Chemical stoichiometry

1. (c) $N = \frac{W(gm)\times 1000}{V\times \text{Eq.wt.}}$

1500*ml* of 0.1*N HCl* = 150*ml* (*N*)

$1 = \frac{W(gm)\times 1000}{150\times 40}$, W (*gm*)= $\frac{150\times 40}{1000} = 6gm.$

2. (c) $N_1V_1 = N_2V_2; \frac{1}{2}\times 200 = \frac{1}{10}\times V_2; V_2 = 1000ml$

Volume of water added $= 1000 - 200 = 800ml.$

3. (a) $2Ag_2CO_3 \xrightarrow{\Delta} 4Ag + 2CO_2 + O_2$

$\mathbf{2\times 276gm}$ $\mathbf{4\times 108gm}$

$\because 2\times 276gm$ of Ag_2CO_3 gives $\mathbf{4\times 108gm}$

$\therefore 1gm$ of Ag_2CO_3 gives $= \frac{4\times 108}{2\times 276}$

$\therefore 2.76gm$ of Ag_2CO_3 gives

$\frac{4\times 108\times 2.76}{2\times 276} = 2.16gm$

4. (c)

$$4NH_{3(g)} + 5O_{2(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(g)}$$
$$t = 01100$$
$$t = t1 - 4x1 - 5x4x6x$$

Oxygen is limiting reagent

So, $X = \frac{1}{5} = 0.2$ all oxygen consumed

Left $NH_3 = 1 - 4\times 0.2 = 0.2.$

5. (c) ∵ 100*gm Hb* contain = 0.33*gm Fe*

∴ 67200*gm Hb* = $\frac{67200\times0.33}{100}gm\ Fe$

gm atom of *Fe* = $\frac{672\times0.33}{56}=4.$

6. (c) $\underset{132}{(NH_4)_2SO_4} \equiv 2NH_3 \equiv \underset{2(36.5)=73gm}{2HCl}$

$\mathbf{73gHCl \equiv 132g(NH_4)_2SO_4}$

$\mathbf{292gHCl = 528g(NH_4)_2SO_4}$

7. (c) $\underset{2(36+1+31+64)=264}{2(NH_4)_2HPO_4} \equiv \underset{62+80=142}{P_2O_5}$

% of $P_2O_5 = \frac{\text{wt. of } P_2O_5}{\text{wt of salt}}\times100$

$=\frac{142}{264}\times100=53.78\%.$

8. (b) $2Al+\frac{3}{2}O_2 \rightarrow Al_2O_3$

According to equation $\frac{3}{2}$ mole of O_2 combines with 2 mole *Al*.

2 mole *Al* = 54*gm*

9. (a) 0.5*gm Se* →100*gm* peroxidase anhydrous enzyme

78.4*gm Se* → $\frac{100\times78.4}{0.5}=1.568\times10^4$

Minimum m.w. →molecule at least contain one selenium.

10. (d) $H_2O+\underset{27gm}{Al}+NaOH \rightarrow NaAlO_2+\underset{\frac{3}{2}\times22.4=33.6L}{\frac{3}{2}H_2}$

11. (c) In $Fe(CNS)_3.\ 3H_2O$

% of $H_2O = \frac{3\times18}{284} \times 100 = 19\%$.

12. (d) $5S + 5O_2 \rightarrow 5SO_2$; $5\ O_2 \equiv 5\ SO_2$; $5 \times 64 = 320gm$.

13. (d) H_3PO_4 is tribasic so $N = 3M = 3 \times 1 = 3$.

14. (b) H_2SO_4 is dibasic $N = 2M = 2 \times 2 = 4$.

15. (a) For Dibasic acid $E = \frac{M}{2} = \frac{200}{2} = 100$

$$N = \frac{W\times1000}{E\times V(\text{in } ml)}$$

$$\frac{1}{10} = \frac{\boldsymbol{W\times1000}}{\boldsymbol{100\times100}} = \boldsymbol{W = 1gm}.$$

16. (b) $N = \frac{10\times\text{sp. gr. of the solution}\times\text{wt. \% of solute}\times\text{Mol. wt.}}{\text{Molecular wt. of solute}\times\text{Eq. wt.}}$

$$N = \frac{10\times1.71\times80\times98}{98\times49} = 27.9$$

18. (c) $2KMnO_4 + 3H_2SO_4 \rightarrow$

$$K_2SO_4 + 2MnSO_4 + 3H_2O + [O]$$

$2FeSO_4 + H_2SO_4 + [O] \rightarrow Fe_2(SO_4)_3 + H_2O] \times 5$
[Mohr–salt]

$2KMnO_4 + 10FeSO_4 + 8H_2SO_4 \rightarrow$

$$K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8H_2O$$

Mohr-salt reducing agent $KMnO_4/H^+$ →oxidising agent

19. (d) Atomic weight = Equivalent weight × Valency

$= 8.9 \times 3 = 26.7 \left(\text{Valency} = \frac{26.89}{8.9} \approx 3\right)$.

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