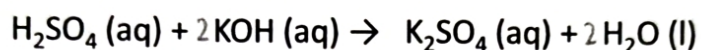


Solution Stoichiometry

Starting with 100.0 mL of 1.21 M H_2SO_4 , calculate the volume (mL) of 2.05 M KOH required to react with it completely.



Step 1- Balance the equation

Step 2- Calculate moles

$$1.21 \text{ M} \cdot 0.1 \text{ L} = 0.121 \text{ mol } \text{H}_2\text{SO}_4$$

Step 3- Calculate moles of KOH

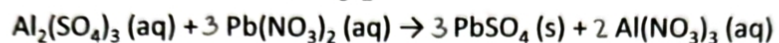
$$0.121 \text{ mol } \text{K}_2\text{SO}_4 \cdot \frac{2 \text{ KOH}}{1 \text{ K}_2\text{SO}_4} = 0.242 \text{ mol KOH}$$

Step 4- Volume of KOH required

$$0.242 \text{ mol} \cdot \frac{1}{2.05 \text{ M}} = 0.118 \text{ L} = 118 \text{ mL}$$

Solution Stoichiometry

A 5.0 mL volume of 0.2 M $\text{Al}_2(\text{SO}_4)_3$ was combined with 10.0 mL of 0.2 M $\text{Pb}(\text{NO}_3)_2$.



Calculate the mass (g) of PbSO_4 (s) (303.3 g/mol) that can be produced.

Step 1- Balance equation

Step 2- Calculate moles

$$0.2 \text{ M} \cdot 0.005 \text{ L} = 0.001 \text{ mol } \text{Al}_2(\text{SO}_4)_3$$

$$0.2 \text{ M} \cdot 0.01 \text{ L} = 0.002 \text{ mol } \text{Pb}(\text{NO}_3)_2$$

Step 3- Find the limiting reactant

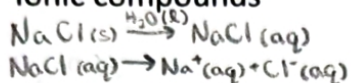
$$0.002 \text{ mol } \text{Pb}(\text{NO}_3)_2 \cdot \frac{1 \text{ Al}_2(\text{SO}_4)_3}{3 \text{ Pb}(\text{NO}_3)_2} = 0.0007 \text{ mol } \text{Al}_2(\text{SO}_4)_3$$

Step 4- Mass of PbSO_4 produced

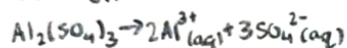
$$0.002 \text{ mol } \text{Pb}(\text{NO}_3)_2 \cdot \frac{3 \text{ PbSO}_4}{3 \text{ Pb}(\text{NO}_3)_2} \cdot \frac{303.3 \text{ g}}{1 \text{ mol}} = 0.61 \text{ g } \text{PbSO}_4$$

Aqueous Solutions of Ionic and Molecular Compounds

Ionic compounds

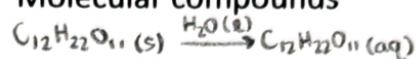


Water-soluble ionic compound dissociates (ionizes) in an aqueous solution



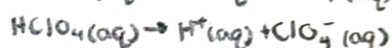
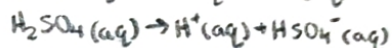
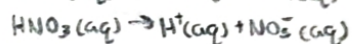
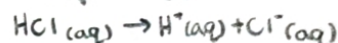
Conduct electricity

Molecular compounds



Water-soluble molecular compounds do not dissociate in an aqueous solution

Exception: acids



Aqueous Solutions

Electrolytes

Strong electrolytes-

Conduct electricity
Solute that are completely ionized in water

Weak Electrolytes-

Weak conductivity
Solute that ionize to a very limited extent

Nonelectrolytes-

Do not ionize when dissolved in water

Example

Soluble ionic compounds

NaCl (aq) , $\text{Al}_2(\text{SO}_4)_3 \text{ (aq)}$, HCl (aq) ,
 $\text{HNO}_3 \text{ (aq)}$, $\text{H}_2\text{SO}_4 \text{ (aq)}$, $\text{HClO}_4 \text{ (aq)}$

$\text{HC}_2\text{H}_3\text{O}_2 \text{ (aq)}$ 1% extent ionization
Molecular compounds (some)

$\text{C}_{12}\text{H}_{22}\text{O}_{11} \text{ (aq)}$, $\text{C}_2\text{H}_5\text{OH (aq)}$,
 $\text{CH}_3\text{OH (aq)}$, H_2O
Molecular compounds