1 – Relative Formula Mass

Relative atomic mass (A_r)	**Larger numbers** on periodic table **above** element symbol.
	e.g. A_r of C = 12, A_r of O = 16
Relative formula mass (M_r)	**Sum** of the **relative atomic masses** of all the atoms in a molecular formula.
	e.g. M_r of CO_2 = (1 x C) + (2 x O) = (1 x 12) + (2 x 16) = 44
Percentage mass of an element in a compound	$\dfrac{\textbf{A}_\textbf{r}\textbf{ x number of atoms of at element}}{\textbf{M}_\textbf{r}\textbf{ of the compound}}$ **x 100**
	e.g. Find the % mass of oxygen in carbon dioxide, CO_2. $\dfrac{1 \times 2}{44} \times 100 = 11.1$

2 – The Mole (HT only)

Avogadro constant	**6.02×10^{23} particles**
One mole	An **amount** of a **substance** that contains the **Avogadro constant number** of **particles**.
	e.g. 1 mole of carbon contains 6.02×10^{23} carbon atoms.
Mass of one mole	The **mass** in **grams** is **equal** to the **relative atomic/formula mass** of the substance.
	e.g. A_r of carbon = 12. One mole of carbon = 12 g.
Calculating number of moles	**number of moles =** $\dfrac{\textbf{mass (in grams)}}{\textbf{M}_\textbf{r}}$ $\qquad$ $n = \dfrac{m}{M_r}$

3 – Conservation of Mass

Law of conservation of mass	**Mass** is **always conserved** in a chemical reaction. Mass of **reactants** = mass of **products**. No **atoms** are **created** or **destroyed**.
Balanced equations	**Balance** equations using **coefficients** (big numbers).
	e.g. **2** Li + F_2 -> **2** LiF (2 Li atoms and 2 F atoms on each side)
Mass may seem to change…	If mass **increases** -> one of the **reactants** may be a **gas**, e.g. a metal reacts with oxygen in the air.
	If mass **decreases** -> one of the **products** may be a **gas**, e.g. bubbles of hydrogen gas are released.

4 – Reacting Masses (HT only)

Coefficients in equations	They tell you **how many moles** of each substance are reacting / being produced.
	e.g. **2** Mg + O_2 -> **2** MgO. In this reaction, 2 moles of Mg react with 1 mole of O_2 and produce 2 moles of MgO.
Limiting reactant	The **reactant** that gets completely **used up**. Mass of **limiting reactant** will **limit** mass of **products**.
Reactant in excess	This reactant will be **left over** when the reaction **stops**.
Example	6.9 g of Na is reacted with 7.6 g of F_2. Which reactant is limiting? Calculate the mass of NaF formed.

Balanced Equation	2 Na	+ F_2	-> 2 NaF
Mass	6.9 g	7.6 g	**12.6 g**
M_r	23	38	42
Moles = mass/M_r	6.9 / 23 = 0.3	7.6 / 38 = 0.2	0.3
Ratio	2 : 1 0.3 : 0.15 **Na is limiting** (0.05 moles of F2 will be left over)		: 2 : 0.3

5 – Concentration of Solutions

Solute	The **substance dissolved** in a **solution**.
Solvent	The **liquid** part of a **solution**, e.g. **water**.
Concentration	Amount of **solute dissolved** in a **certain volume** of a **solution**. **More solute** in a given volume = **higher concentration.**
Calculating concentration	**concentration (in g/dm³) =** $\dfrac{\textbf{mass of solute (in g)}}{\textbf{volume of solvent (in dm}^\textbf{3}\textbf{)}}$ $\qquad$ $c = \dfrac{m}{V}$
Volume conversion	**1 dm^3** = **1000 cm^3**. To go from cm^3 to dm^3, **divide** by **1000**.

GCSE Science

Chemistry C3 – Quantitative Chemistry

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Ratio	2 : 1 0.3 : 0.15 **Na is limiting** (0.05 moles of F2 will be left over)		: 2 : 0.3