

# OCR (A) Chemistry A-level

## Topic 2.1.3 - Amount of substance

### Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



What is the symbol for amount of substance?



What is the symbol for amount of substance?

$n$



What is the unit used to  
measure amount of  
substance?



What is the unit used to measure amount of substance?

Mole



# What does the Avogadro constant represent?



What does the Avogadro constant represent?

The number of atoms per mole of the carbon-12 isotope



# How to calculate the mass of 1 mole of the element?





How to calculate the mass of 1 mole of the element?

Mass of 1 mole = relative atomic mass in  
grams



# How to calculate moles when mass and molar mass are given?



How to calculate moles when mass and molar mass are given?

$$\text{Moles (mol)} = \text{mass (g)} / \text{molar mass (g mol}^{-1}\text{)}$$



# State Avogadro's law



## State Avogadro's law

Under the same temperature and pressure, one mole of any gas would occupy the same volume.



How much volume does a gas occupy, at room temperature and pressure?



How much volume does a gas occupy, at room temperature and pressure?

24 dm<sup>3</sup> or 24000 cm<sup>3</sup>



# Define molar gas volume





Define molar gas volume

The volume per mole of gas molecules



# Why do different gas particles occupy the same volume?



Why do different gas particles occupy the same volume?

The gas particles are very spread out, hence individual differences has no effect.



# How to calculate moles when gas volume is given?



How to calculate moles when gas volume is given?

$$\text{Moles (mol)} = \text{volume (dm}^3\text{)} / 24$$

Or

$$\text{Moles (mol)} = \text{volume (cm}^3\text{)} / 24000$$



# What are the ideal ways in which gases behave? (5)



What are the ideal ways in which gases behave?

- They are in continuous motion
- No intermolecular forces experienced
- Exert pressure when they collide with each other or container
- No kinetic energy is lost in the collisions
- When temperature increases, kinetic energy of gases also increase



Write down the ideal gas equation (in words and symbols, including the units)





Write down the ideal gas equation (in words and symbols, including the units?)

$$pV = nRT$$

Pressure (Pa) x volume ( $\text{m}^3$ ) = number of moles (mol) x gas constant ( $8.314 \text{ J mol}^{-1}$ ) x temperature (K)



1 atmospheric pressure is equal to how many pascal?



1 atmospheric pressure is equal to how many pascal?

$$1 \text{ atm} = 101325 \text{ Pa}$$



$0^{\circ}\text{C}$  is equal to how many  
kelvin?



0°C is equal to how many kelvin?

273 K



# What does concentration of a solution mean?



What does concentration of a solution mean?

It is the amount of solute dissolved in 1  $\text{dm}^3$  of solvent



How do you calculate moles  
when concentration and  
volume are given?





How do you calculate moles when concentration and volume are given?

$$\text{Moles (mol)} = \text{concentration (mol dm}^{-3}\text{)} \times \text{volume (dm}^3\text{)}$$



# What is a standard solution?



What is a standard solution?

A solution of known concentration



Write down the steps to  
prepare a standard solution



## Write down the steps to prepare a standard solution

1. Weigh the solute using the weigh by difference method
2. In a beaker dissolve the solute using the solvent
3. Pour the solution into a volumetric flask
4. Rinse the beaker using the solution and add it to the flask
5. Add solvent to the flask carefully until it reaches the graduation line
6. Mix the solution thoroughly to ensure complete mixing



What do the terms  
concentrated and dilute  
mean?



What do the terms concentrated and dilute mean?

Concentrated - large amount of solute per  $\text{dm}^3$  of solvent

Dilute - small amount of solute per  $\text{dm}^3$  of solvent



# What is a species in a chemical reaction?





What is a species in a chemical reaction?

Any particle that takes part in a reaction



# What are the four common state symbols?



What are the four common state symbols?

1. Solid (s)
2. Liquid (l)
3. Gaseous (g)
4. Aqueous (aq)



# What does the percentage yield mean?



What does percentage yield mean?

The efficiency of which reactants are converted into products



What are the reasons for not obtaining 100% yield? (5)



## What are the reasons for not obtaining 100% yield?

- Reaction may be at equilibrium
- The reactants may be impure
- Side reactions could happen
- Reactants or products may be left behind while transferring
- Loss of products during separation and purification



# How is percentage yield calculated?





How is percentage yield calculated?

Percentage yield = (actual amount of product (mol) / theoretical amount of product (mol)) x 100



# What does atom economy tell us about?



What does atom economy tell us about?

The proportion of desired products compared with all the products formed in the reaction



# How is atom economy calculated?



How is atom economy calculated?

Atom economy = (molecular mass of desired product / sum of the molecular masses of all products) x 100



Does 100% yield mean 100%  
atom economy?



Does 100% yield mean 100% atom economy?

No, even if all the reactants are converted into products, not all products of the reaction will be the required products



Which type of reaction has  
100% atom economy?





Which type of reaction has 100% atom economy?

Addition reactions (two or more reactants are combined to form a product)

