CHEMISTRY

Day-1 : Assignment

Chapter(s): Some Basic Concepts Of Chemistry, Structure Of Atom

Some Basic Concepts Of Chemistry

1. % hydrogen in water and hydrogen peroxide is 11.2 and 5.94 respectively. This data illustrates

1) Law of constant proportions

2) Law of multiple proportions

3) Law of conservation of mass

4) Law of equivalent proportions

2. 12g of element A combines with 16g of element B to form a compound X. In another experiment 12g of element A combines with 32g of element B to form a compound Y. This illustrates

1) Law of conservation of mass

2) Law of constant proportion

3) Law of multiple proportions

4) Law of reciprocal proportion

3. Given the numbers 786, 0.786 and 0.0786cm. The numbers of significant figures for the three numbers respectively are

1) 3, 4 and 5 2) 3, 3 and 3

3) 3, 3 and 4 4) 3, 4 and 4

4. The number of significant figures in 8.256×10^{-3} is

1) 1 2) 3

3) 4 4) infinite

5 H_2O_2 acts as both oxidising as well as reducing agent its product is H_20, when act as oxidising agent and its product is O_2 when act as of reducing agent. The strength of '10\P means one liter of H_20_2 solution on

decomposition at S.T.P. condition liberate 10 liters of oxygen gas $(H_2O \rightarrow H_2O+\frac{1}{2}O_2)$ **15 gm Mn04)2 sample containing inert impurity is completely reacting with 100 ml of '11.2 V' H_20_2, then what will be the % purity of Ba $(Mn0_4)_2$ in the sample ? (Atomic mass Ba = 137, Mn = 55)**

(1) 5% (2) 10% (3)50% (4) none

6 1.2 gm of carbon is burnt completely in oxygen (limited supply) to produce CO and $C0_2$. This mixture of gases is treated with solid 1_20_5 (to know the amount of CO produced), the liberated iodine required 120 ml of 0.1 M hypo solution for complete titration. The % of carbon converted into CO is :

(1) 60% (2) 100%

(3) 50% (4) 30%

7 Nitrogen (N), phosphorus (P) and Potassium (K) are the main nutrients in plant fertilizers. According to an industry convention, the numbers on the label refer to the mass % of N, P_20_5 and K_20 in that order calculate the N : P : K ratio of a 30 : 10 : 10, fertilizer in terms of moles of each element and express it as x : y : 1.

(1) 10 : 0.67 : 1

(2) 20 : 0.37 : 1

(3)0.37 : 10: 1

(4) 5 : 2 : 1

8 **In what ratio should a 15% solution of acetic acid be mixed with a 3% solution of the acid to prepare a 10% solution(all percentages are mass/mass percentages) :**

(1) 7 : 3 , (2)5: 7
(3) 7 : 5 (4) 7 : 10

9 **105 ml of pure water at 4°C saturated with NH_3 gas yielded a solution of density 0.9 g/ml and containing 30% NH by mass. Find the valume of resulting NH_3 solution.**

(1) 66.67 ml (2) 166.67 ml
(3) 133.33 ml (4) 266.67 ml

10 **The equivalent mass of H_3BO_3 (M = Molar mass of H_3BO_3) in its reaction with NaOH to from $Na_2B_4O_7$ is equal to –**

(1) M (2) $\frac{M}{2}$
(3) $\frac{M}{4}$ (4) $\frac{M}{6}$

11 **x gram of pure As_2S_3 is completely oxidised to respective highest oxidation states by 50 ml of 0.1 M hot acidified $KMnO_4$ then x mass of As_2S_3 taken is : (Molar mass of As_2S_3 = 246)**

(1) 22.4 g (2) 43.92 g
(3) 64.23 g (4) None

12 **The number of moles of ferrous oxalate oxidised by one mole of $KMn0_4$ is**

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

13 **How many moles of KMnO4 are needed a mixture of 1 mole of each FeSO4 & FeC2O4 in acidic medium**

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

14 **In the reaction**
$Na_2S_20_3 + 4C1_2 + 5H_20 \longrightarrow Na_2SO_4 + H_2S0_4 + 8HCl$
the equivalent weight of $Na_2 S_2 0_3$ will be

(1) M/4 (13) M/8
(3) M/1 (4) W/2
(M= molecular weight of $Na_2S_20_3$)

15 **Which of the following equations is a balanced one-**

(1) $5Bi03 + 22H^+ + 2M^{n2} \rightarrow 5Bi^{03+} + 7H_20 + 2MnO^-_4$
(2) $5BiO3 + 14H^+ + Mn2^+$ -> $5Bi^{03+} + 7H_20 + 2MnO4^-_4$
(3) $26103 + 4H^+ + 2M^{n2+}$ --> $6Bi^{3+} + 2H_20 + MnO4^-_4$
(4) $6BiO3 + 12H^+ + 2Mn^{2+}\ 6Bi^{3+} + 6H_20 + 2MnO4_4^-$

16 **The following equations are balanced atomwise and chargewise.**

(i) $Cr_2O_7^{2-} + 8H+ + 2H_20_2 \longrightarrow 2Cr^3+ + 7H_20 + 20_2$
(ii) $Cr_20_7^{2-} + 8H+ + 5H_20_2 \longrightarrow 2Cr^{3+} + 9H_20 + 40_2$
(iii) $Cr_20_7^{2-} + 8H+ + 7H_20_2 \longrightarrow 2Cr+ + 11H_20 + 50_2$

The precise equationlequations representing the oxidation of H_20_2 is/are

(1) (i) only (2) (ii) only
(3) (iii) only (4) all the three

17 **An excess of NaOH was added to 100 mL of a ferric chloride solution. This caused the precipitation of 1,425 g of $Fe(OH)_3$. Calculate the normality of the ferric chloride solution**

(1) 0.20 N (2) 0.50 N
(3) 0.25 N (4) 0.40 N

18 **In the reaction $Cr0_5 + H_2SO_4 \rightarrow Cr_2(S0_4)_3 + H_20 + 0_2$ one mole of CrO_5 will liberate how many moles of 0_2**

(1) 5/2 (2) 5/4
(3) 9/2 (4) none of these

19 **0.4g of a polybasic acid H_nA (all the hydrogens are acidic) requires 0.5g of NaOH for complete neutralization. The number of replaceable hydrogen atoms in the acid and the molecular weight of 'A' would be : (Molecular weight of the acid is 96 gms.)**

(1) 1, 95 (2)2,94
(3) 3, 93 (4) 4,92

20 **A solution of $Na_2S_2O_3$ is standardized iodimetrically against 0.1262 g of Mr% This process requires 45 mL of the Na_2 S_20_3 solution. What is the strength of the $Na_2S_2O_3$?**

(1) 0.2M (2) 0.1 M
(3) 0.05M (4)0.1 N

21 **25.0 g of $FeSO_4.7H_20$ was dissolved in water containing dilute H_2S0_4, and the volume was made up to 1.0 L. 25.0 mL of this solution required 20 mL of an N/10 $KMnO_4$ solution for complete oxidation. The percentage of $FeSO_4\cdot$ $7H_20$ in the acid solution is**

(1) 78% (2)98%
(3) 89% (4) 79%

22 **1.0 mol of Fe reacts completely with 0.65 mol of 0_2 to give a mixture of only Fe0 and Fe_2O_3. The mole ratio of ferrous oxide to ferric oxide is**

(1) 2 : 2(2) 4:2 (3)1:2 (4)2: 7

23 **25 mL of a solution containing HCf and H_2S0_4 required 10 mL of a 1 N NaOH solution for neutralization. 20 mL of the same acid mixture on being treated with an excess of $AgNO_3$ gives 0.1425 g of AgCf. The normality of the HC and the normality of the H_2S0_4 are respectively**

(1) 0.40 N and 0.05 N
(2) 0.05 N and 0.25 N
(3) 0.50 N and 0.25 N
(4) 0.40 N and 0.5 N

24 **If 10 gm of V_20_5 is dissolved in acid and is reduced to V^{2+} by zinc metal, how many mole of I_2 could be reduced by the resulting solution if it is further oxidised to $V0^{2+}$ ions ? [Assume no change in state of Zn^2+ions] (V = 51, 0 = 16, I = 127) :**

(1) 0.11 mole of 1_2 (2) 0.22 mole of 1_2
(3) 0.055 mole of 1_2 (4) 0.44 mole of 12

25 **0.70 g of mixture $(NH_4)_2$ $S0_4$ was boiled with 100 mL of 0.2 N Na0H solution till all the NH_3(g) evolved and get dissolved in solution it self. The remaining solution was diluted to 250 mL. 25 mL of this solution was neutralized using 10 mL of a 0.1 N H_2SO_4 solution. The percentage purity of the $(NH_4)_2$ SO sample is**

(1) 94.3 (2) 50.8
(3) 47.4 (4) 79.8

26 **A mixed solution of potassium hydroxide and sodium carbonate required 15 mL. of an N/20 HCI solution when titrated with phenolphthalein as an indicator. But the same amount of the solution when titrated with methyl orange as an indicator required 25 mL of the same acid. The amount of KOH present in the solution is**

(1) 0.014g (2) 0.14g
(3) 0.028g (4) 1,4 g

27 **The percentage of copper in a copper (II) salt can be determined by using a thiosulphate titration. 0.305 gm of a copper (II) salt was dissolved in water and added to, an excess of potassium iodide solution liberating iodine according to the following equation**

$2Cu^2 (aq) + 4I^- (aq) \rightleftharpoons 2CuI(s) + I_2(aq)$

The iodine liberated required 24.5cm³ of a 0.100 mole dm^{-3} solution of sodium thiosulphate

$2S_20_3^{2-} (aq) + I_2(aq) \longrightarrow 2I^- (aq) + S_40_6^{2-} (aq)$

the percentage of copper, by mass in the copper (II) salt is. [Atomic mass of copper = 63.5]

(1) 64.2 (2) 51.0

(3) 48.4 (4) 25.5

28. $3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$

the wrong statement for the above

1) *Cu* is oxidized

2) HNO_3 is reduced

3) *Cu* is reduced

4) *Cu* acts as reducting agen

29. 1 mole of equimolar mixture of ferric oxalate and ferrous oxalate will require x mole of $KMnO_4$ in acidic medium for complete oxidation, x is

1) 0.5 mole 2) 0.9 mole

3) 1.2 mole 4) 4.5 mole

30. The more positive the value of E^0 , the tendency of the species to get reduced. Using the standard electrode potential of redox couples given below, find out which of the following is the strongest oxidizing agent? E^0 values:

$Fe^{3+}/Fe^{2+} = +0.77; I_2(g)/I^- = +0.54;$

$Cu^{2+}/Cu = +0.34; Ag^+/Ag = +0.80V$

1) Fe^{3+} 2) $I_2(g)$ 3) Cu^{2+} 4) Ag^+

31. Which of the following have been arranged in decreasing order of oxidation number of sulphur?

(1) $Na_2S_4O_6 > H_2S_2O_7 > Na_2S_2O_3 > S_8$

(2) $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

(3) $SO_2^{2+} > SO_4^{2-} > SO_3^{-2} > HSO_4^-$

(4) $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

32. For the redox reaction,

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

the correct coefficeint for the balanced reaction are

	MnO_4^-	$C_2O_4^{2-}$	H^+
(1)	2	5	16
(2)	16	5	2
(3)	5	16	2
(4)	2	6	5

1) 2	**2)** 3	**3)** 2	**4)** 3	**5)** 3	**6)** 4	**7)** 1	**8)** 3	**9)** 2	**10)** 1
11) 2	**12)** 4	**13)** 1	**14)** 2	**15)** 2	**16)** 1	**17)** 4	**18)** 4	**19)** 3	**20)** 4
21) 3	**22)** 2	**23)** 2	**24)** 1	**25)** 1	**26)** 1	**27)** 2	**28)** 3	**29)** 2	**30)** 4
31) 4	**32)** 1								

HINTS AND SOLUTIONS

5 N = $\frac{11.2}{5.6}$

Milli equivalents $Ba(MnO_4)_2$ reacted $\Rightarrow$ equivalents of H_2O_2 reacted

$\Rightarrow$ 2 × 100 $\Rightarrow$ 200 m eq^n $\Rightarrow$ 0.2 eq^n

Moles of $Ba(MnO_4)_2 \Rightarrow \frac{0.2}{10} = 0.02$

$\therefore$ wt. of $Ba(MnO_4)_2$ = 0.02 × 375.

% purity of $Ba(MnO_4)_2 = \frac{375 \times 0.02}{15} \times 100 = 50\%$

10 H_3BO_3 is a mono basic acid

So $\frac{M}{1}$ = equivalent mass

11. $5As_2S_3 + 28KMn0_4 + H^+ \longrightarrow 10H_3AsO_4 + 28Mn^{2+} + SO_4^{2-}$

mmoles of $KMn0_4$ = 50 x 0.1 = 5

28 mmoles of $KMnO_4 \longrightarrow$ 5 Moles of As_2S_3

1 mmoles of $KMnO_4 \longrightarrow$ 5/28 moles of As_2S_3

Mass of As_2S_3 = x = 246 x $\frac{5}{28}$ g = 43.92 g

12 Equivalents of FeC_2O_4 = equivalents of $KMnO_4$

x (mole) x 3 = 1 × 5

$x = \frac{5}{3}$

13. Equivalents of $KMnO_4$ = equivalent of $FeSO_4$ + equivalent of FeC_2O_4

x ×5 =1 × 1+1× 3

$x = \frac{4}{5}$ mole

14 $Na_2\overset{+2}{S}_2O_3 \longrightarrow Na_2\overset{+6}{S}O_4$

see the total change in oxidation number

= 4 × 2 = 8

$\therefore \quad E_{Na_2S_2O_3} = \frac{\text{mol.wt.}}{\text{V.f}} = \frac{M}{8}$

15 Reduction

$BiO_3^- + Mn^{2+} \longrightarrow Bi^{3+} + MnO_4^-$

Oxidation

(i) $2e + 6H^+ + BiO_3^- \longrightarrow Bi^{3+} + 3H_2O$

(ii) $4H_2O + Mn^{2+} \longrightarrow MnO_4^- + 8H^+ + 5e$

(i) × 5 + (ii) × 2 we get

$14\ H^+ + 5\ BiO_3^- + 5Mn^{2+} \longrightarrow 5Bi^{3+} + 2MnO_4^- + 7H_2O$

is the correct balanced reaction.

17. $3\ NaOH + FeCl_3 \longrightarrow Fe(OH)_3 + 3NaCl$

m.e. of NaOH = me.e of $Fe(OH)_3$

$100 \times N = \frac{W}{E} \times 1000 \left(E_{Fe(OH)_3} = \frac{\text{mol. wt.}}{3} \right)$

$N = \frac{1.425 \times 10 \times 3}{107} = 0.3999 = 0.4\ N$

18 The balance reaction is

$4CrO_5 + 2H_2SO_4 \longrightarrow 2\ Cr_2(SO_4)_3 + 2H_2O + O_2$

∴ 1 mole CrO5 can liberate only $\frac{1}{4}$ mole O_2

19 Eq of Acid = eq of base

$n \times \frac{0.4}{96} = \frac{0.5}{40}$

$n = \frac{1}{80} \times \frac{96}{0.4} = \frac{96}{32} = 3$

∴ wt of A = 96 – 3 = 93.

20 $Na_2\overset{2+}{S_2}O_3 + K\overset{+5}{B}rO_3 \longrightarrow Br^- + Na_2\overset{+2.5}{S_4}O_6$

v.f = 1 v. = 6

by m.e. of $Na_2S_2O_3$ = m.e. of $KBrO_3$

molarity of $Na_2S_2O_3$ = 0.1 M

21 M.e. of $FeSO_4 \cdot 7H_2O$ in 25 ml = m.e. of $KMnO_4$ used = 2 m.e.

M.e. of $FeSO_4 \cdot 7H_2O$ in 1000 ml = 80 m.e.

mass of $FeSO_4 \cdot 7H_2O$ in solution = $\frac{80}{1} \times 2787 \times \frac{1}{1000} = 22.24\,gm$

% of $FeSO_4 \cdot 7H_2O$ = $\frac{22.24}{25} \times 100$ = 88.96 89%

22. Let moles of FeO and Fe_2O_3 in the mixture is a and b respectively, then by POAC we get following two equation.

a + 3b = 0.65 × 2 = 1.3 ...(i)

a + 2b = 1 ...(ii)

by solving (i) & (ii) we get a : b = 4 : 3

23. Let normality of HCℓ is N_1 and H_2SO_4 is N_2.

∴ M.e. of HCℓ + M.e. of H_2SO_4 = M.e of NaOH

25 × N_1 + 25 × N_2 = 10 × 1 ... (1)

$N_1 + N_2 = 0.4$ ... (1)

BY POAC

Moles of Cℓ = moles of AgCℓ

$\frac{20 \times N_1}{1000} = \frac{0.1435}{143.05} = 10^{-3}$

$N_1 = 0.05\ N$

$N_2 = 0.35\ N$

24. $6e^- + 10H^+ + V_2O_5 \longrightarrow 2V2^+ + 5\ H_2O$

$Zn \longrightarrow Zn^{2+} + 2e^-$ 3 × 3

$V_2O_5 + 3\ Zn + 10\ H^+ \longrightarrow 3\ Zn^{2+} + 2V^{2+} + 5H_2O$ ... (1)

Now $H_2O + V^{2+} \longrightarrow VO^{2+} + 2H^+ + 2e^-$

$2e^- + I_2 \longrightarrow 2r^-$

$V^{2+} + I_2 + H_2O \longrightarrow 21^- + VO^{2+} + 2H^+$

so we have 12 moles of V_2O_5 will reduce 2 moles of iodine

so $\left(\frac{10}{102+80}\right)\times 2$ moles of will be reduced by

given amount of V_2O_5 = 0.11 moles of 1_2

25. M.e. of NH_3 = 10

m.e. of NH3 = 10

m.mole of $(NH_4)_2SO_4$= 5

wt. of $(NH_4)_2$ SO_4 = 5

wt. of (NH4)2 SO4 = $\frac{5}{1000} \times 132 = 0.66$ gm

% of $(NH_4)_2$ $S0_4$ = $\frac{0.66}{0.7} \times 100 =$

94.28 %

26 $K0H + Na_2aO_3$

a M.e. b.M.e.

$a + \frac{b}{2} = 15 \times \frac{1}{20}$

2a + b= 1.5 … (i)(in presence of phenolphthalein)

$a + b = 25 \times \frac{1}{20} = 1.25$ … (ii) (in presence of Methyl orange)

by solving (i) & (ii) a = 0.25 m.e

mass of K0H = $\frac{0.25}{1000} \times 56 = 0.$ 014 gm

27. From given reactions

mmoles of hypo = mmoles of iodine × 2

= mmoles of Cu^{2+} ions

= 24.5 × 0.1 mmoles

So mass of copper = 24.5 × 0.1 × 10-3 × 63.5 gm

So % of copper = $\frac{24.5\times 0.1\times 10^{-3}\times 63.5}{0.305}\times 100\% \approx 51.0\%$