Check Worksheet

(6) $K^+ OH^-$ potassium hydroxide + $Cu^{2+} NO_3^-$ copper (II) nitrate

KNOWN $2KOH_{(aq)} + Cu(NO_3)_{2(aq)} \rightarrow 2KNO_{3(aq)} +$ UNKNOWN $Cu(OH)_{2(s)}$

$m = 2.67\,g$ $\quad m = ?$

$$2.67\,g\,KOH \times \frac{1\,mol\,KOH}{56.11\,g\,KOH} = 0.0476\,mol\,KOH$$

$$0.0476\,mol\,KOH \times \frac{1\,mol\,Cu(OH)_2}{2\,mol\,KOH} = 0.0238\,mol\,Cu(OH)_2$$

$$0.0238\,mol\,Cu(OH)_2 \times \frac{97.57\,g\,Cu(OH)_2}{1\,mol\,Cu(OH)_2} = 2.32\,g\,Cu(OH)_2$$

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 $NH_{3(aq)}$ is neededfor the ammonia to react completely with 10.0 L of 12.9 mol/L $H_3PO_{4(aq)}$ toproduce fertilizer?

UNKNOWN KNOWN

$$2NH_{3(aq)} + H_3PO_{4(aq)} \longrightarrow (NH_4)_2HPO_{4(aq)}$$

$C = 14.8\ mol/L$ $C = 12.9\ mol/L$

$V = ?$ $V = 10.0\ L$

Step 1: Moles Known

$$10.0\ L\ H_3PO_4 \times \frac{12.9\ mol\ H_3PO_4}{1\ L\ H_3PO_4} = 129\ mol\ H_3PO_4$$

Step 2: Moles Unknown

$$129\ mol\ H_3PO_4 \times \frac{2\ mol\ NH_3}{1\ mol\ H_3PO_4} = 258\ mol\ NH_3$$

Step 3: Volume Unknown

$$258\ mol\ NH_3 \times \frac{1\ L\ NH_3}{14.8\ mol\ NH_3} = 17.4\ L\ NH_3$$

$$V = \frac{n}{C} = \frac{258\ mol}{14.8\ mol/L} = 17.4\ L\ NH_3$$