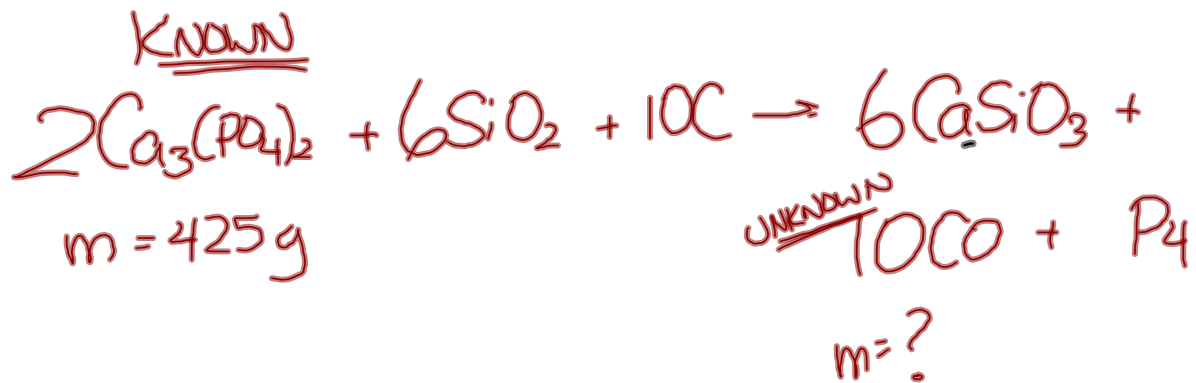


Check Worksheet



$$425 \text{ g } \text{Ca}_3(\text{PO}_4)_2 \times \frac{1 \text{ mol } \text{Ca}_3(\text{PO}_4)_2}{310.18 \text{ g } \text{Ca}_3(\text{PO}_4)_2} \times \frac{10 \text{ mol CO}}{2 \text{ mol } \text{Ca}_3(\text{PO}_4)_2} \times \frac{28.01 \text{ g CO}}{1 \text{ mol CO}}$$

$$= 192 \text{ g CO}$$

Solution Stoichiometry

SOLUTION STOICHIOMETRY

- the methods used to calculate the quantities of substances in solution.
- involves **molar concentrations and the volumes of solutions.**

$$C = \frac{n}{V}$$

$$n = C \times V$$

$$V = \frac{n}{C}$$

Solutions of ammonia and phosphoric acid are used to produce ammonium hydrogen phosphate fertilizer. What volume of 14.8 mol/L $\text{NH}_3(\text{aq})$ is needed for the ammonia to react completely with 10.0 L of 12.9 mol/L $\text{H}_3\text{PO}_4(\text{aq})$ to produce fertilizer?



$$C = 14.8 \text{ mol/L} \quad C = 12.9 \text{ mol/L}$$

$$V = ? \quad V = 10.0 \text{ L}$$

Step 1: Moles Known

$$10.0 \text{ L } \text{H}_3\text{PO}_4 \times \frac{12.9 \text{ mol } \text{H}_3\text{PO}_4}{1 \text{ L } \text{H}_3\text{PO}_4} = 129 \text{ mol } \text{H}_3\text{PO}_4$$

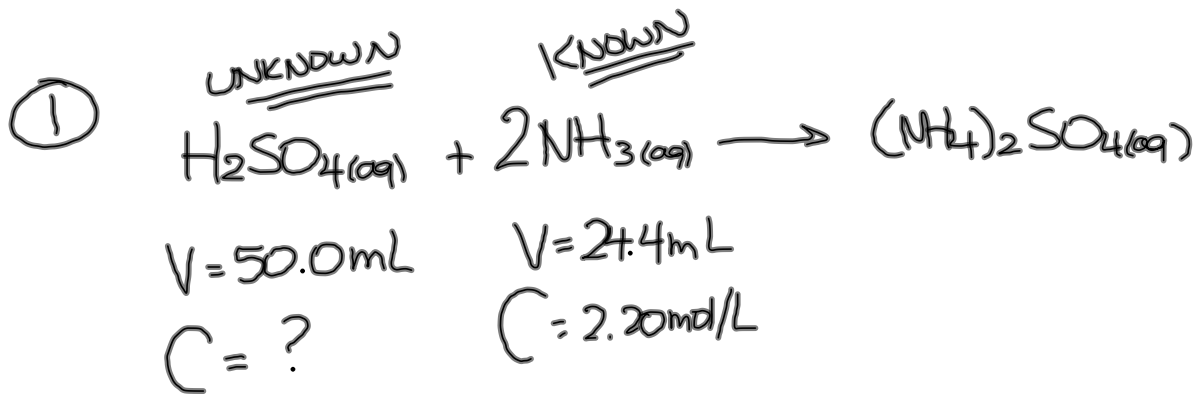
Step 2: Moles Unknown

$$129 \text{ mol } \text{H}_3\text{PO}_4 \times \frac{2 \text{ mol } \text{NH}_3}{1 \text{ mol } \text{H}_3\text{PO}_4} = 258 \text{ mol } \text{NH}_3$$

Step 3: Volume Unknown

$$258 \text{ mol } \text{NH}_3 \times \frac{1 \text{ L } \text{NH}_3}{14.8 \text{ mol } \text{NH}_3} = \boxed{17.4 \text{ L } \text{NH}_3}$$

$$V = \frac{n}{C} = \frac{258 \text{ mol}}{14.8 \text{ mol/L}}$$



Step 1: Moles Known

$$0.0244 \text{ L NH}_3 \times \frac{2.20 \text{ mol NH}_3}{1 \text{ L NH}_3} = 0.05368 \text{ mol NH}_3$$

Step 2: Moles Unknown

$$0.05368 \text{ mol NH}_3 \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NH}_3} = 0.02684 \text{ mol H}_2\text{SO}_4$$

Step 3: Concentration Unknown

$$C = \frac{n}{V} = \frac{0.02684 \text{ mol H}_2\text{SO}_4}{0.0500 \text{ L H}_2\text{SO}_4} = \boxed{0.537 \text{ mol/L}}$$

$$0.02684 \text{ mol H}_2\text{SO}_4 \times \frac{1}{0.0500 \text{ L H}_2\text{SO}_4}$$

Worksheet

