

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Working Scientifically	Tiered Vocabulary and Reading Activity	Support
Lesson: <i>Conservation of Mass</i>	- Students will know that the law of conservation of mass states that no atoms are lost or made during a chemical reaction - Students will know that the mass of the products equals the mass of the reactants - Students will know that the law of conservation of mass means that symbol equations must be balanced - Students will know that the mass of a reaction can be observed to increase. This is due to one of the reactants being a gas, and not being measured in the initial mass measurement - Students will know that the mass of a reaction can be observed to decrease. This is due to one of the products being a gas, and escaping the reaction vessel. - Students will know how to explain any observed changes in mass during a chemical reaction - Students will know that there are uncertainties linked with any chemical measurements. - Students will know how to balance equations Students will know how to use the range of a set of measurements about the mean as a measure of uncertainty.	Students need to already know how to work out the number of atoms in a molecule	Experimental skills – forming a hypothesis Measurement – make and record accurate representations	Tier 2 Conservation – the total value remains constant Tier 3 Open system- Can exchange matter with its surroundings. Closed system- a system that is completely isolated from its environment, nothing can enter or leave. Vessel- container	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: Relative Formula Mass	- Students will know that the symbol for relative formula mass is M_r - Students will know that the relative formula mass of a compound is the sum of the relative atomic masses of the atoms in the numbers shown by the formula - Students will know that in a balanced equation the sum of the relative formula masses of the reactants is equal to the sum of the relative formulas masses of the products in the quantities shown - Students will know how to calculate the relative formula mass of a compound given the formula Students will know how to calculate the percentage by mass in a compound given relative formulas masses and relative atomic masses	Students need to already know how to use a periodic table to determine the relative atomic mass of an atom	Vocabulary, units, symbols and nomenclature	Tier 3 Relative formula mass (M_r): The sum of all the relative atomic masses of the atoms in the numbers shown in the formula	Tassomai Knowledge organiser BBC bitesize KayScience videos

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Lesson: <i>Moles (Higher Tier)</i>	- Students will know that chemical amounts are measured in moles. - Students will know that the symbol for moles is mol. - Students will know that the mass of one mole of a substance in grams is equal to its relative formula mass - Students will know that one mole of a substance contains the same number of particles as one mole of any other substance. - Students will know that the number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant (6.02×10^{23}) - Students will know that to calculate the number of moles you use the equation: $\text{moles} = \text{mass} \div \text{relative formula mass}$ Students will know how to use the equation to calculate the number of moles, the mass or the relative formula mass	Students already need to know how to use the periodic table to find atomic mass Students already need to know how to calculate relative formula mass	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	<i>Mole (mol): A unit of substance.</i> <i>Relative: in relation or proportion to something else</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: <i>(Higher Tier) Calculating Moles using Masses</i>	- Students will know that the masses of reactants and products can be calculated from balanced symbol equations - Students will know that balanced equations show the relative number of moles of the reactants and products taking part - Students will know how to calculate the masses of substances shown in a balanced equation - Students will know how to calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant.	Students need to already know how to calculate relative formula mass Students already need to know how to calculate number of moles	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	<i>Tier 2</i> <i>Excess: Exceeding something else in amount</i> <i>Exceeding: greater than</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: <i>Using Moles to Balance Equations</i>	- Students will know that the balancing numbers in a symbol equation can be calculated from the masses of reactants and products by converting the masses into moles and converting the number of moles into simple whole number ratios - Students will know how to balance an equation given the masses of reactants and products.	- Students need to already know how to calculate number of moles - Students need to already know how to change the subject of a mathematical equation	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature		Tassomai Knowledge organiser BBC bitesize KayScience videos

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Lesson: Limiting Reactants (Higher tier)	- Students will know that a limiting reactant is a reactant that is completely used up in a chemical reaction - Students will know that when a reactant is used in excess more of the reactant is used than necessary - Students will know how to explain the effect of a limiting reactant on the number of products it is possible to obtain Students will know how to determine the limiting reactant when given information on masses of reactants	Students already need to know how to calculate number of moles Students already need to know how to balance symbol equations	Experimental Skills and Strategies The Development of Scientific Thinking	Tier 3 <i>Limiting Reactant: reactant that is completely used up in a chemical reaction</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: Concentration of Solutions	- Students will know that most chemical reactions take place in solutions - Students will know that the concentration of a solution can be measured in mass per given volume e.g. g/dm³ - Students will know the equation for calculating concentration is: - concentration = mass ÷ volume - Students will know that to convert from cm³ to dm³ you need to divide by 1000 - Students will know how to calculate concentration from mass of a solute Students will know how to explain how mass of a solute and volume of a solution are related to the concentration of the solution	Students need to already know that grams is a unit of mass	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	Tier 2 <i>Convert: change the form, character, or function of something.</i> Tier 3 <i>Concentration: The amount of a substance in a certain volume of a solution.</i> <i>Solution: When a solute dissolve in a solvent</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: Concentration (TRIPLE ONLY)	- Students will know that concentration of a solution can be measured in mol/dm³ - Students will know that the equation for calculating concentration in mol/dm³ is: - concentration = moles/ volume - Students will know how to calculate concentration, moles and volume using the equation above - Students will know how to calculate the concentration of an unknown solution using the volume and concentration of a solution it reacts with Students will know how to interchange between mol/dm³ and g/dm³	Students need to already know how to convert between cm ³ and dm ³	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature		Tassomai Knowledge organiser BBC bitesize KayScience videos

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Lesson: Percentage Yield (TRIPLE ONLY)	- Students will know that it is not always possible to obtain the calculated amount of a product. - Students will know the reasons why it's not possible to obtain the calculate amount of a product include: - The reaction may not go to completion due to being reversible - Some of the products will be lost when separated from the reaction mixture - Some of the reactants may react in ways different to the expected reaction - Students will know that the product obtained is known as the yield - Students will know that percentage yield can be calculated by using the equation: $\% \text{ yield} = (\text{actual yield} \div \text{theoretical yield}) \times 100$ - Students will know how to calculate the percentage yield of a product from the actual yield of a reaction Students will know how to calculate the theoretical mass of a product from a given mass of reactant and the balanced equation	Students already need to know how to calculate number of moles Students already need to know how to calculate percentages	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	<i>Tier 2</i> <i>Theoretical: based on or calculated through theory rather than experience or practice</i> <i>Tier 3</i> <i>Yield: Amount produced</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos
Lesson: Atom Economy (TRIPLE ONLY)	- Students will know that the atom economy is a measure of the amount of starting materials that end up as useful products. - Students will know that it is important for sustainable development and economic reasons to use reactions that have high atom economy - Students will know that atom economy is calculated with the equation: $(\text{relative formula mass of desired product from the equation} \div \text{Total relative formula masses of all reactants from the equation}) \times 100$ - Students will know how to calculate the atom economy of a reaction Students will know how to explain why a particular reaction is chosen to produce a specified product	Students already need to know how to calculate number of moles Students already need to know how to calculate percentages	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	<i>Tier 2</i> <i>Economy: careful management of available resources</i> <i>Tier 3</i> <i>Atom Economy: The percentage of the reactant that is turned into the desired product</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos

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Lesson: <i>Molar Gases</i>	- Students will know that equal amounts in moles of gases occupy the same volume under the same temperature and pressure - Students will know that one mole of any gas at room temperature and pressure occupies 24 dm³ - Students will know that room temperature is 20 degrees Celsius - Students will know that room atmosphere is 1 atmosphere pressure - Students will know that the volumes of gaseous reactants and products can be calculated from the balanced equation for the reaction - Students will know how to calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass - Students will know how to calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product	- Students need to already know how to calculate number of moles - Students need to already know how to balance equations Students need to already know how to change the subject of a mathematical equation	The Development of Scientific Thinking Analysis and Evaluation Vocabulary, Units, Symbols and Nomenclature	<i>Tier 3</i> <i>Pressure – the force exerted per unit area.</i> <i>Volume – The amount of particles that occupies an area.</i>	Tassomai Knowledge organiser BBC bitesize KayScience videos