

YEAR 11 CHEMISTRY SEMESTER 1

TITLE: CHEMICAL QUANTITIES AND CALCULATIONS (3)

LESSON	TITLE	OBJECTIVES	Check your progress		
			MEG 2	MEG 5	MEG 8
1	Conservation of mass and balancing equations	<ul style="list-style-type: none"> -Explore ideas about the conservation of mass -Understand what the numbers in equations stand for -Write balanced symbol equations 	State the law of the conservation of mass	Explain how to balance equations in terms of numbers of atoms on both sides of the equation	Explain the meaning of subscripts within a formula and multipliers before a formula in a balanced equation
2	Relative formula mass	<ul style="list-style-type: none"> -Review the differences between the isotopes of an element -Distinguish between the mass of an atom and the relative atomic mass of an element -Use relative atomic masses to calculate relative formula masses 	Be able to calculate a relative formula mass from the sum of the relative atomic masses	Calculate the sum of the relative formula masses of reactants and products	Show how the relative formula masses of reactants are equal to the relative formula masses of products
3	Mass changes when gases are in reactions	<ul style="list-style-type: none"> -Find out how mass can be gained or lost during a reaction -Find the mass of carbon dioxide released per gram of copper carbonate decomposed -Assess the accuracy of measurements 	Explain that when there is a mass change in a reaction it may be because a gas is given off	Explain why there appears to be a mass change when metals carbonates are heated or metals are heated in oxygen	Explain observed changes in mass in non-enclosed systems and explain the changes in terms of the particle model

4	Chemical measures and uncertainty	<ul style="list-style-type: none"> -Explore ideas about the accuracy of measurements -Consider how closely measurements reflect true values -Explore ways of estimating the uncertainty in a set of measurements 	Describe that whenever a measurement is made there is always a degree of uncertainty about the result	Represent a distribution of results and make estimates of uncertainty	Represent the range of a set of measurements about a mean as a measure of uncertainty
5	Moles and amounts of substance	<ul style="list-style-type: none"> -Describe the measurements of amounts of substances in moles -Calculate the amount of moles in a given mass of a substance -Calculate the mass of a given number of moles of a substance -calculate the masses of substances in a balanced symbol equation -Calculate the masses of reactants and products from balanced symbol equations -Calculate the mass of a given reactant or product 	Describe the measurement of amounts of substance in moles	Calculate the number of moles in a given mass	Calculate the mass of a given number of moles
6	Using moles to balance equations	<ul style="list-style-type: none"> -Convert masses in grams to amounts in moles -Balance an equation given the masses of reactants and products -Change the subject of a mathematical equation 	Calculate the masses of substances in a balanced symbol equation	Calculate the masses of reactants and products from balanced symbol equations	Calculate the mass of a given reactant or product

	Concentration of solutions	<ul style="list-style-type: none"> -Relate mass, volume and concentration -Calculate the mass of solute in solution -Relate concentration in mol/dm^3 to mass and volume 	Convert masses in grams to amounts in moles Relate mass, volume and concentration	Balance an equation given the masses of reactants and products Calculate the mass of solute in a solution	Change the subject of a mathematical equation Relate concentration in mol/dm^3 to mass and volume
7	Percentage yield	<ul style="list-style-type: none"> -Calculate the percentage yield from the actual yield -Identify the balanced equation needed for calculating yields -Calculate theoretical product amounts from reactant amounts 	Identify the balanced equation needed for calculating yields	Calculate the theoretical amount of products from the amounts of reactants	Calculate the percentage yield from the actual yield and the theoretical yield
8	Atom economy	<ul style="list-style-type: none"> -Identify the balanced equation of a reaction -Calculate the atom economy of a reaction to form a product -Explain why a particular reaction pathway is chosen 	Identify the balanced equation of a reaction	Calculate the atom economy of a reaction to form a desired product	Explain why a particular reaction pathway is chosen to produce a product given the atom economy, yield, rate, equilibrium position and usefulness of by-products
9	Using concentrations of solutions	<ul style="list-style-type: none"> -Describe how to carry out titrations -Calculate concentrations in titrations in mol/dm^3 and in g/dm^3 	Describe how to carry out titrations	Calculate concentrations in titrations in mol/dm^3 and in g/dm^3	Explain how the concentration of a solution in mol/dm^3 is related to the mass of

		-Explain how the concentration of a solution in mol/dm ³ is related to the mass of the solute and the volume of the solution			the solute and the volume of the solution
10	Amounts of substance in volumes of gases	-Explain that the same amount of any gas occupies the same volume at room temperature and pressure (rtp) -Calculate the volume of a gas at rtp from its mass and relative formula mass -Calculate the volumes of gases from a balanced equation and a given volume of a reactant or product	Explain that the same amount of any gas (in moles) occupies the same volume at room temperature and pressure	Calculate the volume of a gas at rtp from its mass and relative formula mass	Calculate the volumes of gases from a balanced equation and a given volume of a reactant or product
11	Amounts in chemistry	-Use atomic masses to calculate formula masses -Explain how formula mass relates to the number of moles -Explain how the number of moles relates to other quantities			
12	Change the subject of an equation	-Use equations to demonstrate conservation -Rearrange the subject of an equation -Carry out multi-step calculations			
<p>KEY TERM LIST: Balanced equation, conservation of mass, reactants, products Atomic mass, formula mass</p>					

Gas, mass, particles, thermal decomposition

Uncertainty, estimate, distribution of results, range of measurements

Mole, chemical amount, relative formula mass, Avogadro number/constant, reactant mass, product mass, molar mass, molar volume

Balanced equation, solute, solvent, solution, concentration

Yield, percentage yield, theoretical yield, actual yield

Atom economy, sustainability, reaction pathway, by-product

Titration, burette, pipette, indicator

Gas volume, room temperature and pressure, decimetre cubed, atmospheric pressure

Equation, rearrange, multiply, multi-step calculation

MATHEMATICAL SKILLS:

Substitute numerical values into equations

Calculate the range and mean of a set of values

Use appropriate units for physical quantities

Translate information between graphical and numerical form

Recognise and use expressions in decimal form

Use expressions in standard form

Use an appropriate number of significant figures

Change the subject of an equation

Use ratios, fractions and percentages

Solve simple algebraic equations

Understand and use simple mathematical symbols

Construct and interpret frequency tables and diagrams, bar charts and histograms

Make estimates of the results of simple calculations