Daily Tutorial Sheet-11	Numerical Value Type for JEE Main

126.(5) meq of acid = meq of base

$$\frac{g}{E}\times 1000 = N_b \times V_b$$

$$\Rightarrow \quad \frac{2}{600/x}\times 1000 = \frac{1}{6}\times 100 \qquad (N_{NaOH} = M_{NaOH})$$

since $x = 1 \quad \Rightarrow \quad x = 5$

127.(4) Mass of 1 gm eq $= E = \frac{M_0}{x}$

For monobasic acids, $x = 1$, So $E = M_0$

HCl, HNO_3, H_3PO_2, CH_3COOH

128.(8) $2K_4[Fe(CN)_6] + 3ZnSO_4 \longrightarrow K_2Zn_3[Fe(CN)_6]_2 + 3K_2SO_4$

2 mol $K_4[Fe(CN)_6] \equiv 3$ mol $ZnSO_4$

$$0.05\times V_{mL} K_4[Fe(CN)_6] \equiv \frac{3}{2}\times 0.05\times V_{mL}\ ZnSO_4 = 60\times 0.01$$

$$\Rightarrow \quad V_{mL} = 8mL$$

129.(7) $$MSO_4.xH_2O \xrightarrow[\text{Dehydration}]{} MSO_4 + xH_2O$$

Molar mass of $MSO_4.xH_2O = 65.4 + 32 + 64 + 18x$

$$\therefore \quad \frac{18x}{161\cdot 4 + 18x}\times 100 = 43.85$$

$$1800x = 7077.39 + 789.3x$$

$$\Rightarrow \quad x = 7$$

130.(3) $M = \frac{g}{M_0} = \frac{276}{92} = 3$

131.(3) $$3H_2 \quad + \quad N_2 \longrightarrow 2NH_3$$

Given moles : $\frac{6}{2} = 3 \qquad \frac{14}{28} = 0.5$

3 mol of H_2 required 1 mol of N_2 so N_2 is the limiting reagent. 0.5 mol of N_2 will react with 1.5 mol H_2. So 1.5 mol H_2 will be left.

Mass of 1.5 mol $H_2 = 2\times 1.5\,g = 3g$

132.(3) For complete neutralization

Meq of acid = meq of base

$$\frac{g}{E}\times 1000 = N_b \times V_b$$

$$\frac{0.98}{98/x}\times 1000 = 0.5\times 2\times 30 \quad (\text{n-factor for } Ba(OH)_2 = 2)$$

$$\Rightarrow \quad x = 3$$

133.(2) $N = \frac{gmeq}{V_L}$

gmeq of acid $= \frac{g}{E} = \frac{39}{82/x}$

$N_a = \frac{39x}{82} \times \frac{1}{1} = \frac{39x}{82}$

Similarly $N_b = \frac{g}{E} \times \frac{1}{V_L} = \frac{40}{40} \times \frac{1}{1} = 1N$

For complete neutralization :

$N_a V_a = N_b V_b$

$\frac{39x}{82} \times 100 = 1 \times 95$

$\Rightarrow \quad x = 1.99 \approx 2$

134.(2) Let V_1 be the volume of $Ca(NO_3)_2$ solution

and V_2 be the volume of $NaNO_3$ solution

concentration of anion (NO_3^-) in the mixture $= \frac{(2 \times M_1 V_1) + M_2 V_2}{V_1 + V_2}$

concentration of cation (Ca^{2+}, Na^+) in the mixture $= \frac{M_1 V_1 + M_2 V_2}{V_1 + V_2}$

conc of anion = conc of cation $+ \frac{50}{100}$ (conc of cation)

$= \frac{3}{2} \times$ conc of cation

$\therefore \quad \frac{2M_1V_1 + M_2V_2}{V_1 + V_2} = \frac{3}{2} \frac{M_1V_1 + M_2V_2}{V_1 + V_2}$

$\Rightarrow \quad 2(0.1)V_1 + 0.2V_2 = \frac{3}{2}(0.1V_1 + 0.2V_2)$

$\Rightarrow \quad 0.4V_1 + 0.4V_2 = 0.3V_1 + 0.6V_2$

$\Rightarrow \quad 0.1V_1 = 0.2V_2 \quad \Rightarrow \quad \frac{V_1}{V_2} = 2$

135.(5) 49% by volume means

49 g of H_2SO_4 is present in 100 mL solution

Mass of solution = Volume × d

$= 100 \times 1.49g = 149g$

Mass of solvent = Mass of solution - mass of solute

$= 149 - 49 = 100g$

Molality $= \frac{n_B}{g_A} \times 100$

$n_B = \frac{g_B}{M_0(B)} = \frac{49}{98} = 0.5$

$\therefore \quad$ Molality $= \frac{0.5}{100} \times 1000 = 5$

136.(4) Let the normality of acid solution A be N_A

and the normality of acid solution B be N_B

$N_A \times V_A = N_{Na_2CO_3} \times V_{Na_2CO_3}$

$N_A \times 10 = 1 \times 25 \quad \Rightarrow \quad N_A = 2.5$

Similarly $N_B \times V_B = N_{Na_2CO_3} \times V_{Na_2CO_3}$

$N_B \times 40 = 1 \times 25$

$N_B = \frac{5}{8} N$

$N_A Y_A + N_B V_B = 1 \times 1$

$(2.5 \times V_A) + \frac{5}{8} \times V_B = 1$

$V_A + V_B = 1$

$V_A = 1 - V_B$

So $2.5(1 - V_B) + \frac{5}{8} V_B = 1$

$2.5 - 2.5V_B + 0.625V_B = 1$

$\Rightarrow \quad 1.5 = 1.875\,V_B \quad \Rightarrow \quad 0.8 = V_B$

$V_A = 0.2$

So $\frac{V_B}{V_A} = 4$

137.(8) $M_{AgNO_3} = \frac{10xd}{M_0}$

$= \frac{10 \times 5 \times 1.19}{170} = 0.35M$

	Given mass(g)	No. of moles (g / M_0)
NaCl	0.1498	0.0025
KCl	0.1498	0.002
NH_4Cl	0.1498	0.0028

Since the number of moles of NH_4Cl is most is the volume of $AgNO_3$ required for complete precipitation of Cl^- will be highest in this case.

$AgNO_3(aq) + Cl^-(aq) \longrightarrow AgCl \downarrow + NO_3^-(aq)$

$0.0028 = M_{AgNO_3} \times V_{AgNO_3}$

$\Rightarrow \quad V_{AgNO_3 = 0.008L}$ or 8 mL

138.(4) $ZnCr_2O_x$

Zn : Cr : O = 1 : 2 : x

So for 1.8×10^{23} atoms of Cr i.e. 0.3 mol of Cr, $\frac{0.3}{2} \times x$ mol of O atoms must be present.

$\frac{0.3}{2} \times x = 0.6 \quad \Rightarrow \quad x = 4$

139.(5) The properties that do not depend on volume are temperature independent i.e. meq of solute, mole of solute, ppm (W/W), mole fraction, molality

140.(2) The properties that depend only on the amount of solute are dilution independent i.e. meq of solute, mole of solute.