

## Reacting masses and volumes

1.  $25 \text{ cm}^3$  of a solution of  $0.1 \text{ mol dm}^{-3}$  NaOH reacts with  $50 \text{ cm}^3$  of a solution of hydrochloric acid. What is the molarity of the acid?
2.  $25.0 \text{ cm}^3$  of a  $0.10 \text{ mol dm}^{-3}$  solution of sodium hydroxide was titrated against a solution of hydrochloric acid of unknown concentration.  $27.3 \text{ cm}^3$  of the acid was required. What was the concentration of the acid?
3.  $10 \text{ cm}^3$  of a solution of NaCl react with  $15 \text{ cm}^3$  of a  $0.02 \text{ mol dm}^{-3}$  solution of  $\text{AgNO}_3$ . What is the concentration of the NaCl solution in  $\text{g dm}^{-3}$ ?
4.  $25 \text{ cm}^3$  of a  $0.1 \text{ mol dm}^{-3}$  solution of an acid  $\text{H}_x\text{A}$  reacts with  $75 \text{ cm}^3$  of a  $0.1 \text{ mol dm}^{-3}$  solution of NaOH. What is the value of x?  
Equation:  $\text{H}_x\text{A} + x\text{NaOH} \rightarrow \text{Na}_x\text{A} + x\text{H}_2\text{O}$
5. A solution of hydrochloric acid of volume  $25.0 \text{ cm}^3$  was pipetted onto a piece of marble which is calcium carbonate. When all action had ceased,  $1.30 \text{ g}$  of the marble had dissolved. Find the concentration of the acid  
Equation:  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
6. What volume of  $0.1 \text{ mol dm}^{-3}$  hydrochloric acid would be required to dissolve  $2.3 \text{ g}$  of calcium carbonate?  
Equation:  $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
7.  $2.05 \text{ g}$  of the carbonate of an unknown alkali metal ( $\text{X}_2\text{CO}_3$ ) required  $8.9 \text{ cm}^3$  of  $2.0 \text{ mol dm}^{-3}$  hydrochloric acid to completely dissolve it. What was the relative atomic mass of the metal and which metal was it?  
Equation:  $\text{X}_2\text{CO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow 2\text{XCl}(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
8.  $3.2 \text{ g}$  of hydrated sodium carbonate,  $\text{Na}_2\text{CO}_3 \cdot x\text{H}_2\text{O}$ , was dissolved in water and the resulting solution was titrated against  $1.0 \text{ mol dm}^{-3}$  hydrochloric acid.  $22.4 \text{ cm}^3$  of the acid was required. What is the value of x?