Quantitative chemistry

Amount of substance in moles

Key term	Definition
Amount of substance (*n*)	how many atoms, molecules or formula units are present in a sample of the substance, measured in moles (mol)
Avogadro's number	the number 6.02 x 10^{23}, which is the number of atoms, molecules or formula units in one mole of the substance
Cubic decimetre (dm^3)	a unit of volume, the same as one litre (l), which is equal to 1000 cubic centimetres (cm^3)
Empirical formula	gives the simplest whole number ratio of atoms of each element in a substance, such as CH_2 for ethene which has molecular formula C_2H_4
Formula unit	for substances with giant structures, this is the formula of the smallest group of atoms or ions that make up the substance, such as Na_2SO_4 for sodium sulfate or C for diamond or graphite
Mass (*m*)	the property of matter that causes a sample of a substance to feel the force of gravity, measured in grams (g)
Molar mass (*M*)	the mass of one mole of a substance, which is given by the value of its relative atomic or formula mass in grams
Molar volume of a gas (V_m)	the volume occupied by one mole of a gas, which is approximately 24 cubic decimetres (dm^3) at room temperature and pressure
Mole (mol)	the unit of amount of substance, where one mole is the amount containing 6.02 x 10^{23} (Avogadro's number) atoms, molecules or formula units
Volume (*V*)	how much three-dimensional space is taken up by a sample of a substance, measured in cubic centimetres (cm^3) or cubic decimetres (dm^3)

Balanced chemical equations

Key term	Definition
Atom economy	in a balanced symbol equation, the mass of the desired product given as a percentage of the total mass of the reactants
Balanced symbol equation	for a chemical reaction this shows the chemical formulas of the reactants and products separated by an arrow. Whole numbers may be written before the formulas to balance the equation
By-product	a substance produced by a chemical reaction that isn't the desired product and is often treated as waste
Chemical formula	uses chemical symbols to show the relative number of the atoms of each element in a substance, such as H_2O for water or NaCl for sodium chloride
Excess reactant	is not used up in a chemical reaction because another reactant has run out first
Limiting reactant	is completely used up in a chemical reaction, which therefore limits the amount of products that can be formed

Concentration of solutions and titration

Key term	Definition
Burette	a narrow tube with a scale on the side and a tap at the bottom, used to accurately measure the volume of liquid run out of it during a titration
Concentration (c)	the number of grams or moles of solute present in each cubic decimetre of a solution, measured in g/dm^3 or mol/dm^3
Concordant results	two or more results that agree closely with each other; in a titration two results are concordant if they are within 0.1 cubic centimetre (cm^3) of each other
End point	in a titration, the exact volume added when the indicator changes colour
Measuring cylinder	a tall tube with a scale on the side used to measure the volume of a liquid or the volume of a gas bubbling up into it through water
pH indicator	a substance which has a different colour above a certain pH value than below that pH value, such as methyl orange or phenolphthalein
Pipette	a narrow tube filled by suction, with a mark or scale printed on the side, used to draw up a measured volume of liquid
Solution	the mixture produced when a solute dissolves in a solvent
Titration	a method for finding the concentration of a solution by reaction with another solution of known concentration
Titre	the volume of solution added from the burette that is needed to reach the end point

Reacting masses and gas volumes

Key term	Definition
Actual yield	the mass or amount of product actually made in a chemical reaction
Gas syringe	a glass tube with a scale printed on the side and a freely moving plunger, used to collect and measure the volume of a gas
Percentage yield	the actual yield, given as a percentage of the theoretical yield
Predicted/ theoretical yield	the maximum mass or amount of product you could make in a chemical reaction if no other reactions take place and nothing is lost
Top pan balance	an electronic device with a metal tray and a digital readout, used to measure the mass of a sample of a substance

Relative mass

Key term	Definition
Percentage composition	the relative mass of the atom/s of one element in a compound, given as a percentage of the relative formula mass
Relative atomic mass (A_r)	the average mass of an atom of an element taking into account the naturally occurring percentages of its isotopes
Relative formula mass (M_r)	the total of the relative atomic masses of all the atoms in the chemical formula of a substance added together
Relative mass	the mass of a particle relative to $\frac{1}{12}$ of the mass of a ^{12}C atom