

Solution Stoichiometry

Remember – change to moles before you do anything else

Consider the following reaction:



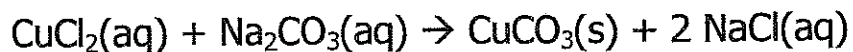
- a) How many moles of KOH are there in 23.0mL of a 0.20M solution?

- b) If the solution in (a) reacts completely with sulphuric acid, how many moles of sulphuric acid will be used up?

- c) If the volume of the sulphuric acid is 10.0mL, what is its concentration?

Practice Questions:

1. Consider the following reaction:

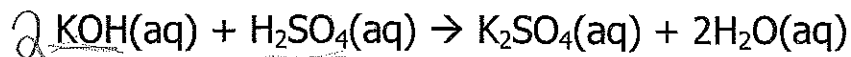


- a) Predict the mass of copper (II) carbonate that will form when 250mL of a 0.50M solution of CuCl_2 reacts completely.
- b) What volume of 0.10M Na_2CO_3 will be required to produce 3.0g of CuCO_3 ?
- c) What volume of 0.25M sodium sulphate will be needed to react with 120mL of 0.15M copper (II) chloride?

Solution Stoichiometry

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Consider the following reaction:



conc. \downarrow
 $C = \frac{n}{V}$ # of moles / volume

- a) How many moles of KOH are there in 23.0mL of a 0.20M solution?

$$n = C \cdot V = (0.20 \text{ M})(0.0230 \text{ dm}^3) = 0.0046 \text{ mol KOH}$$

- b) If the solution in (a) reacts completely with sulphuric acid, how many moles of sulphuric acid will be used up?

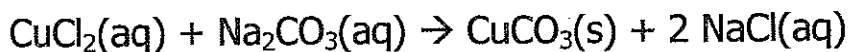
$$0.0046 \text{ mol KOH} \times \frac{1 \text{ mol H}_2\text{SO}_4}{2 \text{ mol KOH}} = 0.0023 \text{ mol H}_2\text{SO}_4$$

- c) If the volume of the sulphuric acid is 10.0mL, what is its concentration?

$$C = \frac{n}{V} = \frac{0.0023 \text{ mol}}{0.010 \text{ dm}^3} = 0.23 \text{ mol/dm}^3$$

Practice Questions:

1. Consider the following reaction:



a) Predict the mass of copper (II) carbonate that will form when 250mL of a 0.50M solution of CuCl_2 reacts completely.

$$(0.250 \text{ L})(0.50 \text{ M}) = 0.125 \text{ mol CuCl}_2$$

$$0.125 \text{ mol CuCl}_2 \times \frac{1 \text{ mol CuCO}_3}{1 \text{ mol CuCl}_2} \times \frac{123.56 \text{ g CuCO}_3}{1 \text{ mol CuCO}_3} = 15 \text{ g}$$

b) What volume of 0.10M Na_2CO_3 will be required to produce 3.0g of CuCO_3 ?

$$3.0 \text{ g CuCO}_3 \times \frac{1 \text{ mol CuCO}_3}{123.56 \text{ g CuCO}_3} \times \frac{1 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol CuCO}_3} = 0.02428 \text{ mol Na}_2\text{CO}_3$$

$$V = \frac{n}{C} = \frac{0.02428 \text{ mol}}{0.10 \text{ M}} = 0.24 \text{ dm}^3 = 240 \text{ cm}^3$$

c) What volume of 0.25M sodium ^{carbonate} sulphate will be needed to react with 120mL of 0.15M copper (II) chloride?

$$(0.120 \text{ dm}^3)(0.15 \text{ M}) = 0.018 \text{ mol CuCl}_2$$

$$0.018 \text{ mol CuCl}_2 \times \frac{1 \text{ mol Na}_2\text{CO}_3}{1 \text{ mol CuCl}_2} = 0.018 \text{ mol Na}_2\text{CO}_3$$

$$\frac{0.018 \text{ mol Na}_2\text{CO}_3}{0.25 \text{ M}} = 0.072 \text{ dm}^3 = 72 \text{ cm}^3$$