C3 Quantitative Chemistry

Can you…?	☺	😐	☹
3.1.1 Conservation of mass and balanced chemical equations			
Recall that the law of conservation of mass states that no atoms are lost or made during a chemical reaction so the mass of the products equals the mass of the reactants.			
Interpret symbol equations representing chemical reactions.			
3.1.2 Relative formula mass			
Calculate the relative formula mass of a compound.			
Recall that in a balanced chemical equation, the sum of the relative formula masses of the reactants in the quantities shown equals the sum of the relative formula masses of the products in the quantities shown.			
3.1.3 Mass changes when a reactant or product is a gas			
Give examples of reactions that appear to involve a change in mass.			
Explain why some reactions appear to involve a change in mass.			
3.1.4 Chemical measurements			
Explain what is meant by measurement uncertainty.			
Represent the distribution of results and estimate uncertainty.			
Use the range of a set of measures about the mean as a measure of uncertainty.			
3.2.1 Moles (HT only)			
Recall that chemical amounts are measured in moles. The symbol for the unit mole is mol.			
Recall that the number of atoms, molecules or ions in a mole of a given substance is the Avogadro constant. The value of the Avogadro constant is 6.02×10^{23} per mole.			
Recall that the mass of one mole of a substance in grams is equal to its relative formula mass.			
Use the relative formula mass of a substance to calculate the number of moles in a given mass of that substance and vice versa.			
3.2.2 Amounts of substances in equations (HT only)			
Interpret chemical equations in terms of moles.			
Calculate the masses of substances shown in a balanced symbol equation.			
Calculate the masses of reactants and products from the balanced symbol equation and the mass of a given reactant or product.			
3.2.3 Using moles to balance equations (HT only)			
Recall that the balancing numbers in a symbol equation can be calculated from the masses of reactants and products by converting the masses in grams to amounts in moles and converting the numbers of moles to simple whole number ratios.			

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Balance an equation given the masses of reactants and products.			
3.2.4 Limiting reactants (HT only)			
State what it means if a reactant is the limiting reactant.			
State what it means if a reactant is in excess.			
Explain the effect of a limiting quantity of a reactant on the amount of products it is possible to obtain in terms of amounts in moles or masses in grams.			
3.2.5 Concentration of solutions			
Recall that the concentration of a solution can be measured in mass per given volume of solution, eg grams per dm^3 (g/dm^3).			
Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution.			
Explain how the mass of a solute and the volume of a solution is related to the concentration of the solution. (HT only)			
3.3.1 Percentage yield (Chemistry only)			
Explain why it is not always possible to obtain the calculated amount of product from a reaction.			
Recall that the amount of product obtained is known as the yield.			
State what percentage yield is.			
Calculate the percentage yield of a product from the actual yield of a reaction.			
Calculate the theoretical mass of a product from a given mass of reactant and the balanced equation for the reaction. (HT only)			
3.3.2 Atom economy (Chemistry only)			
Recall that the atom economy (atom utilisation) is a measure of the amount of starting materials that end up as useful products.			
Explain why atom economy is important.			
Calculate the atom economy of a reaction to form a desired product from the balanced equation.			
Explain why a particular reaction pathway is chosen to produce a specified product given appropriate data such as atom economy (if not calculated), yield, rate, equilibrium position and usefulness of by-products.			
3.4 Using concentrations of solutions in mol/dm3 (Chemistry only) (HT only)			
Recall that concentrate can be measured in mol/dm^3.			
Calculate the amount in moles of solute or the mass in grams of solute in a given volume of solution from its concentration in mol/dm^3.			

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If two solutions react completely, calculate the concentration of a solution using the volumes of the two solutions and the concentration of one of the solutions.			
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.			
3.5 Use of amount of substance in relation to volumes of gases (Chemistry only) (HT only)			
Recall that equal amounts in moles of gases occupy the same volume under the same conditions of temperature and pressure.			
Recall that the volume of one mole of any gas at room temperature and pressure (20^oC and 1 atmosphere pressure) is 24 dm^3.			
Recall that the volumes of gaseous reactants and products can be calculated from the balanced equation for the reaction.			
Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass			
Calculate volumes of gaseous reactants and products from a balanced equation and a given volume of a gaseous reactant or product.			
Change the subject of a mathematical equation.			