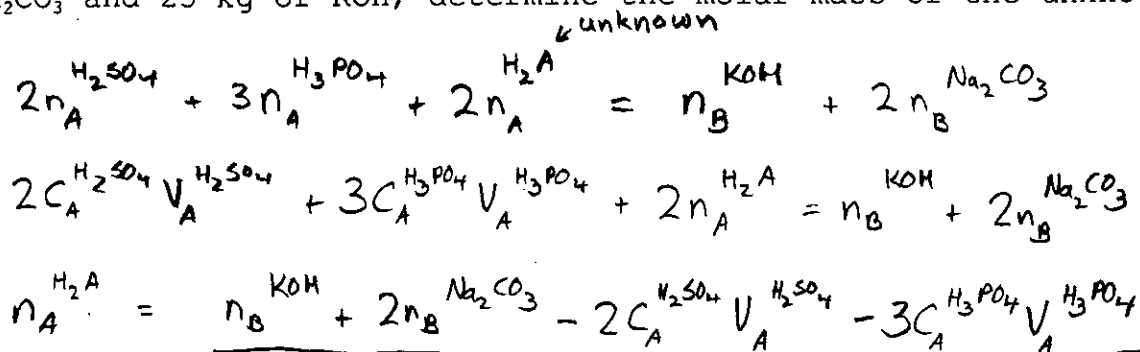


## Titration Questions - If You Can Do This One You Can Do Them All!

1. A mixture of sulphuric acid, phosphoric acid and an unknown solid diprotic acid is neutralized with potassium hydroxide and then sodium carbonate. Given that there is 3.45 L of 18.0 M  $\text{H}_2\text{SO}_4$ , 25.2 L of 14.8 M  $\text{H}_3\text{PO}_4$ , ~~24.240~~ <sup>12.124</sup> kg of the diprotic acid, 50 kg of  $\text{Na}_2\text{CO}_3$  and 25 kg of KOH, determine the molar mass of the unknown acid.



$$n_A^{\text{H}_2\text{A}} = \frac{(25 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol}}{56.1 \text{ g}}) + 2(50.0 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1 \text{ mol}}{105.99 \text{ g}}) - 2\left(\frac{18.0 \text{ mol}}{\text{L}} \times 3.45 \text{ L}\right) - 3\left(\frac{14.8 \text{ mol}}{\text{L}} \times 25.2 \text{ L}\right)}{2}$$

$$n_A^{\text{H}_2\text{A}} = 72.98 \text{ mol}$$

$$\Rightarrow \frac{12.124 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}}}{72.98 \text{ mol}} = 166.13 \text{ g/mol}$$

molar mass  
is g/mol (i.e. a ratio)

P.S. acid is phthalic acid

