Chemical stoichiometry

21. (d)$2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5[O]$

$\underbrace{+7 \qquad\qquad\qquad\qquad +2}_{\text{Change by 5}}$

$\text{Eq. wt.} = \frac{\text{Mol. wt.}}{5}$

22. (c) Dibasic acid *NaOH;* $N_1V_1 = N_2V_2$

$\frac{W}{E} \times 1000 = \frac{1}{10} \times 25; \frac{0.16}{E} \times 1000 = \frac{25}{10}$

$M = 2 \times E = 2 \times 64 = 128.$

23. (d) *NaOH* *HCl*

$N_1V_1 = N_2V_2; 20 \times \frac{1}{10} = \frac{1}{20} \times V$; *V* = 40*ml.*

24. (a) $NV = N_1V_1 + N_2V_2$

$0.2 \times 2 = 0.5x + 0.1(2 - x)$

$0.4 = 0.5x + 0.2 - 0.1x$

$0.2 = 0.4x$

$x = \frac{1}{2}L = 0.5L$

25. (d) $NV = N_1V_1 + N_2V_2 + N_3V_3$

$N \times 1000 = 1 \times 5 + \frac{1}{2} \times 20 + \frac{1}{3} \times 30 = 5 + 10 + 10 = 25$

$N = 0.025 = \frac{N}{40}.$

26. (b) $NH_{3(g)} + HCl_{(g)} \rightarrow NH_4Cl_{(s)}$

$\underset{t=t}{t=0} \quad \underset{0}{20ml} \quad \underset{20ml}{40ml} \quad \underset{\text{solid}}{0}$

Final volume = 20*ml*.

27. (b) $KMnO_4$ Oxalic acid

$\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2}; \frac{20\times0.1}{2} = \frac{M_2V_2}{5}; M_2V_2 = 5.$

28. (b) Acidic medium $E = \frac{M}{5} = \frac{158}{5} = 31.6gm.$

29. (c) 0.1 *M* $AgNO_3$ will react with 0.1 *M NaCl* to form 0.1 *M* $NaNO_3$. But as the volume is doubled, conc. of $NO_3^- = \frac{0.1}{2} = 0.05M$

30. (a) Acid base

$\boldsymbol{N_1V_1} = N_2V_2$; $N_1 \times 30 = 0.2 \times 15; N_1 = 0.1N$

31. (b) (I) Phenopthalein indicate partial neutralisation of $Na_2CO_3 \rightarrow NaHCO_3$

Meq. of Na_2CO_3+ Meq. of *NaOH* = Meq. of *HCl*

$\frac{W}{E} \times 1000 + \frac{W}{E} \times 1000 = NV$

(Suppose $Na_2CO_3 = agm$, NaOH = *b gm*)

$\frac{a}{106} \times 1000 + \frac{b}{40} \times 1000 = 300 \times 0.1$.....(1)

(II) Methyl orange indicate complete neutralisation

HCl *HCl*

$N_1V_1 = N_2V_2$, $25 \times 0.2 = 0.1 \times V_2soV_2 = 50ml$excess

$\therefore \frac{a}{53} \times 1000 + \frac{b}{40} \times 1000 = 350 \times 0.1$.....(2)

From (1) and (2) *b* =1*gm.*

32. (c) From solution of (31)

From equation (1)

$a = Na_2CO_3 = 0.53gm.$

33. (b) $(H_2SO_4)\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2}(NaOH)$

$\frac{1\times V_1}{1} = \frac{1\times 10}{2}; V_1 = 5ml.$

34. (c) Atom in highest oxidation state can oxidize iodide to liberate I_2 which is volumetrically measured by iodometric titration using hypo.

$2I^- \rightarrow I_2$

Pb^{+2} →Lowest oxidation state can not oxidise iodide to I_2.

35. (d) $KMnO_4$ =Mohr salt

$\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2}; \frac{0.1\times 10}{1} = \frac{M_2V_2}{5}; M_2V_2 = 5.$

36. (d) The equivalent weight of $H_3PO_4 = \frac{\text{molecular weight}}{2}$

∵mole wt of H_3PO_4= 3 + 31 + 64 = 98

$\therefore \frac{98}{2} = 49$

37. (b) $Ba(OH)_2 + CO_2 \rightarrow BaCO_3 + H_2O$

Atomic wt. of $BaCO_3$ =137 + 12 + 16 × 3= 197

No. of mole $= \frac{\text{wt. of substance}}{\text{mol wt.}}$

∵1 mole of $Ba(OH)_2$ gives 1 mole of $BaCO_3$

∴205 mole of $Ba(OH)_2$will give .205 mole of $BaCO_3$

$\therefore$wt. of 0.205 mole of $BaCO_3$ will be

$.205 \times 197 = 40.385gm \approx 40.5gm$

38. (d) $N_1 = 0.5N \rightarrow 10mg$ per mL

$N_2 = \frac{10\times10^{-3}gm}{40\times1} \times 1000$=0.25*N*

$V_1 = 500ml,$ $V_2 =?$

$N_1V_1 = N_2V_2$; $0.5 \times 500 = 0.25 \times V_2$

$V_2 = 1000mL$ final volume water added = 1000 – 500

= 500*mL*.

39. (a) eq. of $KMnO_4$ = eq. of $Fe(C_2O_4)$

$x \times 5 = 1 \times 3$

$x = 0.6$

40. (b)

Element	At.wt.	Mole	Ratio	Empirical formula
C =86%	12	7.1	1	CH_2
H =14%	1	14	2	Beleongs to alkeneC_nH_{2n}