



## C4.3 Knowledge Quiz: Quantitative Chemistry

Explain what is shown by a chemical formula.	The ratio of the elements in a compound.
Identify how many atoms of each element are present in $\text{Na}_2\text{CO}_3$ .	2 sodium atoms, 1 carbon atom and 3 oxygen atoms.
Define relative atomic mass.	The average mass of the atoms of an element compared to an atom of carbon-12.
Describe where to find relative atomic mass of an element.	The mass number from the periodic table.
State the symbol for relative atomic mass.	$A_r$
Define relative formula mass.	The sum of the relative atomic masses of the elements in a formula.
State the symbol for relative formula mass.	$M_r$
Calculate the relative formula mass of $\text{Na}_2\text{CO}_3$ .	$(23 \times 2) + 12 + (16 \times 3) = 106$
Explain why chemical equations have to be balanced.	Because atoms cannot be created or destroyed so there must be the same number of each type of atom in the reactants and products.
State the law of conservation of mass.	The total mass of the products is equal to the total mass of the reactants.
State the equation used to calculate the percentage by mass of an element in a compound.	$\% \text{ by mass} = \frac{\text{mass of element}}{\text{mass of compound}} \times 100$
Calculate the percentage by mass of sodium in $\text{Na}_2\text{CO}_3$ .	$(46/106) \times 100 = 43.40 \%$
Define concentration.	The mass of solute per unit volume of solution.
Convert $500 \text{ cm}^3$ to $\text{dm}^3$ .	$0.5 \text{ dm}^3$
State the equation that links concentration, mass and volume.	$\text{Concentration} = \frac{\text{mass}}{\text{volume}}$
State the unit of concentration.	$\text{g/dm}^3$
State the general equation for the reaction between an acid and an alkali.	$\text{Acid} + \text{alkali} \rightarrow \text{salt} + \text{water}$
State the general equation for the reaction between an acid and a metal carbonate.	$\text{Acid} + \text{metal carbonate} \rightarrow \text{salt} + \text{water} + \text{carbon dioxide}$
State the general equation for the reaction between an acid and a metal.	$\text{Acid} + \text{metal} \rightarrow \text{salt} + \text{hydrogen}$



Name the type of salts made from hydrochloric acid.	Chlorides
Name the type of salts made from sulfuric acid.	Sulfates
Name the type of salts made from nitric acid.	Nitrates
Name the ion produced by acids in aqueous solutions.	Hydrogen ion (H <sup>+</sup> )
Name the ion produced by alkalis in aqueous solutions.	Hydroxide ion (OH <sup>-</sup> )
State the pH of a neutral solution.	7
State the pH of an acidic solution.	Less than 7
State the pH of an alkaline solution.	Greater than 7
Describe two ways to measure pH.	Using Universal Indicator or a pH probe.
Write the ionic equation that represents neutralisation.	$\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$

### HT only

State the unit for moles.	Mol
State how many particles there are in 1 mole of any substance.	$6.03 \times 10^{23}$
State the name given to this number.	Avogadro's number or the Avogadro constant
Describe the relationship between the relative formula mass and the mass in grams of a substance.	The relative formula mass is equal to the mass in grams of one mole of a substance.
State the equation that links number of moles, mass and relative formula mass.	$\text{number of moles} = \frac{\text{mass}}{\text{Mr}}$
Calculate the number of moles in 88 g of carbon dioxide.	$88/44 = 2 \text{ mol}$
Calculate the mass of 0.5 mol of carbon dioxide.	$0.5 \times 44 = 22 \text{ g}$
Explain what is meant by the molar ratio in a chemical equation.	The ratio of how many moles of each reactant react and how many moles of product react. Shown by the coefficients in a balanced equation.
Explain what is meant by the limiting reactant.	The reactant that will run out first.





Explain what it means if a reactant is in excess.	The reactant will not run out, it will be left over.
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Define a strong acid.	An acid that completely dissociates in solution.
Give an example of a strong acid.	Hydrochloric acid, sulfuric acid, nitric acid.
Define a weak acid.	An acid that partially dissociates in solution.
Give an example of a weak acid.	Ethanoic acid, citric acid carbonic acid.
Explain what pH is a measure of.	The acidity or alkalinity of a solution. It is a measure of concentration of $H^+$ ions.
Define a concentrated acid.	A solution in which the acid molecules are mixed with few or no water molecules.
Define a dilute acid	A solution in which the acid molecules are mixed with many water molecules.

### Chemistry only

State the two units that concentration can be measured in.	$g/dm^3$ or $mol/dm^3$
State the equation that links concentration, number of moles and volume.	$\text{Concentration} = \frac{\text{number of moles}}{\text{volume}}$

Explain the purpose of a titration.	To measure the volume (and therefore concentration) of an acid or alkali required to neutralise a known volume of acid or alkali.
Name the piece of apparatus that should be used to measure a fixed volume.	Pipette
Name the piece of apparatus that should be used to measure a variable volume.	Burette
Explain why phenolphthalein is used as an indicator in titration rather than universal indicator.	It shows a clear colour change.
Define the end point of a titration.	When all of the acid/alkali has been neutralised.
Define a titre.	The volume of acid or alkali added from the burette required to completely neutralise the alkali or acid.
Define concordant results.	Results that fall within $0.2\text{ cm}^3$ of each other.

State the molar volume of a gas at rtp.	$24\text{ dm}^3$
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Describe the conditions of rtp.	20 °C and 1 atm of pressure.
State the equation that links volume of gas, number of moles and molar volume.	Volume = number of moles $\times$ 24

