1. $H_2SO_{4(aq)} + 2NaOH_{(aq)} \rightarrow Na_2SO_{4(aq)} + 2H_2O_{(\ell)}$

$V = 100.0\ mL$ $\quad m = ?$

$= 0.1\ L$

$c = 1.50\ \frac{mol}{L}$ $\quad M = 39.997\ \frac{g}{mol}$

Linc :

$$m_{NaOH} = 0.1\ L\ H_2SO_4 \times \frac{1.50\ mol\ H_2SO_4}{L\ H_2SO_4} \times \frac{2\ mol\ NaOH}{1\ mol\ H_2SO_4} \times \frac{39.997\ g\ NaOH}{1\ mol\ NaOH}$$

$$= 12.0\ g$$

OR

$$n_{H_2SO_4} = 0.1\ L \times 1.50\ \frac{mol}{L} = 0.15\ mol$$

$$n_{NaOH} = 0.150\ mol\ H_2SO_4 \times \frac{2\ mol\ NaOH}{1\ mol\ H_2SO_4} = 0.3\ mol$$

$$m_{NaOH} = 0.3\ mol \times \frac{39.997\ g}{mol} = 12.0\ g$$

2. $3H_2SO_{4(aq)} + 2Al(OH)_{3(aq)} \rightarrow Al_2(SO_4)_{3(aq)} + 6H_2O_{(\ell)}$

$V = 100\ mL$ $\quad V = 50\ mL$

$= 0.1\ L$ $\quad = 0.05\ L$

$c = 1.5\ \frac{mol}{L}$ $\quad c = ?$

$$C_{Al(OH)_3} = 0.1\ L\ H_2SO_4 \times \frac{1.5\ mol\ H_2SO_4}{1\ L\ H_2SO_4} \times \frac{2\ mol\ Al(OH)_3}{3\ mol\ H_2SO_4} \times \frac{}{0.05\ L\ Al(OH)_3}$$

$$= 2.0\ \frac{mol}{L}$$

3. $2KOH(aq) + H_2SO_4(aq) \rightarrow K_2SO_4(aq) + 2H_2O(\ell)$

$m = 1560\ g$ $\quad V = 5.67\ L$

$M = 56.105\ \frac{g}{mol}$ $\quad c = ?$

$$C_{H_2SO_4} = 1560\ g\ KOH \times \frac{1\ mol\ KOH}{56.105\ g\ KOH} \times \frac{1\ mol\ H_2SO_4}{2\ mol\ KOH} \times \frac{}{5.67\ L}$$

$= 2.45\ \frac{mol}{L}$ $\quad$ ∴ the concentration of sulfuric acid is 2.45 M

4. $HC_2H_3O_2(aq) + NaOH(aq) \rightarrow NaC_2H_3O_2(aq) + H_2O(\ell)$

$m = ?$ $\quad c = 2.90\ \frac{mol}{L}$

$M = 60.052\ \frac{g}{mol}$ $\quad V = 0.3\ L$

$$m_{HC_2H_3O_2} = 0.3\ L\ NaOH \times \frac{2.90\ mol\ NaOH}{L\ NaOH} \times \frac{1\ mol\ HC_2H_3O_2}{1\ mol\ NaOH} \times \frac{60.052\ g\ HC_2H_3O_2}{1\ mol\ HC_2H_3O_2}$$

$= 52.2\ g$

∴ the mass of acetic acid is 52.2 g

5. $3H_2C_2O_4(aq) + 2Fe(OH)_3(s) \rightarrow Fe_2(C_2O_4)_3(aq) + 6H_2O(\ell)$

$c = 4.70\ \frac{mol}{L}$ $\quad m = ?$

$V = 2.20\ L$ $\quad M = 106.866\ \frac{g}{mol}$

$$m_{Fe(OH)_3} = 2.20\ L\ H_2C_2O_4 \times \frac{4.70\ mol\ H_2C_2O_4}{1\ L\ H_2C_2O_4} \times \frac{2\ mol\ Fe(OH)_3}{3\ mol\ H_2C_2O_4} \times \frac{106.866\ g\ Fe(OH)_3}{mol\ Fe(OH)_3}$$

$= 737\ g$

∴ the mass of $Fe(OH)_3$ is 737 g

6. $2HF_{(aq)} + Ba(OH)_{2\,(aq)} \longrightarrow BaF_2 + 2H_2O_{(\ell)}$

$m = ?$ $\quad c = 2.0\ \frac{mol}{L}$

$M = 20.006\ \frac{g}{mol}$ $\quad V = 1.7\ L$

$$m_{HF} = 1.7\ L\ Ba(OH)_2 \times \frac{2.0\ mol\ Ba(OH)_2}{1\ L\ Ba(OH)_2} \times \frac{2\ mol\ HF}{1\ mol\ Ba(OH)_2} \times \frac{20.006\ g\ HF}{mol\ HF}$$

$= 136\ g$

$= 140\ g$ (with s.f.)

$\therefore$ 140 g of HF is required.