Unit 2 Amount of Substance (Paper 1, 2 & 3)

2.1 Relative atomic mass and relative molecular mass

Relative atomic mass and relative molecular mass in terms of ^{12}C.
The term relative formula mass will be used for ionic compounds.
You should be able to:
• define relative atomic mass (A r)
• define relative molecular mass (M r).
The mole and the Avogadro constant
The Avogadro constant as the number of particles in a mole.
The mole as applied to electrons, atoms, molecules, ions, formulas and equations.
The concentration of a substance in solution, measured in mol dm $^{-3}$.
You should be able to carry out calculations:
• using the Avogadro constant
• using mass of substance, M r , and amount in moles
• using concentration, volume and amount of substance in a solution.
You will **not** be expected to recall the value of the Avogadro constant.
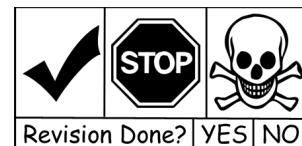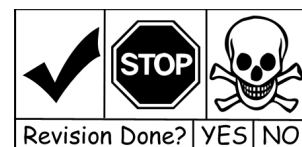
2.2 The Ideal Gas Equation

The ideal gas equation PV = nRT with the variables in SI units.
You should be able to use the equation in calculations.
You will **not** be expected to recall the value of the gas constant, R

Empirical and molecular formulae
Empirical formula is the simplest whole number ratio of atoms of each element in a compound.
Molecular formula is the actual number of atoms of each element in a compound.
The relationship between empirical formula and molecular formula.
You should be able to:
• calculate empirical formula from data giving composition by mass or percentage by mass
• calculate molecular formula from the empirical formula and relative molecular mass.formulae
be able to calculate empirical formulae from data giving percentage composition by mass
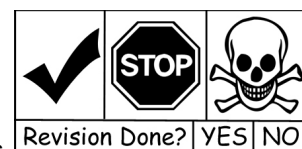
Balanced equations and associated calculations
Equations (full and ionic).

Percentage atom economy is: $\dfrac{\text{molecular mass of desired product}}{\text{sum of molecular masses of all reactants}} \times 100$

Economic, ethical, and environmental advantages for society and for industry of developing chemical processes with a high atom economy.
You should be able to:
• write balanced equations for reactions studied
• balance equations for unfamiliar reactions when reactants and products are specified.
You should be able to use balanced equations to calculate:
• masses
• volumes of gases
• percentage yields
• percentage atom economies
• concentrations and volumes for reactions in solutions.