11th- JEE | NEET | B-1 | CHEMISTRY **DPP : Redox Reaction**

DPP-01: Calculation of oxidation number

1. The oxidation number of Oxygen in Na_2O_2 is :
(1) + 1 (2) + 2 (3) – 2 (4) – 1

2. One of the following has both positive and negative oxidation states
(1) F (2) Cl (3) He (4) Na

3. The oxidation state of osmium (Os) in OsO_4 is
(1) + 7 (2) + 6 (3) + 4 (4) + 8

4. Oxidation number of nitrogen in $(NH_4)_2SO_4$ is
(1) $-\frac{1}{3}$ (2) – 1 (3) + 1 (4) – 3

5. In which of the following compounds, the oxidation number of iodine is fractional ?
(1) IF_7 (2) I_3^- (3) IF_5 (4) IF_3

6. The oxidation number of cobalt in $K_3[Co(NO_2)_6]$ is
(1) 0 (2) + 4 (3) + 3 (4) + 6

7. Phosphorus has the oxidation state of +3 in
(1) Phosphorous acid (2) Orthophosphoric acid
(3) Hypophosphorous acid (4) Metaphosphoric acid

8. The oxidation number of Phosphorus in $Mg_2P_2O_7$ is :
(1) + 3 (2) + 2 (3) + 5 (4) – 3

9. In which of the following compounds, nitrogen has an oxidation state of –1 ?
(1) N_2O (2) NO_2^- (3) NH_2OH (4) N_2H_4

10. Which of the following is a redox reaction?
(1) $NaCl + KNO_3 \longrightarrow NaNO_3 + KCl$ (2) $CaC_2O_4 + 2\,HCl \longrightarrow CaCl_2 + H_2C_2O_4$
(3) $Mg(OH)_2 + 2\,NH_4Cl \longrightarrow MgCl_2 + 2\,NH_4OH$ (4) $Zn + 2\,AgCN \longrightarrow 2\,Ag + Zn(CN)_2$

DPP-02 : Balancing of redox reactions

1. A reducing agent is a substance :
(1) in which an element undergoes increase in oxidation number.
(2) in which an element undergoes decrease in oxidation number.
(3) which gains electron(s)
(4) which shares electron(s)

2. Consider the following reaction:
$3Br_2 + 6CO_3^{2-} + 3H_2O \longrightarrow 5Br^- + BrO_3^- + 6\,HCO_3^-$
Which of the following statements is true regarding this reaction:
(1) Bromine is oxidized and the carbonate radical is reduced.
(2) Bromine is reduced and the carbonate radical is oxidized.
(3) Bromine is neither reduced nor oxidized.
(4) Bromine is both reduced and oxidized.

3. Which of the following is a redox reaction:

(1) $2\,CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$ (2) $CuSO_4 + 4\,NH_3 \rightarrow [Cu(NH_3)_4]\,SO_4$

(3) $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$ (4) $Cr_2O_7^{2-} + 2OH^- \rightarrow 2\,CrO_4^{2-} + H_2O$

4. Consider the reaction,

$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$

With reference to the above, which one of the following is the correct statement ?

(1) Zn is reduced to Zn^{2+} (2) Zn is oxidised to Zn^{2+}

(3) Zn^{2+} is oxidised to Zn (4) Cu^{2+} is oxidised to Cu.

5. Which reaction does not represent auto redox or disproportionation reaction :

(1) $Cl_2 + OH^- \longrightarrow Cl^- + ClO_3^- + H_2O$ (2) $2H_2O_2 \longrightarrow H_2O + O_2$

(3) $2Cu^+ \longrightarrow Cu^{2+} + Cu$ (4) $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$

6. In the reaction $X^- + XO_3^- + H^+ \longrightarrow X_2 + H_2O$, the molar ratio in which X^- and XO_3^- react is :

(1) 1 : 5 (2) 5 : 1 (3) 2 : 3 (4) 3 : 2

7. The compound that can work both as an oxidising as well as a reducing agent is :

(1) $KMnO_4$ (2) H_2O_2 (3) $Fe_2(SO_4)_3$ (4) $K_2Cr_2O_7$

8. Which of the following behaves as both oxidising and reducing agents ?

(1) H_2SO_4 (2) SO_2 (3) H_2S (4) HNO_3

9. When $KMnO_4$ acts as an oxidising agent and ultimately forms MnO_4^{2-}, MnO_2, Mn_2O_3 and Mn^{2+}, then the number of electrons transferred in each case is :

(1) 4, 3, 1, 5 (2) 1, 5, 3, 7 (3) 1, 3, 4, 5 (4) 3, 5, 7, 1

DPP-03 : Classical Concept of Equivalent weight / Mass, Equivalent weight, n-factor and Normality for Acid, Base and Precipitate

1. When N_2 is converted into NH_3, the equivalent weight of nitrogen will be :

(1) 1.67 (2) 2.67 (3) 3.67 (4) 4.67

2. In the ionic equation $2K^+BrO_3^- + 12H^+ + 10e^- \longrightarrow Br_2 + 6H_2O + 2K^+$,

the equivalent weight of $KBrO_3$ will be :

(1) M/5 (2) M/2 (3) M/6 (4) M/4

(where M = molecular weight of $KBrO_3$)

3. If molecular weight of $KMnO_4$ is 'M', then its equivalent weight in acidic medium would be :

(1) M (2) M/2 (3) M/5 (4) M/4

4. In the conversion $NH_2OH \longrightarrow N_2O$,

the equivalent weight of NH_2OH will be :

(1) M/4 (2) M/2 (3) M/5 (4) M/1

(M = molecular weight of NH_2OH)

5. In the reaction between SO_2 and O_3, the equivalent weight of SO_2 is :

(1) the same as its molecular weight (2) half the molecular weight

(3) one-third of the molecular weight (4) one-fourth of the molecular weight

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

$NaOH + H_3PO_4 \longrightarrow NaH_2PO_4 + H_2O$

(1) 59 (2) 49 (3) 25 (4) 98

7. The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted into
(1) Mn_2O_3 (2) MnO_4^- (3) MnO_2 (4) MnO_4^{2-}

8. The equivalent weight of Mohr's salt, $FeSO_4.(NH_4)_2SO_4.6H_2O$ is equal to
(1) Its molecular weight (2) Atomic weight
(3) half-its molecular weight (4) one-third its molecular weight

9. When HNO_3 is converted into NH_3, the equivalent weight of HNO_3 will be :
(1) M/2 (2) M/1 (3) M/6 (4) M/8
(M = molecular weight of HNO_3)

10. In the reaction : $Na_2S_2O_3 + 4Cl_2 + 5H_2O \longrightarrow Na_2SO_4 + H_2SO_4 + 8HCl$,
the equivalent weight of $Na_2S_2O_3$ will be : (M = molecular weight of $Na_2S_2O_3$)
(1) M/4 (2) M/8 (3) M/1 (4) M/2

11. Which of the following relations is incorrect for solutions ?
(1) 3 N $Al_2(SO_4)_3$ = 0.5 M $Al_2(SO_4)_3$ (2) 3 M H_2SO_4 = 6 N H_2SO_4
(3) 1 M H_3PO_4 = 1/3 N H_3PO_4 (4) 1 M $Al_2(SO_4)_3$ = 6 N $Al_2(SO_4)_3$

12. Equivalent weight of carbon in CO and CO_2 are in the ratio of :
(1) 1 : 1 (2) 1 : 2 (3) 2 : 1 (4) 1 : 4

13. $28\ NO_3^- + 3As_2S_3 + 4H_2O = 6AsO_4^{3-} + 28NO + 9SO_4^{2-} + 8H^+$.
What will be the equivalent mass of As_2S_3 in above reaction : (Molecular mass of As_2S_3 = M)
(1) $\frac{M}{2}$ (2) $\frac{M}{4}$ (3) $\frac{M}{24}$ (4) $\frac{M}{28}$

DPP-04 : Titration

1. How many millilitres of 0.1N H_2SO_4 solution will be required for complete reaction with a solution containing 0.125 g of pure Na_2CO_3 :
(1) 23.6 mL (2) 25.6 mL (3) 26.3 mL (4) 32.6 mL

2. If 25 mL of a H_2SO_4 solution reacts completely with 1.06 g of pure Na_2CO_3, what is the normality of this acid solution :
(1) 1 N (2) 0.5 N (3) 1.8 N (4) 0.8 N

3. A certain weight of pure $CaCO_3$ is made to react completely with 200 mL of a HCl solution to give 224 mL of CO_2 gas at STP. The normality of the HCl solution is:
(1) 0.05N (2) 0.1 N (3) 1.0 N (4) 0.2 N

4. Equivalent mass of a bivalent metal is 32.7. Molecular mass of its chloride is :
(1) 68.2 (2) 103.7 (3) 136.4 (4) 166.3

5. 10 mL of 1 N HCl is mixed with 20 mL of 1 M H_2SO_4 and 30 mL of 1 M NaOH. The resultant solution has :
(1) 20 meq of H^+ ions (2) 20 meq of OH^-
(3) 0 meq of H^+ or OH^- (4) 30 milli moles of H^+

DPP-05 : Hydrogen peroxide, Hardness of water

1. The volume strength of 1.5 N H_2O_2 solution is :
(1) 4.8 V (2) 8.4 V (3) 3 V (4) 8 V

2. Temporary hardness is due to bicarbonates of Mg^{2+} and Ca^{2+}. It is removed by addition of CaO as follows :

$Ca(HCO_3)_2 + CaO \longrightarrow 2CaCO_3 + H_2O$

Mass of CaO required to precipitate 2 g $CaCO_3$ is :

(1) 2 g (2) 0.56 g (3) 0.28 g (4) 1.12 g

3. The mass of oxalic acid crystals ($H_2C_2O_4 . 2H_2O$) required to prepare 50 mL of a 0.2 N solution is :

(1) 4.5 g (2) 6.3 g (3) 0.63 g (4) 0.45 g

4. 125 mL of 63% (w/v) $H_2C_2O_4 . 2H_2O$ solution is made to react with 125 mL of a 40%(w/v) NaOH solution. The resulting solution is: (ignoring hydrolysis of ions)

(1) neutral (2) acidic (3) strongly acidic (4) alkaline

DPP-06 : Equivalent Concept for Redox reactions, $KMnO_4$ / $K_2Cr_2O_7$ v/s Reducing Agents & their Redox Titration

1. If equal volumes of 0.1 M $KMnO_4$ and 0.1 M $K_2Cr_2O_7$ solutions are allowed to oxidise Fe^{2+} to Fe^{3+} in acidic medium, then Fe^{2+} oxidised will be :

(1) more by $KMnO_4$ (2) more by $K_2Cr_2O_7$

(3) equal in both cases (4) cannot be determined.

2. Which of the following solutions will exactly oxidize 25 mL of an acid solution of 0.1 M iron (II) oxalate:

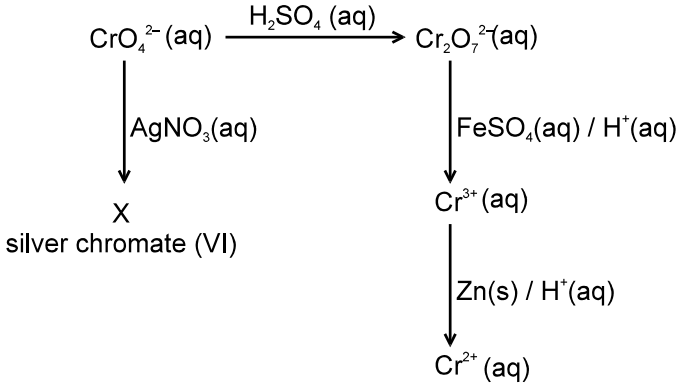
(1) 25 mL of 0.1 M $KMnO_4$ (2) 25 mL of 0.2 M $KMnO_4$

(3) 25 mL of 0.6 M $KMnO_4$ (4) 15 mL of 0.1 M $KMnO_4$

3. An element A in a compound ABD has oxidation number –n. It is oxidised by $Cr_2O_7^{2-}$ in acid medium. In the experiment, 1.68×10^{-3} moles of $K_2Cr_2O_7$ were used for 3.36×10^{-3} moles of ABD. The new oxidation number of A after oxidation is :

(1) 3 (2) 3 – n (3) n – 3 (4) +n

4. Consider the reactions shown below :



Which of the following statements is false : [Atomic Mass of Zinc = 65.4]

(1) Silver chromate (VI) has the formula Ag_2CrO_4.

(2) The minimum mass of zinc required to reduce 0.1 mole of Cr^{3+} to Cr^{2+} is 6.54 g.

(3) The conversion of CrO_4^{2-} into $Cr_2O_7^{2-}$ is not a redox reaction.

(4) The equation $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \rightarrow 6Fe^{3+} + 2Cr^{3+} + 7H_2O$ correctly describes the reduction of $Cr_2O_7^{2-}$ by acidified $FeSO_4$.

5. The number of moles of oxalate ions oxidized by one mole of MnO_4^- ion in acidic medium is :

(1) $\frac{5}{2}$ (2) $\frac{2}{5}$ (3) $\frac{3}{5}$ (4) $\frac{5}{3}$

ANSWER KEY

DPP-01

1.	(4)	**2.**	(2)	**3.**	(4)	**4.**	(4)	**5.**	(2)	**6.**	(3)	**7.**	(1)
8.	(3)	**9.**	(3)	**10.**	(4)								

DPP-02

1.	(1)	**2.**	(4)	**3.**	(3)	**4.**	(2)	**5.**	(4)	**6.**	(2)	**7.**	(2)
8.	(2)	**9.**	(3)										

DPP-03

1.	(4)	**2.**	(1)	**3.**	(3)	**4.**	(2)	**5.**	(2)	**6.**	(4)	**7.**	(3)
8.	(1)	**9.**	(4)	**10.**	(2)	**11.**	(3)	**12.**	(3)	**13.**	(4)		

DPP-04

1.	(1)	**2.**	(4)	**3.**	(2)	**4.**	(3)	**5.**	(1)				

DPP-05

1.	(2)	**2.**	(2)	**3.**	(3)	**4.**	(1)						

DPP-06

1.	(2)	**2.**	(4)	**3.**	(2)	**4.**	(2)	**5.**	(1)				