PHYSICAL CHEMISTRY

NEET

CRASH COURSE

MOLE CONCEPT & REDOX REACTION

SMART ACHIEVERS

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MOLE CONCEPT & REDOX REACTION

Q.1 In the reaction $N_2 + 3H_2 \longrightarrow 2\,NH_3$, ratio by volume of N_2, H_2 and NH_3 is 1 : 3 : 2. This illustrates law of -
(1) Difinite proportion (2) Multiple proportion
(3) Reciprocal proportion (4) Gaseous volumes

Q.2 When 100 g of ethylene polymerizes to polythylene according to equation $nCH_2 = CH_2 \rightarrow -(-CH_2 - CH_2 -)_n-$. The weight of polyethylene produced will be:-
(1) $\frac{n}{2}$ gm (2) 100 gm (3) $\frac{100}{n}$ gm (4) 100ngm

Q.3 Which of the following combination illustrate law of reciprocal proportion :–
(1) N_2O_3, N_2O_4, N_2O_5 (2) PH_3, P_2O_5, P_2S_5
(3) CS_2, CO_2, SO_2 (4) NaCl, NaBr, NaI

Q.4 The number of molecule in 4.25 gms of NH_3 is -
(1) 1.505×10^{23} (2) 3.01×10^{23} (3) 6.02×10^{23} (4) None of these

Q.5 Which contains least no. molecules:-
(1) 1 g CO_2 (2) 1 gN_2 (3) 1g O_2 (4) 1g H_2

Q.6 Number of oxygen atoms in 8 gms of ozone is -
(1) 6.02×10^{23} (2) $\frac{6.02\times10^{23}}{2}$ (3) $\frac{6.02\times10^{23}}{3}$ (4) $\frac{6.02\times10^{23}}{6}$

Q.7 The actual weight of a molecule of water is -
(1) 18 gm (2) 2.99×10^{-23} gm
(3) both (1) & (2) are correct (4) None of these

Q.8 Insulin contains 3.4% sulphur. The minimum mol. wt. of insulin is –
(1) 941.176 (2) 944 (3) 945.27 (4) None

Q.9 In a gaseous reaction of the type $aA + bB \longrightarrow cC + dD$, which statement is wrong ?
(1) a litre of A combines with b litre of B to give C and D
(2) a mole of A combines with b moles of B to give C and D
(3) a gm of A combines with b gm of B to give C and D
(4) a molecules of A combines with b molecules of B to give C and D

Q.10 26 CC of CO_2 are passed over red hot coke. The volume of CO evolved is :–
(1) 15 CC (2) 10 CC (3) 32 CC (4) None of thes

Q.11 If 0.5 moles of $BaCl_2$ is mixed with 0.2 moles of Na_3PO_4 the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is -

$$3BaCl_2 + 2Na_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6NaCl$$

(1) 0.7 (2) 0.5 (3) 0.3 (4) 0.1

Q.12 For the reaction $A + 2B \longrightarrow C$, 5 mole of A and 8 mole of B will produce
(1) 5 mole of C (2) 4 mole of C (3) 8 mole of C (4) 13 mole of C

Q.13 If 0.5 mol of $BaCl_2$ is mixed with 0.1 mole of Na_3PO_4, the maximum number of mole of $Ba_3(PO_4)_2$ that can be formed is:-
(1) 0.7 (2) 0.05 (3) 0.30 (4) 0.10

Q.14 A hydrocarbon contains 75% of carbon. Then its molecular formula is -
(1) CH_4 (2) C_2H_4 (3) C_2H_6 (4) C_2H_2

Q.15 A compound of X and Y has equal mass of them. If their atomic weights are 30 and 20 respectively. Molecular formula of that compound
(its mol. wt. is 120) could be -
(1) X_2Y_2 (2) X_3Y_3 (3) X_2Y_3 (4) X_3Y_2

Q.16 An oxide of sulphur contains 50% of sulphur in it. Its emperial formula is -
(1) SO_2 (2) SO_3 (3) SO (4) S_2O

Q.17 A compound contains 38.8% C, 16.0% H and 45.2% N. The formula of the compound would be
(1) CH_3NH_2 (2) CH_3CN (3) C_2H_5CN (4) $CH_2(NH)_2$

Q.18 10 ml of gaseous hydrocarbon on combustion give 40 ml of $CO_2(g)$ and 50 ml of H_2O (vap.). The hydrocarbon is -
(1) C_4H_5 (2) C_8H_{10} (3) C_4H_8 (4) C_4H_{10}

Q.19 The oxidation number of Oxygen in Na_2O_2 is :
(1) + 1 (2) + 2 (3) – 2 (4) – 1

Q.20 One of the following has both positive and negative oxidation states
(1) F (2) Cl (3) He (4) Na

Q.21 The oxidation state of osmium (Os) in OsO_4 is
(1) + 7 (2) + 6 (3) + 4 (4) + 8

Q.22 The oxidation number of cobalt in $K_3[Co(NO_2)_6]$ is
(1) 0 (2) + 4 (3) + 3 (4) + 6

Q.23 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)

Q.24 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.

Q.25 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) $Cr_2O_7^{2-} + 2OH^- \rightarrow 2\ CrO_4^{2-} + H_2O$

Q.26 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.

Q.27 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) $(NH_4)_2Cr_2O_7 \longrightarrow N_2 + Cr_2O_3 + 4H_2O$

Q.28 In an organic compound of molar mass 108 g mol^{-1} C,H and N atoms are present in 9 : 1 : 3.5 by weight. Molecular formula can be :
(1) $C_6H_8N_2$ (2) $C_7H_{10}N$ (3) $C_5H_6N_3$ (4) $C_4H_{18}N_3$

Q.29 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

Q.30 Which of the following concentration factor is affected by change in temperature ?
(1) Molarity (2) Molality (3) Mole fraction (4) Weight fraction

Q.31 The oxidation state of Cr in $[Cr(NH_3)_4Cl_2]^+$ is :
(1) + 3 (2) + 2 (3) + 1 (4) 0

Q.32 The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is :
(1) + 4 (2) + 6 (3) + 2 (4) + 3

Q.33 Which of the following chemical reactions depicts the oxidizing behaviour of H_2SO_4?
(1) $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O$ (2) $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$
(3) $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$ (4) $2PCl_5 + H_2SO_4 \rightarrow 2POCl_3 + 2HCl + SO_2Cl_2$

Q.34 How many moles of magnesium phosphate, $Mg_3(PO_4)_2$ will contain 0.25 mole of oxygen atoms ?
(1) 0.02 (2) 3.125×10^{-2} (3) 1.25×10^{-2} (4) 2.5×10^{-2}

Q.35 In the reaction
$2Al_{(s)} + 6HCl_{(aq)} \rightarrow 2Al^{3+}_{(aq)} + 6Cl^-_{(aq)} + 3H_2\ (g)$
(1) 6L $HCl_{(aq)}$ is consumed for every 3L H_2 produced.
(2) 33.6 L $H_{2(g)}$ is produced regardless temperature and pressure for every moles that reacts.
(3) 67.2 L $H_{2(g)}$ at STP is produced for every mole of Al that reacts .
(4) 11.2 L $H_{2(g)}$ at STP is produced for every mole of $HCl_{(aq)}$ consumed.

Q.36 The molarity of a solution obtained by mixing 750 mL of 0.5(M) HCl with 250 mL of 2(M)HCl will be:
(1) 0.875 M (2) 1.00 M (3) 1.75 M (4) 0.975 M

Q.37 Which has maximum number of atoms :
(1) 24 g of C (12) (2) 56 g of Fe (56) (3) 27 g of Al (27) (4) 108 g Ag (108)

Q.38 Given that the abundances of isotopes ^{54}Fe, ^{56}Fe and ^{57}Fe are 5%, 90% and 5%, respectively, the atomic mass of Fe is :
(1) 55.85 (2) 55.95 (3) 55.75 (4) 56.05

Q.39 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

Q.40 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

Q.41 Find the volume strength of H_2O_2 solution prepared by mixing of 250 mL of 3N H_2O_2 & 750 mL of 1N H_2O_2 solution :
(1) 1.5 V (2) 8.4 V (3) 5.6 V (4) 11.2 V

Q.42 125 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

Q.43 M is molecular weight of $KMnO_4$. The equivalent weight of $KMnO_4$ when it is converted into K_2MnO_4 is :
(1) M (2) M/3 (3) M/5 (4) M/7

Q.44 Which statement is not correct ?
(1) Potassium permanganate is a powerful oxidising substance
(2) Potassium permanganate is a weaker oxidising agent than potassium dichromate
(3) Potassium permanganate is a stronger oxidising agent than potassium dichromate
(4) Potassium dichromate oxidised a secondary alcohol into a ketone.

Q.45 If 1/2 moles of oxygen combine with aluminium to form Al_2O_3 then weight of Aluminium metal used in the reaction is (Al = 27) –
(1) 27 g (2) 18 g (3) 54 g (4) 40.5 g

ASSERTION & REASON

Directions : Each of these questions contains an Assertion followed by reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.
(1) If both assertion and reason are true and reason is the correct explanation of assertion.
(2) If both assertion and reason are true but reason is not the correct explanation of assertion.
(3) If Assertion is true but reason is false.
(4) If both assertion and reason are false.

Q.46 **Assertion :** The percentage of nitrogen in urea is 46.6%.
Reason : Urea is Ionic compound.

Q.47 **Assertion :** One molal aqueous solution of glucose contains 180 g of glucose in 1 kg water. **[AIIMS 2008]**
Reason : Solution containing one mole of solute in 1000 g of solvent is called one molal solution.

Q.48 **Assertion :** The weight percentage of a compound A in a solution is given by

$$\% \text{ of } A = \frac{\text{Mass A}}{\text{Total mass of solution}} \times 100$$

Reason : The mole fraction of a component A is given by,

$$\text{Mole fraction of } A = \frac{\text{No. of moles of A}}{\text{Total no. of moles of all components}}$$

Q.49 **Assertion :** A one molal solution prepared at 20°C will retain the same molality at 100°C, provided there is no loss of solute or solvent on heating.
Reason : Molality is independent of temperature.

Q.50 **Assertion :** A molecule of butane, C_4H_{10} has a mass of 58.12 amu.
Reason : One mole of butane contains 6.022×10^{23} molecules and has a mass of 58.12 g.

ANSWER KEY

MOLE CONCEPT & REDOX REACTION

Q.1	4	Q.2	2	Q.3	3	Q.4	1	Q.5	1	Q.6	2	Q.7	2
Q.8	1	Q.9	3	Q.10	4	Q.11	4	Q.12	2	Q.13	2	Q.14	1
Q.15	3	Q.16	1	Q.17	1	Q.18	4	Q.19	4	Q.20	2	Q.21	4
Q.22	3	Q.23	1	Q.24	4	Q.25	3	Q.26	2	Q.27	4	Q.28	1
Q.29	3	Q.30	1	Q.31	1	Q.32	4	Q.33	1	Q.34	2	Q.35	4
Q.36	1	Q.37	1	Q.38	2	Q.39	3	Q.40	2	Q.41	2	Q.42	1
Q.43	1	Q.44	2	Q.45	2	Q.46	3	Q.47	1	Q.48	2	Q.49	1
Q.50	1												