

C4 Chemical calculations		Length of topic: 4 F combined / 7 H combined / 11 Separates		Chemical calculations
Numeracy/Skills Links: <ul style="list-style-type: none">• Use of ratios, fraction and percentage• Rearranging subject of the equation• Use of decimal form and standard form• Use appropriate significant figures		Keywords: Moles, atomic mass, formula mass, conservation of mass, yield, concentration, limiting reactant,		KS3 links: Matter 2 - atoms, elements and compounds. Chemical formula. Reactions 1 - acids, alkalis and neutralisation. Matter 2 – Balancing equations and conservation of mass.
Misconceptions: <ul style="list-style-type: none">• Formulas can be changed• Using the coefficient from a balanced equation to calculate Rfm (Mr)• Gas has no mass				
Lessons				
1. Conservation of mass	<ul style="list-style-type: none">• Recap atoms and elements in a formula• Define conservation of mass• Explain why some reactions appear to lose or gain mass• Balance symbol equations		7. Limiting reactants (H)	<ul style="list-style-type: none">• Define the terms excess and limiting reactants• Be able to determine the limiting reactant if given masses• Use the limiting reactant to determine the theoretical yield
2. Conservation of mass practical	<ul style="list-style-type: none">• Safely carry out the oxidation of magnesium practical• Explain observed changes in mass and link to the particle model• Explain why actual mass is different to the theoretical mass• Calculate uncertainty from given results• Use masses from a reaction to determine a compound formula (empirical formula) (H)		8. Concentration of solutions	<ul style="list-style-type: none">• Define concentration• Explain how mass of solute and volume of solvent affects concentration (H)• Calculate concentration in g/dm3• Calculate concentration in mol/dm3 (SS)
3. RFM and the mole	<ul style="list-style-type: none">• Identify the relative atomic mass (Ar)• Calculate the relative formula mass (Mr)• Calculate the percentage mass of an element• Define a mole and use to calculate masses (H)		9. Titration calculations (SS)	<ul style="list-style-type: none">• Recap neutralisation• Describe the use of titration (demo)• Calculate concentration of an unknown solution using a known concentration
4. Reacting masses (HT) (theoretical mass)	<ul style="list-style-type: none">• Recall that a balanced equation represents the ratio of moles reacting• Calculate masses of reactants and products from a balanced symbol equation• Balance an equation from given masses of reactants and products		10. Atom economy (SS)	<ul style="list-style-type: none">• Define atom economy• Calculate atom economy• Explain why a high atom economy is important• Compare atom economy data for reactions to justify a reaction pathway
5. Percentage yield (SS)	<ul style="list-style-type: none">• Calculate the percentage yield if given actual and theoretical mass• Calculate the theoretical mass (last lesson) if given mass of reactant and use to calculate a percentage yield• Give reasons why a reaction may give less than the theoretical yield.		11. Gas volume (HT) (SS)	<ul style="list-style-type: none">• Know that one mole of any gas will occupy 24dm3• Calculate the volume of a gas at room temperature• Calculate volumes of gases from a balanced equation.
6. Moles to a balanced equation (H)	<ul style="list-style-type: none">• Be able to calculate moles of reactants from given masses• Be able to use masses to moles to balance an equation		Activities: L2 – Magnesium oxide conservation of mass practical L3 – Demo moles of compounds L8 – Demo concentration L9 – Demo titration	

