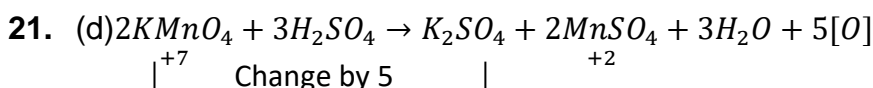


## Chemical stoichiometry

20. (c)  $MW = 2 \times V.D. = 2 \times 22 = 44.$



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

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)  $NaOH \quad HCl$

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

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

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

$$0.4 = 0.5x + 0.2 - 0.1x$$

$$0.2 = 0.4x$$

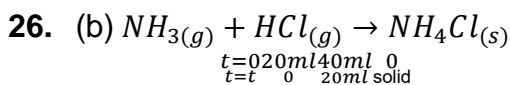
$$x = \frac{1}{2}L = 0.5L$$

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

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

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





Final volume = 20ml.

27. (b)  $KMnO_4$  Oxalic acid

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}, \frac{20 \times 0.1}{2} = \frac{M_2 V_2}{5}, M_2 V_2 = 5.$$

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

$$N_1 V_1 = N_2 V_2; N_1 \times 30 = 0.2 \times 15; N_1 = 0.1N$$

31. (b) (I) Phenolphthalein 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  $Na_2CO_3 = a gm$ ,  $NaOH = b gm$ )

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

(II) Methyl orange indicate complete neutralisation

$HCl$   $HCl$

$$N_1 V_1 = N_2 V_2, 25 \times 0.2 = 0.1 \times V_2 \text{ so } V_2 = 50ml \text{ excess}$$

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



From (1) and (2)  $b = 1\text{gm}$ .

32. (c) From solution of (31)

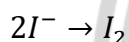
From equation (1)

$$a = \text{Na}_2\text{CO}_3 = 0.53\text{gm}.$$

33. (b)  $(\text{H}_2\text{SO}_4) \frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2} (\text{NaOH})$

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

34. (c) Atom in highest oxidation state can oxidize iodide to liberate  $\text{I}_2$  which is volumetrically measured by iodometric titration using hypo.



$\text{Pb}^{+2} \rightarrow$  Lowest oxidation state can not oxidise iodide to  $\text{I}_2$ .

35. (d)  $\text{KMnO}_4$  = Mohr salt

$$\frac{M_1 V_1}{n_1} = \frac{M_2 V_2}{n_2}; \frac{0.1 \times 10}{1} = \frac{M_2 V_2}{5}; M_2 V_2 = 5.$$

36. (d) The equivalent weight of  $\text{H}_3\text{PO}_4 = \frac{\text{molecular weight}}{2}$

$$\therefore \text{mole wt of } \text{H}_3\text{PO}_4 = 3 + 31 + 64 = 98$$

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

37. (b)  $\text{Ba}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{BaCO}_3 + \text{H}_2\text{O}$

$$\text{Atomic wt. of } \text{BaCO}_3 = 137 + 12 + 16 \times 3 = 197$$

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

$\therefore 1$  mole of  $\text{Ba}(\text{OH})_2$  gives 1 mole of  $\text{BaCO}_3$



CHEMICAL ARITHMETIC (MOLE CONCEPT)

$\therefore$  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  $mL$

$$N_2 = \frac{10 \times 10^{-3} gm}{40 \times 1} \times 1000 = 0.25N$$

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

$$N_1 V_1 = N_2 V_2; 0.5 \times 500 = 0.25 \times V_2$$

$$V_2 = 1000mL \text{ final volume water added} = 1000 - 500 \\ = 500mL.$$

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

$$x \times 5 = 1 \times 3$$

$$x = 0.6$$

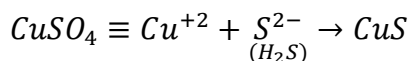
40. (b)

Element	At.wt.	Mole	Ratio	Empirical formula
C = 86%	12	7.1	1	$CH_2$
H = 14%	1	14	2	Belongs to alkene $C_n H_{2n}$

41. (b)  $AgNO_3 \equiv 2Ag^+ + S_{(H_2S)}^{2-} \rightarrow Ag_2S$

$\therefore$  2 mole  $\rightarrow$  1 mole [100  $\times$  1 = 100 millimole]

$\therefore$  100 millimole  $\rightarrow$  50 millimole  $H_2S$  required

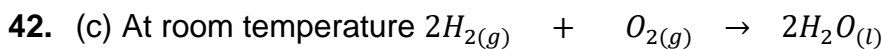


$\therefore$  1 mole  $\rightarrow$  1 mole [100  $\times$  1 = 100 millimole]

$\therefore$  100 millimole  $\rightarrow$  100 millimole  $H_2S$  required

$$\text{Ratio } \frac{50}{100} = \frac{1}{2}.$$

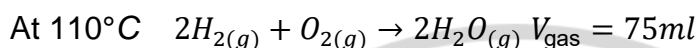




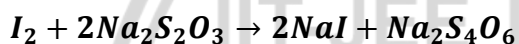
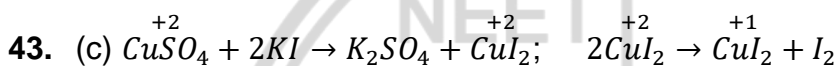
$$\begin{array}{cccc}
 t=0 & 50ml & 50ml & 0 \\
 t=t & 50-2x & 50-x & 2x \\
 & =0 & 25\text{gases} & (50)\text{liquid}
 \end{array}$$

In this case  $H_2$  is limiting reagent

$$x = 25ml$$



$$t=t \quad 0 \quad 25ml \quad 50ml$$



Eq. wt. of  $CuSO_4 \cdot 5H_2O$  = Mol. wt. = 250

100 ml of 0.1 N hypo  $\equiv$  100 ml of 0.1 N  $CuSO_4 \cdot 5H_2O$

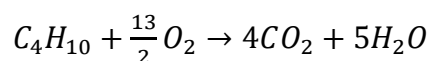
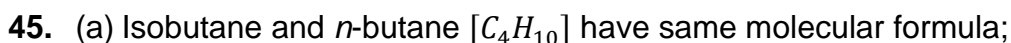
$$= \frac{250 \times 0.1 \times 100}{100} = 2.5gm$$



$$\frac{12.6}{63} = 0.2 \text{ mole}; HNO_3 \equiv KOH$$

$$0.2 \text{ mole} \equiv 0.2 \text{ mole}$$

$$0.2 \times 56 = 11.2gm.$$



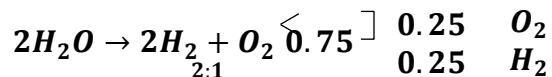
For 58gm of  $C_4H_{10}$  208 gm  $O_2$  is required then for 5 kg of  $C_4H_{10}$   $O_2 = \frac{5 \times 208}{58}$

$$= 17.9kg$$



CHEMICAL ARITHMETIC (MOLE CONCEPT)

46. (b)  $n = \frac{16.8}{22.4} = 0.75 \text{ mole of } H_2 \text{ and } O_2$



2 mole  $H_2$  – 2 mole  $H_2O$

0.5 mole  $H_2$  – 0.5 mole  $H_2O = 9gm$ .

47. (a)  $\therefore 3ml (O) \rightarrow 1ml O_3$

$30ml (O) \rightarrow 10ml O_3$

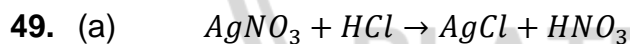
$x = \frac{150 \times 10}{100} = 15ml$

$V \text{ of } O_2 + V \text{ of } O_3 = 135 + 10 = 145ml$

Turpentine oil absorb ozone.

48. (a) 50%  $HCl$  itself means 50gm  $HCl$  react with 100gm sample

% Purity =  $\frac{50}{100} \times 100 = 50\%$ .



$\frac{30}{170} \quad \frac{500 \times 0.2}{1000}$

$t=0$  0.176 mole 0.1 mole limiting = 14.345gm

$t=t$  0.076 mole 0 0.1mole

50. (d)  $KMnO_4 \quad FeSO_4$

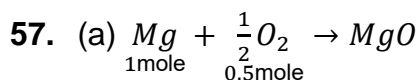
$\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2}; M_1V_1 = \frac{n_1}{n_2} M_2V_2$

$= \frac{2}{10} \times 10 \times \frac{1}{10} = \frac{1}{5} = 0.2$

For (d),  $M_1V_1 = 0.02 \times 10 = \frac{1}{5}$







0.5 mole of oxygen react with 1 mole of Mg

1.5 mole of oxygen react with  $\frac{1.5}{0.5} = 3\text{mole}$

$$24 \times 3 = 72\text{gm.}$$



100 g  $\text{CaCO}_3$  with 2 N HCl gives 44 g  $\text{CO}_2$

100 g  $\text{CaCO}_3$  with 1 N HCl gives 22 g  $\text{CO}_2$

