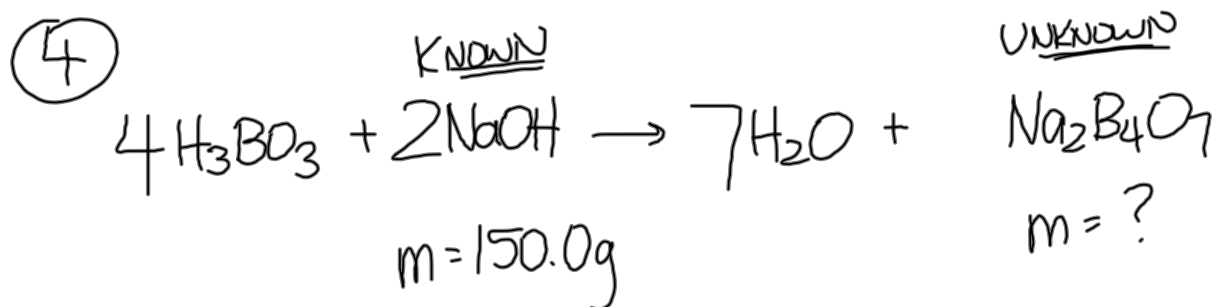


# Check Worksheet



$$150.0\text{g NaOH} \times \frac{1\text{ mol NaOH}}{40.00\text{g NaOH}} \times \frac{1\text{ mol Na}_2\text{B}_4\text{O}_7}{2\text{ mol NaOH}} \times \frac{201.22\text{g Na}_2\text{B}_4\text{O}_7}{1\text{ mol Na}_2\text{B}_4\text{O}_7}$$

$$= 377.3\text{g Na}_2\text{B}_4\text{O}_7$$

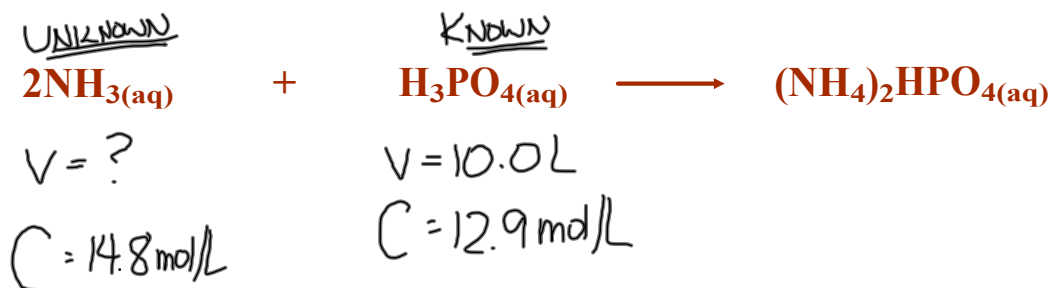
# Solution Stoichiometry

## SOLUTION STOICHIOMETRY

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

## Solution Stoichiometry

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?



Step 1: Moles Known

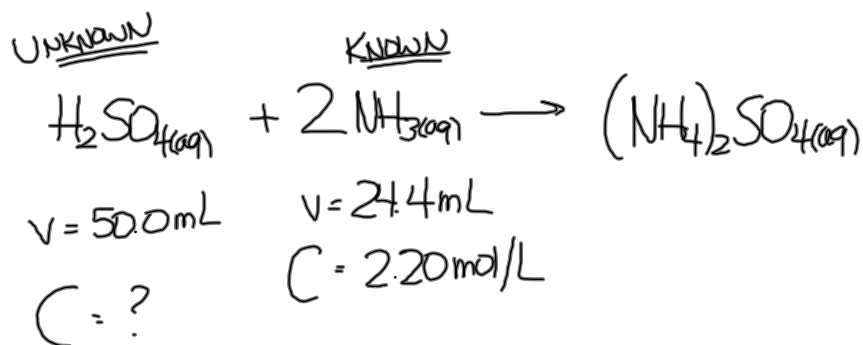
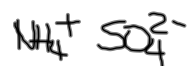
$$10.0 \text{ L H}_3\text{PO}_4 \times \frac{12.9 \text{ mol H}_3\text{PO}_4}{1 \text{ L H}_3\text{PO}_4} = 129 \text{ mol H}_3\text{PO}_4$$

Step 2: Moles Unknown

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

Step 3: Volume Unknown

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



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

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

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

$$0.0244 \cancel{\text{L NH}_3} \times \frac{2.20 \cancel{\text{mol NH}_3}}{1 \cancel{\text{L NH}_3}} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol NH}_3} \times \frac{1}{0.0500 \text{ L H}_2\text{SO}_4}$$

# Worksheet

