A) $0.780M$

(B) $0.261M$

(C) $4.35 \times 10^{-4}M$

(D) $1.56M$

CORRECT ANSWER: D

SOLUTION:

Equivalent of $K_2Cr_2O_7 =$ Eq. of Fe

$\Rightarrow 25.8 \times 0.101 \times 6$

$= 10.0 \times M \times 1$

$\Rightarrow M = 1.56mol/L$

Q-24 - 11882152

$0.3g$ of an oxalate salts was dissolved in $100mL$ solution. The solution required $90mL$ of $N/20 KMnO_4$ for complete oxidation. The $\%$ of oxalate ion in salt is:

(A) $33\ \%$

(B) $66\ \%$

(C) $70\ \%$

(D) $40\ \%$

CORRECT ANSWER: B

SOLUTION:

$$\text{Meq. of oxalate} = \text{Meq. Of} KMnO_4$$

$$\frac{w}{\frac{88}{2}} \times 1000 = 90$$

$$\times \frac{1}{20}$$

$$\therefore w_{\text{oxalate}} = 0.198g$$

$$\% \text{ oxalate} = \frac{0.198}{0.3}$$

$$\times 100 = 66\ \%$$

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Q-25 - 11882144

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

(A) $8mL$

(B) $16mL$

(C) $32mL$

(D) $64mL$

CORRECT ANSWER: B

SOLUTION:

Meq.of $HNO_3 = \text{Meq.of} Fe^{3+}$

$[\text{Eq.of} HNO_3 = M/3]$

or

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

$$\therefore V = 15.87 mL$$

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Q-26 - 11032682

For decolourisation of 1mol of $KMnO_4$, the moles of H_2O_2 required is

(A) $1/2$

(B) $3/2$

(C) $5/2$

(D) $7/2$

CORRECT ANSWER: C

SOLUTION:

$$\underset{(n=5)}{\text{Eq of}} MnO_4^?$$

$$\equiv \underset{(n=2)}{\text{Eq of}}\, H_2O_2$$

$$\frac{1}{5}\text{mol} = \frac{1}{2}\text{mol}$$

$$1\text{mol of} \quad MnO_4^?$$

$$= \frac{5}{2}\text{mol of} H_2O_2$$

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Q-27 - 12226930

What mass of N_2H_4 can be oxidised to N_2 by $24g$ of K_2CrO_4 which is reduced to $Cr(OH)_4^-$?

(A) $2.969g$

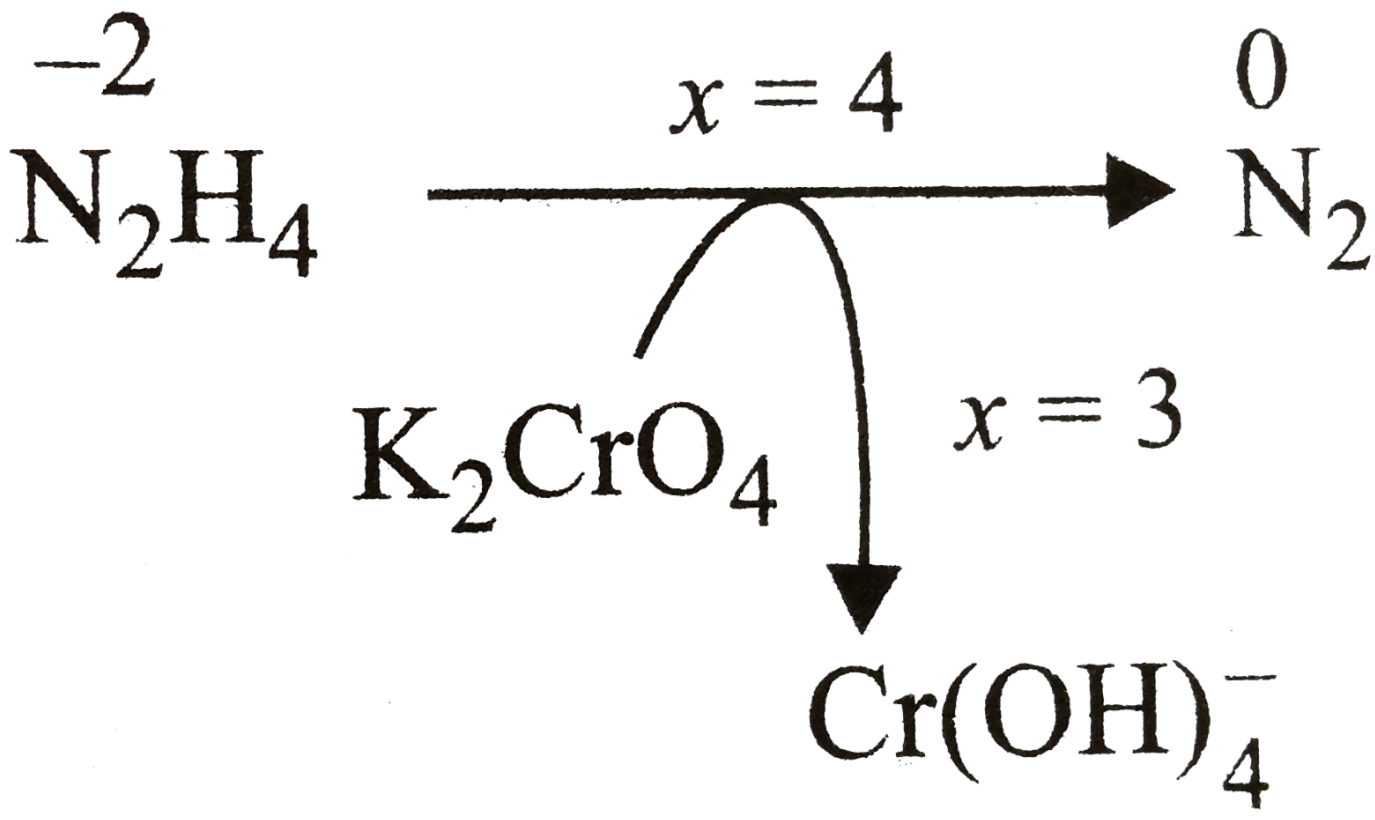
(B) $5.25g$

(C) $9.08g$

(D) $29.69g$

CORRECT ANSWER: A

SOLUTION:



Moles of K_2CrO_4 reacted $= \frac{24}{194}$ moles.

4 moles of K_2CrO_4 reacts with 3 moles of N_2H_4

$\therefore \frac{24}{194}$ moles of K_2CrO_4 reacts with $\frac{3}{4} \times \frac{24}{194}$

moles of

N_2H_4

$\therefore$ Amount of N_2H_4 reacted $= \frac{3}{4} \times \frac{24}{194}$ moles

$= \frac{3}{4} \times \frac{24}{194} \times 32g$

$= 2.969g$

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Q-28 - 11882139

What volume of O_2 measured at standard condition will be formed by the action of $100mL$ of $0.5N KMnO_4$ on hydrogen peroxide in an acid solution?

The skeleton equation for the reaction is,

$KMnO_4 + H_2SO_4 + H_2O_2$
$\rightarrow KHSO_4 + MnSO_4$
$+ H_2O + O_2$

(A) 0.12litre

(B) 0.28litre

(C) 0.56litre

(D) 1.12litre

CORRECT ANSWER: B

SOLUTION:

Meq.of

$O_2 = Meq.\ of KMnO_4$

$= 100 \times 0.5$

$\frac{w}{8} \times 1000 = 50$

$\therefore w_{O_2} = 0.4g$

$\therefore VO_2 = \frac{22.4 \times 0.4}{32}$

$= 0.28$

litre

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Q-29 - 12226944

Equivalent weight of $K_2Cr_2O_7$ in the following reaction is

$Cr_2O_7^{2-} Fe^{2+} \rightarrow Fe^{3+} Cr^{3+}$

$(M = molarmass \text{ of } K_2Cr_2O_7)$

(A) $\frac{M}{3}$

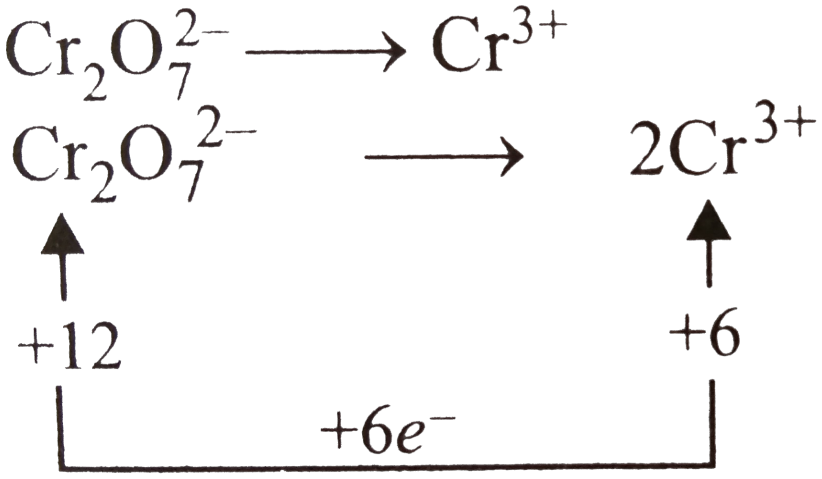
(B) $\frac{M}{6}$

(C) $\frac{M}{5}$

(D) $\frac{M}{4}$

CORRECT ANSWER: B

SOLUTION:



Balance Cr oxidantion number of Cr-atom on each side

Thus, equivalent weight of

$K_2Cr_2O_7$

$$= \frac{molarmass}{changeInON}$$

$$= \frac{M}{6}$$

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Q-30 - 12226946

In the equation

$H_2S + 2HNO_3 \rightarrow 2H_2O + 2NO_2 + S$

The equivalent weight of hydrogen sulphide is

(A) 17

(B) 68

(C) 34

(D) 16

CORRECT ANSWER: A

SOLUTION:

$$H_2S \overset{0}{\rightarrow} S + 2e$$

Equivalent wt.

$$= \frac{Molwt.}{2} = \frac{34}{2}$$

$$= 17$$

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Q-31 - 18255426

In the reaction,

$$l_2 + 2S_2O_3^{2-} \rightarrow 2l^- + S_4O_6^{2-}$$

, equivalent weight of iodine will be equal to

(A) M

(B) $M / 2$

(C) $M / 4$

(D) $2M$

CORRECT ANSWER: B

SOLUTION:

$$l_2^0 + 2S_2O_3^{2-} \rightarrow \overset{-1}{2l^-} + S_4O_6^{2-}$$

$\therefore$ Decrease in ON of iodine per atom $= 1$

$\therefore$ Decrease in ON of iodine per molecule

$= 2 \times 1 = 2$ Hence, equivalent weight of iodine

$$\frac{\text{Molecular weight of iodine}}{\text{Total decrease in ON of iodine per molecule}} = \frac{M}{2}$$

Q-32 - 12226954

In alkaline medium , $KMnO_4$ reacts as follows

$$2KMnO_4 + 2KOH \rightarrow 2K_2MnO_4 + H_2O + O$$

Therefore, the equivalent mass of $KMnO_4$ will be

(A) 31.6

(B) 52.7

(C) 7.0

(D) 158.0

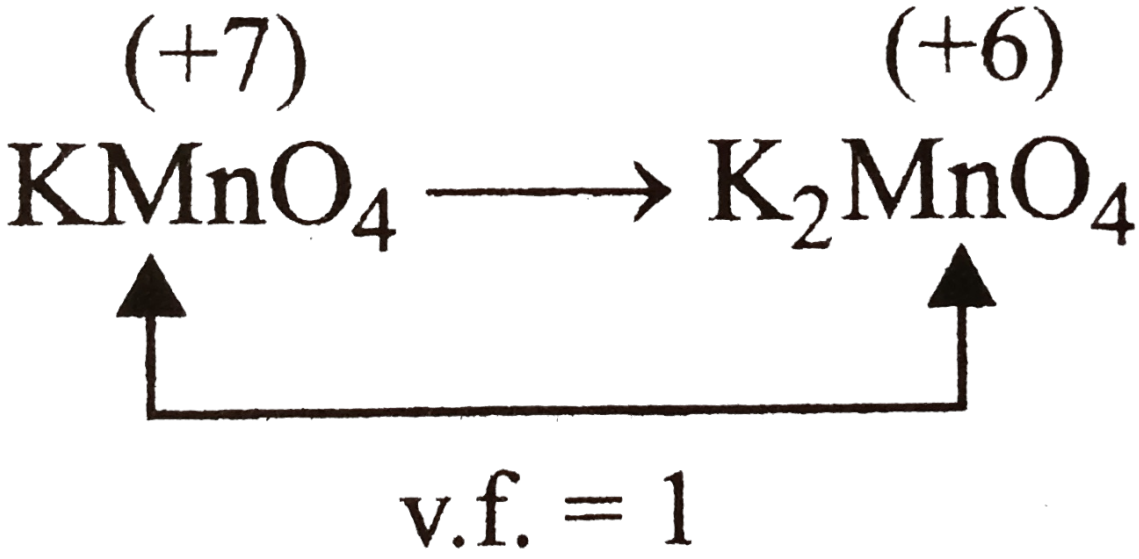
CORRECT ANSWER: D

SOLUTION:

$$E = \frac{M.M}{\text{Valence factor}}$$

$$= \frac{158}{1}$$

(d) $E = \dfrac{\text{M.M}}{\text{Valence factor}} = \dfrac{158}{1}$



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Q-33 - 12226965

Equivalent weight of H_3PO_2 when it disproportionates into PH_3 and H_3PO_3 is (mol.wt. of $H_3PO_2 = M$)

(A) M

(B) $\dfrac{3M}{4}$

(C) $\dfrac{M}{2}$

(D) $\dfrac{M}{4}$

CORRECT ANSWER: B

SOLUTION:

$$H_3PO_2 \rightarrow PH_3$$

$$P^+ + 4e^- \rightarrow P^{3-}$$

$$\therefore Eq.\,wt.\,(H_3PO_2)$$

$$= M/4$$

$$H_3PO_2 \rightarrow H_3PO_3$$

$$P^+ \rightarrow P^{3+} + 2e^-$$

$$\therefore Eq.\,wt.\,(H_3PO_2)$$

$$= M/2$$

Hence,

Eq.wt.

$$(H_3PO_2) = \frac{M}{4} + \frac{M}{2}$$

$$= \frac{3}{4}M$$

Q-34 - 12226967

$5L$ of $KMnO_4$ solution contains 0.01 equiv. of $KMnO_4$. $50ml$ of the given solution contain, how many moles of $KMnO_4$?

$KMnO_4 \rightarrow MnO_2$

(A) $\frac{10^{-6}}{4}$

(B) $\frac{10^{-4}}{3}$

(C) 3×10^{-5}

(D) 10^{-5}

CORRECT ANSWER: B

SOLUTION:

Moles of

$$KMnO_4 = \frac{0.01 \times 50}{5000 \times 3}$$

$$= \frac{10^{-4}}{3}$$

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Q-35 - 12226972

Among the following select the disproportionation reaction?

(i)

$2Pb(NO_3)_2 \rightarrow 2PbO$
$+ 4NO_2 + O_2$

$(ii)\ I_2 \rightarrow I^- + IO_3^-$

(iii)

$3Cl_2 + 6NaOH \rightarrow 5NaCl$
$+ NaClO_3 + 3H_2O$

(iv)

$P_4 + 3NaOH + 3H_2O$
$\rightarrow 3NaH_2PO_2 + PH_3$

(A) (i), (ii), (iii)

(B) (ii), (iii), (iv)

(C) (i), (iii), (iv)

(D) All of these

CORRECT ANSWER: B

SOLUTION:

A reaction in which the same species is simultaneously oxidised as well as reduced is called a disproportionation reaction.

$(ii)\ \overset{0}{I_2} \rightarrow \overset{-1}{I^-} + \overset{+5}{IO_3^-}$

(iii)

$\overset{0}{3Cl_2} + 6NaOH \rightarrow 5\overset{-1}{NaCl} + \overset{+5}{NaClO_3} + 3H_2O$

(iv)

$$\overset{0}{P_4} + 3NaOH + 3H_2O$$

$$\rightarrow 3NaH_2\overset{+1}{P}O_4$$

$$+ \overset{-3}{P}H_3$$

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Q-36 - 12226974

Based on the following reaction,

$$XeO_6^{4-}(aq) + 2F^-(aq)$$

$$+ 6H^+(aq) \rightarrow XeO_3(aq)$$

$$+ F_2(g) + 3H_2O(l)$$

$$(\Delta(G) < o)$$

It can be concluded that

(A) oxidising power of F^- is grater than that of XeO_6^{4-}

(B) it is not a redox reaction

(C) it is a disproportionation reaction

(D) oxidising power of XeO_6^{4-} is greater than that of

F^-

CORRECT ANSWER: D

SOLUTION:

$$\underset{\substack{\uparrow \\ (+8)}}{XeO_6^{4-}} + \underset{\substack{\uparrow \\ (-1)}}{F^-} \rightarrow \underset{\substack{\uparrow \\ (+6)}}{XeO_3} + \underset{\substack{\uparrow \\ (0)}}{F_2}$$

Since, $\Delta G < 0$, hence it is spontaneous in forward direction. Oxidation number of Xe decreases, hence, it is an oxidising agent, and oxidation number of F increases, hence it is a reducing agent.

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Q-37 - 11882296

Statement VO_2^+ and VO^{2+} both are called vanadyl ions.

Explanation VO_2^+ is dioxovanadium (V) ion and VO^{2+} is oxovanadium (IV) ion.

(A) S is correct but E is wrong.

(B) S is wrong but E is correct.

(C) Both S and E are correct and E is correct explanation of S

(D) Both S and E are correct but E is not correct explanation of S.

CORRECT ANSWER: D

SOLUTION:

Both statement and explanation are correct but explanation is not reason for statement.

Q-38 - 12226986

Assertion: CrO_5 on decomposition undergoes disproportionation.

Reason: CrO_5 undergoes intermolecular redox reaction.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explantion of the assertion.

(C) If assertion is true but reason is false.

(D) If assertion is false but reason is true.

CORRECT ANSWER: C

SOLUTION:

$CrO_5 \xrightarrow{\Delta} CrO_3 + O_2$ (Disproportionation of O^-)

Q-39 - 60007067

Assertion : Stannous chloride is a powerful oxidising agent which oxidises mercuric chloride to mercury.

Reason : Stannous chloride gives grey precipitate with mercuric chloride, but stannic chloride does not do so.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(C) If assertion is true but reason is false.

(D) If assertion is false but reason is true.

CORRECT ANSWER: D

SOLUTION:

Here, assertion is false, because stannous chloride is a strong reducing agent not strong oxidising agent. Stannous chlorides gives Grey precipitate with mercuric chloride. Hence, reason is true.

Q-40 - 12226994

Assertion: If a strong acid is added to a solution of potassium chromate it changes its colour from yellow to orange.

Reason: The colour change is due to the oxidation of potassium chromate.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explantion of the assertion.

(C) If assertion is true but reason is false.

(D) If assertion is false but reason is true.

CORRECT ANSWER: C

SOLUTION:

$$\underset{yellow}{2CrO_4^{2-}} \xrightarrow{H^+} \underset{\text{or } an \geq}{Cr_2O_7^{2-}}$$

Cr in $+6$ state.

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Q-41 - 11032681

The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order

(A) $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

(B)

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

$< S_2O_6^{2-}$

(C)

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

$< SO_3^{2-}$

(D)

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

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

CORRECT ANSWER: A

SOLUTION:

$$S_2O_6^{2-} : 2x - 12 = -2 \Rightarrow x = 5$$

$$SO_3^{2-} : x - 6 = -2$$

$$\Rightarrow x = 4$$

$$S_2O_4^{2-} : 2x - 8 = -2$$

$$\Rightarrow x = 3$$

Q-42 - 60007075

Oxidation numbers of P in PO_4^{3-}, of S in SO_4^{2-} and that of Cr in $Cr_2O_7^{2-}$ are respectively

(A) $+5,\ +6$ and $+6$

(B) $+3,\ +6$ and $+5$

(C) $+5,\ +3$ and $+6$

(D) $-3,\ +6$ and $+6$

CORRECT ANSWER: A

SOLUTION:

$PO_4^{3-}(P = +5)$

$SO_4^{2-}(S = +6)$

$Cr_2O_7^{2-}(Cr = +6).$

Q-43 - 41524674

When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from :

(A) Zero to -1 and zero to $+3$

(B) Zero to $+1$ and zero to -3

(C) Zero to $+1$ and zero to -5

(D) Zero to -1 and zero to $+5$

CORRECT ANSWER: D

SOLUTION:

$$\underset{O.N.=0}{Cl_2} + NaOH$$

$$\rightarrow \underset{-1}{Cl^{\Theta}} + \underset{+5}{ClO_3{}^{\Theta}}$$

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Q-44 - 60007190

For the redox reaction

$$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficients of the reactants for the balanced equation are

(A)

MnO_4^-	$C_2O_4^{2-}$	H^+
16	5	2

(B)

MnO_4^-	$C_2O_4^{2-}$	H^+
2	5	16

(C)

MnO_4^-	$C_2O_4^{2-}$	H^+
2	16	5

(D)

MnO_4^-	$C_2O_4^{2-}$	H^+
5	16	2

CORRECT ANSWER: B

SOLUTION:

$$\overset{(+7)}{Mn}O_4^- \rightarrow \overset{}{Mn}^{+2},$$

$5e^-$

gain

$$\overset{(+3)}{C_2}O_4^{-2} \rightarrow \overset{(+4)}{CO_2},$$

$2e^-$

loss

Multiplying (1) by 2 and (2) by 5 to balance e^-

$$2MnO_4^- + 5C_2O_4^{-2} \rightarrow 2Mn^{+2} + 10CO_2$$

on balancing charge ,

$$2MnO_4^- + 5C_2O_4^{-2} + 16H^+ \rightarrow 2Mn^{+2} + 10CO_2 + 8H_2O$$

Q-45 - 60007088

HNO_2 acts both as reductant and oxidant, while HNO_3 acts only as oxidant. It is due to their

(A) Solubility ability

(B) Maximum oxidation number

(C) Minimum oxidation number

(D) Minimum number of valence electrons

CORRECT ANSWER: B

SOLUTION:

In $H\overset{*}{N}O_2$ oxidation number of $N = +3$

In $H\overset{*}{N}O_3$ oxidation number of $N = +5$.

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Q-46 - 60007215

The brown ring complex compound is formulated as

$\left[Fe(H_2O)_5NO^+\right]SO_4$. The oxidation state of iron is

(A) 1

(B) 2

(C) 3

(D) 0

CORRECT ANSWER: A

SOLUTION:

$\left[Fe(H_2O)_5NO^+\right]SO_4$

$$\left[\overset{x}{Fe}\left(\overset{0}{H_2O}\right)_5\overset{+1}{NO}\right]^{+2}SO_4^{2-}, x+0+1$$

$$=+2$$

$$x=+1$$

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Q-47 - 12227042

Assertion: In some cases oxygen shows positive oxidation number though it is an electronegative element.

Reason: Fluorine is more electronegative than oxygen.

CORRECT ANSWER: A

SOLUTION:

Oxygen is the most electronegative element after fluorine. Therefore, in the compounds between oxygen

and fluorine, oxygen is found to show positive oxidation state.

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Q-48 - 60007209

One mole of N_2H_4 loses 10 mol of electrons to form a new compound Y. Assuming that all nitrogen appear in the new compound, what is the oxidation state of N_2 in Y (There is no change in the oxidation state of hydrogen)

(A) $+3$

(B) -3

(C) -1

(D) $+5$

CORRECT ANSWER: A

SOLUTION:

$$N_2^{2-} ta._2 N^{a+} + 10e^-$$
$$\therefore 2a - [2 \times (-1)]$$
$$= 10$$

$$\therefore a = +3$$

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Q-49 - 12227053

In a balanced equation

$$H_2SO_4 + xHI \rightarrow H_2S + YI_2 + zH_2O$$

, the value of x, y, z are

(A) $x = 3, y = 5, z = 2$

(B) $x = 4, y = 8, z = 5$

(C) $x = 8, y = 4, z = 4$

(D) $x = 5, y = 3, z = 4$

CORRECT ANSWER: C

SOLUTION:

The values of x, y, z are 8, 4, 4 respectively hence the reaction is

$$H_2SO_4 + 8HI \rightarrow H_2S + 4I_2 + 4H_2O$$

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Q-50 - 12227060

Which is the best description of the behaviour of bromine in the reaction given below

$$H_2O + Br_2 \rightarrow HOBr + HBr$$

(A) Oxidised only

(B) Reduced only

(C) Proton acceptor only

(D) Both oxidised and reduced

CORRECT ANSWER: D

SOLUTION:

$$H_2O + \underset{0}{Br_2} \rightarrow \underset{+1}{HOBr} + HBr$$
$$-1$$

In the above reaction the oxidation number of Br_2 increases from zero (in Br_2) to $+1$ (in $HOBr$) and decreases from zero $\left(Br_3\right)$ to -1 (in HBr). Thus Br_2 is oxidised as well as as reduced and hence it is a redox reaction.

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Q-51 - 60007036

H_2O_2 reduces $K_4Fe(CN)_6$

(A) In neutral solution

(B) In acidic solution

(C) In non-polar solvent

(D) In alkaline solution

CORRECT ANSWER: B

SOLUTION:

When H_2O_2 reduces with $K_4\left[Fe(CN)_6\right]$. It is present in acidic solution.

$$2K_4\left[Fe(CN)_6\right] + H_2SO_4 + H_2O_2 \rightarrow 2K_3\left[Fe(CN)_6\right] + K_2SO_4 + 2H_2O$$

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Q-52 - 12227051

For the reaction, $C + O_2 \rightarrow CO_2, \Delta H = -393J$

$2Zn + O_2 \rightarrow 2ZnO, \Delta H = -412J$

(A) Carbon can oxidise Zn

(B) Oxidation of carbon is not feasible

(C) Oxidation of Zn is not fesible

(D) Zn can oxidise carbon

CORRECT ANSWER: D

SOLUTION:

Zn can oxidise carbon because heat of combustion of $Zn < C$.

Assertion: Reaction of SO_2 and H_2S in the presence of Fe_2O_3 catalyst gives elemental sulphur.

Reason: SO_2 is a reducing agent.

CORRECT ANSWER: B

SOLUTION:

SO_2 shows both oxidising and reducing nature. The reaction given in assertion is due to oxidizing nature of SO_2.

Q-54 - 60007093

If HNO_3 changes into N_2O, the oxidation number is changed by

(A) $+2$

(B) -1

(C) 0

(D) $+4$

CORRECT ANSWER: D

SOLUTION:

$$HNO_3 \Leftrightarrow \overset{*}{N}_2O$$

$$1 + x - 6 = 0 \quad 2x$$

$$-2 = 0$$

$$x = \ +5 \quad 2x = 2$$

$$x = \frac{}{2} = \ +1.$$

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Q-55 - 12227019

Following reaction describes the rusting of iron

$4Fe + 3O_2 \rightarrow 4Fe^{3+}$
$+ 6O_{2-}$

Which one of the following statements is incorrect?

(A) This is an example of a redox reaction

(B) Metallic iron is reduced to Fe^{3+}

(C) Fe^{3+} is an oxidising agent

(D) Metallic iron is a reducing agent

CORRECT ANSWER: B

SOLUTION:

Metallic iron is oxidised to Fe^{+3}.

Assertion: The passage of H_2S through aqueous solution of SO_2 gives yellow turbidty of S in solution. Reason: The yellow turbidity of S is in colloidal state due to oxidation of H_2S by $SO_2(aq)$.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explantion of the assertion.

(C) If assertion is true but reason is false.

(D) If assertion is false but reason is true.

CORRECT ANSWER: A

SOLUTION:

$$2H_2S + SO_2 \rightarrow 2H_2O + 3S$$

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Q-57 - 12226990

Assertion: N atom has two different oxidation states in NH_4NO_2.

Reason: One N atom has $-ve$ oxidation number as it is attached with less electronegative H atom and other has $+ve$ oxidation number as it is attached with more electronegative atom.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explantion of the assertion.

(C) If assertion is true but reason is false.

(D) If assertion is false but reason is true.

CORRECT ANSWER: A

SOLUTION:

N in NH_4^+ is in -3 oxidation state and in NO_2^- it is $+3$ oxidation state.

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Q-58 - 12226957

The equivalent weight of phosphoric acid (H_3PO_4) in the reaction

$NaOH + H_3PO_4$
$\rightarrow NaH_2PO_4 + H_2O$

is

(A) 25

(B) 98

(C) 59

(D) 49

CORRECT ANSWER: B

SOLUTION:

Molecular weight of H_3PO_4 is 98 and change in its

valency $= 1$ equivalent wieght of H_3PO_4

$$= \frac{\text{Molecular weight}}{\text{change in valency}}$$

$$= \frac{98}{1} = 98$$

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Q-59 - 12226960

In the following reaction (unbalanced), equivalent weight of As_2S_3

is related to molecular weight M by

$$As_2S_3 + H + NO_3^- \rightarrow NO$$
$$+ H_2O + AsO_4^{3-} + SO_4^{2-}$$

(A) $\frac{M}{2}$

(B) $\frac{M}{4}$

(C) $\frac{M}{28}$

(D) $\frac{M}{24}$

CORRECT ANSWER: C

SOLUTION:

$$\begin{array}{lccccc} & As_2S_3 & \longrightarrow & AsO_4^{3-} & + & 3SO_4^{2-} \\ \text{O.N.} & 2As = +6 & & 2 \times 5 & & 3 \times 6 \\ & 3s = -6 & & = 10 & & = 18 \end{array}$$

$Net = -Total$
$= 28 Netchange = 28$

Thus, equivalent mass of $As_2O_3 = \frac{M}{28}$

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Q-60 - 12226962

In the following disproportionation of Cl_2 in basic medium

$Cl_2 + 2KOH \rightarrow KCl$
$+ KClO + H_2O$

Equivalent mass of Cl_2 is

(A) 35.50

(B) 71.00

(C) 47.33

(D) 11.83

CORRECT ANSWER: B

SOLUTION:

In a disproportionation reaction

net equivalent mass $=$ E(oxidation part)$+$ E(reduction part)

	Change in O.N	Equivalent weight
$\frac{1}{2}\underset{0}{Cl_2} \longrightarrow \underset{-1}{Cl^-}$	1	$= \frac{M}{2}$
$\frac{1}{2}\underset{0}{Cl_2} \longrightarrow \underset{+1}{ClO^-}$	1	$= \frac{M}{2}$

$$\text{Net} = \frac{M}{2} + \frac{M}{2} = M = 71.0$$

$$Net = \frac{M}{2} + \frac{M}{2}$$

$$= M = 71.0$$