Chemical Analysis

1. What volume of a solution of hydrochloric acid containing 73 g of acid per litre would sufficient for the exact neutralization of sodium hydroxide obtained by allowing 0.46 g metallic sodium to act upon water

   ($Cl = 35.5$, $Na = 23.0$, $o = 16$)

   (a) 10 ml (b) 15 ml

   (c) 20 ml (d) 8 ml

2. A white sodium salt dissolves readily in water to give a solution which is neutral to litmus. When silver nitrate solution is added to the solution, a white precipitate is formed which does not dissolve in dilute nitric acid. The anion could be

   (a) SO_4^{2-} (b) CO_3^{2-}

   (c) S^{2-} (d) Cl^-

3. Sometimes yellow turbidity appears on passing H_2S gas even in the absence of the second group radicals. This happens because

   (a) Sulphur is present in the mixture as an impurity

   (b) The fourth group radicals are precipitated as sulphides

   (c) The H_2S is oxidized by some acid radicals

   (d) The third group radicals are precipitated

4. The colour of $CuCr_2O_7$ solution in water is green because

   [Bihar CEE 1995]

   (a) $Cr_2O_7^{2-}$ ions are green

   (b) Cu^{++} ions are green

   (c) Both ions are green

   (d) Cu^{++} ions are blue and $Cr_2O_7^{2-}$ ions are yellow

5. Pb^{++}, Cu^{++}, Zn^{++}, and Ni^{++} ions are present in a given acidic solution. On passing hydrogen sulphide gas through this solution the available precipitate will contain

   [MP PMT 1996; MP PET/PMT 1998]

   (a) PbS and NiS (b) PbS and CuS

   (c) CuS and ZnS (d) CuS and NiS

6. In acidic medium, dichromate ion oxidises ferrous ion to ferric ion. If the *gram* molecular weight of potassium dichromate is 294 *grams*, its *gram* equivalent weight is......*grams*

   (a) 294   (b) 127

   [UPSEAT 2001]

   (c) 49   (d) 24.5

7. Metallic tin in the presence of HCl is oxidise $K_2Cr_2O_7$ to stannic chloride. What volume of decinormal dichromate solution would be reduced by 1 g of tin

   [UPSEAT 2001]

   (a) 168.49 ml (b) 175.49 ml

   (c) 170.50 ml (d) 162.38 ml

   [Rb. PMT 1998]

8. 50 ml $10 N - H_2SO_4$, 25 ml $12N–HCl$ and 40 ml $5 N – HNO_3$ were mixed together and the volume of the mixture was made 1000 ml by adding water. The normality of the resultant solution will be

   [MP PET/PMT 1998; MP PMT 2002]

   (a) 1 N (b) 2 N

   [AIIMS 1982]

   (c) 3 N (d) 4 N

9. An aqueous solution of colourless metal sulphate M, gives a white precipitate with $NaOH$. This was soluble in excess of $NaOH$. On passing H_2S through this solution a white precipitate is formed. The metal M in the salt is

   [KCET 1990]

   (a) Ca (b) Ba

   (c) Al (d) Zn

10. A compound is soluble in water. If ammonia is added, a red precipitate appears which is soluble in dilute HCl. The compound has

    (a) Aluminium   (b) Zinc

    (c) Iron   (d) Cadmium

11. Nessler's reagent is

    [CPMT 1997; MP PET/PMT 1998]

    (a) $KHgI_4$ (b) $K_2HgI_4 + NH_4OH$

    (c) $K_2HgI_4 + KOH$ (d) $KHgI_4 + NH_4OH$

12. Neutral ferric chloride is added to the aqueous solution of acetate. The blood red colour is obtained, it is due to the compound

    (a) $Fe(OH)_2$ (b) $Fe(OH)_3$

    (c) $Fe(CH_3COO)_3$ (d) $Fe(OH)_2(CH_3COO)$

13. Mark the gas which turns lime water milky

(a) H_2S (b) SO_2

(c) Cl_2 (d) CO_2

14. Which of the following reactions with H_2S does not produce metallic sulphide

(a) $ZnCl_2$ (b) $CdCl_2$

(c) $COCl_2$ (d) $CuCl_2$

[AIIMS 1997]

A S Answers and Solutions

(SET -21)

1. (a) $\dfrac{0.46}{23} = \dfrac{73}{36.5} \times V(l)$

$V = 10\,ml$

2. (d) $NaCl + H_2O \rightarrow \underset{(aq)}{NaCl}$

$\underset{(aq)}{NaCl} + \underset{(aq)}{AgNO_3} \rightarrow \underset{\text{white ppt}}{AgCl} \xrightarrow[\text{dil}]{HNO_3} \text{Insoluble}$

3. (b) This is due to the precipitation of fourth group radical as sulphides due to high concentration of S^{2-} in the solution as a result yellow turbidity is obtained

4. (d) Cu^{++} ions are blue and $Cr_2O_7^{--}$ ions are yellow, yellow and blue combination gives-green colour.

5. (b) As both Pb^{2+} and Cu^{2+} require acidic medium and low concentration of S^{2-} to be precipitated as sulphide and low concentration of S^{2-} is provided by common ion effect of HCl and H_2S.

6. (c) In acidic medium potassium dicromate shows + 6 oxidation state $\dfrac{M}{6} = \dfrac{294}{6} = 49$

7. (a) $0.1 \times V = \dfrac{2}{119}$

$V = 168.06\,ml$.

8. (a) $\underset{N_1V_1}{H_2SO_4} + \underset{N_2V_2}{HCl} + \underset{N_3V_3}{HNO_3}$ Total volume $= N \times 1000\,ml$

$N = \dfrac{N_1V_1 + N_2V_2 + N_3V_3}{1000}$

$= \dfrac{50 \times 10 + 25 \times 12 + 40 \times 5}{1000}$

$N = \dfrac{500 + 300 + 200}{1000} = \dfrac{1000}{1000} = 1N$

9. (d) $Zn^{+2} + 2NaOH \rightarrow \underset{\text{(white ppt.)}}{Na_2ZnO_2} + 2H_2O$

$Na_2ZnO_2 + H_2S \rightarrow \underset{\text{(White ppt.)}}{ZnS} + 2NaOH$

10. (c) $FeCl_3 + 3NH_4OH \rightarrow \underset{\text{(red)}}{Fe(OH)_3} + 3NH_4Cl$

$2Fe(OH)_3 + 6HCl \rightarrow \underset{\substack{\text{(soluble} \\ \text{in HCl)}}}{2FeCl_3} + 6H_2O$

11. (c) Nessler's reagent $= K_2HgI_4 + KOH$.

12. (c) $3CH_3COONa + FeCl_3 \rightarrow \underset{\text{Blood red ppt.}}{Fe(CH_3COO)_3} + 3\,NaCl$

13. (bd) CO_2 and SO_2 turns lime water milky, as

★★★ $Ca(OH)_2\,(aq.) + CO_2 \rightarrow \underset{\text{(milky)}}{CaCO_3} \downarrow + H_2O$

$Ca(OH)_2 + SO_2 \rightarrow \underset{\text{(milky)}}{CaSO_3} \downarrow + H_2O$

14. (c) In $COCl_2$ metal is not present.