



Chemistry A'Level

Transition Work

The course

The course you will be following is OCR Chemistry A (H432).

You can visit the OCR website to find out more about the course and to view the specification.

<https://www.ocr.org.uk/qualifications/as-and-a-level/chemistry-a-h032-h432-from-2015>

Organising your work

Please arrive in September with a file and dividers in which you can organise and store your notes and work. You will need a supply of A4 lined paper along with pens, pencils, a 30cm ruler and a calculator. You will be provided with a lab book to record your practical work for your Practical Endorsement.

Transition work

The transition work is designed to check your understanding of the fundamental knowledge from GCSE Chemistry and Maths to be successful in A level Chemistry. It will also help your teachers assess your strengths and weaknesses to support you in the first few weeks of your course as you make the step up from GCSE to A'level.

Please bring your completed work to your first Chemistry lesson of the term and hand it in to your teacher.

Section 1: Atomic structure and ion formation

1. Complete the table:

Particle	Relative Mass	Relative Charge
Proton	1	
Neutron		
Electron	1/1840	

2. Draw diagrams to show the electron arrangements, and write down the shorthand, of the following elements: carbon, hydrogen, chlorine

carbon	hydrogen	chlorine

3. What is the charge on an ion formed when an atom loses two electrons? _____

4. What is the charge on an ion formed when an atom gains two electrons? _____

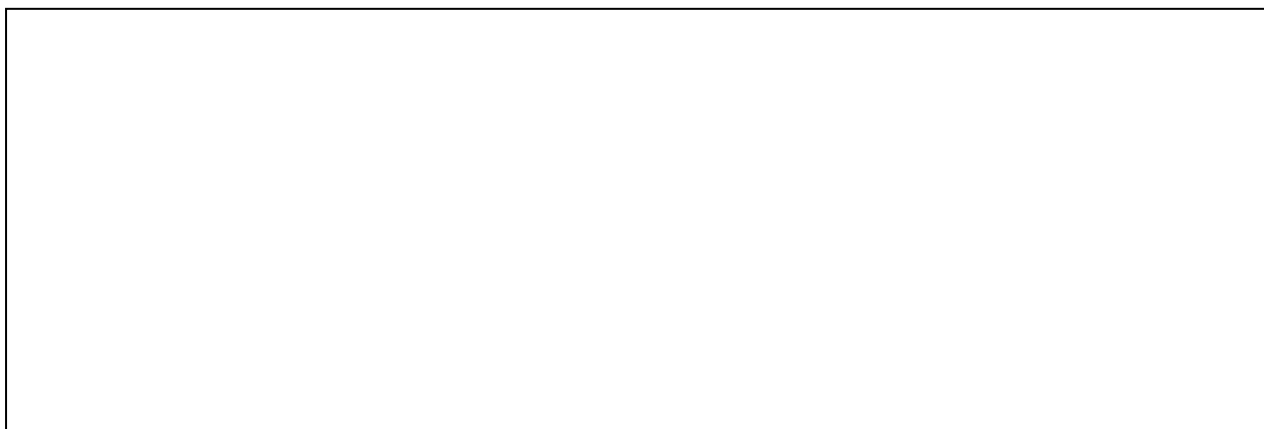
5. Using the periodic table, predict the charge on the ion formed from each of the following elements:

aluminium	
barium	
rubidium	
sulfur	
fluorine	

6. Explain what is meant by an isotope

Section 2: Bonding

7. Draw a diagram showing how a magnesium atom reacts with an oxygen atom to form magnesium ions and oxide ions. In your diagram try to clearly demonstrate the electron transfer process and show the charges on the ions formed.



8. Draw 'dot and cross' diagrams showing the bonding and non-bonding electrons in the following molecules:

a) ammonia (NH_3)



b) oxygen (O_2)



9. What type of **bonding** would you expect the chlorides of sodium and magnesium to exhibit?

10. What type of **bonding** would you expect the chloride of phosphorous to exhibit?

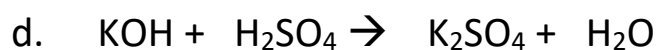
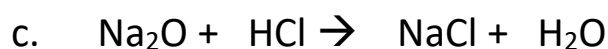
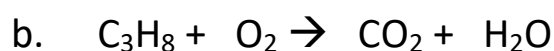
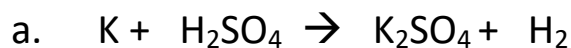
Section 3: Deducing formulae from ions and balancing equations

Common ions:			
Aluminium: Al ³⁺	Bromide: Br ⁻	Calcium: Ca ²⁺	Carbonate: CO ₃ ²⁻
Chloride: Cl ⁻	Iron (II): Fe ²⁺	Iron (III): Fe ³⁺	Nitrate: NO ₃ ⁻
Oxide: O ²⁻	Potassium: K ⁺	Sodium: Na ⁺	Sulfate: SO ₄ ²⁻

11. Use the charges on the ions in the table above to deduce the formulae of the following ionic compounds.

Sodium chloride		Iron (II) chloride	
Calcium bromide		Potassium oxide	
Sodium carbonate		Aluminium sulfate	
Aluminium oxide		Iron (III) nitrate	

12. Balance the symbol equations for the following reactions:



Section 4: Mathematical Requirements

13. A student performs a titration and gets the following results for the volume of acid titrated:

25.05 25.00 24.90 23.65

Calculate the mean volume of the acid _____ cm³

14. Round the following numbers to the decimal places given:

a. 0.0272 to 3 d.p. _____

b. 11.325 to 2 d.p. _____

c. 23.976 to 1 d.p. _____

d. 0.9191 to 2 d.p. _____

15. What is 649.352 to:

- a. 2 significant figures _____
- b. 3 significant figures _____
- c. 4 significant figures _____

16. What is 0.003425625 to:

- a) 2 significant figures _____
- b) 3 significant figures _____
- c) 4 significant figures _____

17. Convert the following to ordinary numbers:

- a. 6.23×10^3 _____
- b. 2.3×10^{-3} _____
- c. 1.2×10^{-6} _____
- d. 4.323×10^5 _____

18. Rearrange the following equations to make "moles" the subject.

Moles x Mr = mass _____

Volume of a gas = moles x 24 _____

concentration = $\frac{\text{moles}}{\text{volume}}$ _____

PV = nRT (where n is the number of moles) _____

Section 5: Structure and bonding

19. For each of the statements, say if it is true or false and explain why.

- a. Giant covalent structures tend to have low melting and boiling points.

True/false because

- b. Most intermolecular forces are strong and make it difficult to separate the molecules.

True/false because

- c. Most covalent substances do not conduct electricity.

True/false because

- d. Graphite conducts electricity.

True/false because

- e. Graphite is slippery because the intramolecular bonds are weak covalent bonds.

True/false because

Section 6: Deliberate Practice

Deliberate practice aims to get you in the habit of LEARNING key information. This key information is the foundation of good understanding in any subject.

Effective learning involves writing the information down WITHOUT looking at the notes. An approach could be to learn all the ions first by flash cards or simply saying them over and over if you have a pretty good working memory. Once you think you know the information, write it down without looking. Then, check and correct.

For this technique to be effective you MUST then do this again the following day, week etc until the information is learnt. Once you are confident you are SECURE in the knowledge there is no need to keep writing it down. Done correctly, the task gets easier and less time consuming as you progress through the weeks and your confidence in chemistry increases. Done incorrectly, you get stressed and shut down. Take your time and tackle in chunks.

Tasks:

1. Write out and learn the following equations.

$$\text{moles} = \frac{\text{mass (g)}}{\text{Mr}}$$

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

$$\text{moles} \times 6.02 \times 10^{23} = \text{number of atoms, ions or molecules}$$

$$\text{moles} \times 24 = \text{volume of gas dm}^3$$

$$\% \text{ yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

$$\% \text{ atom economy} = \frac{\text{RFM of desired product}}{\text{RFM of all reactants}} \times 100$$

2. Write out and learn the following formulae for common substances and ions

sodium hydroxide	NaOH
ammonia	NH ₃
sulfuric acid	H ₂ SO ₄
nitric acid	HNO ₃
hydrochloric acid	HCl
ethanoic acid	CH ₃ COOH

hydroxide ion	OH ⁻
ammonium ion	NH ₄ ⁺
sulfate ion	SO ₄ ²⁻
nitrate ion	NO ₃ ⁻
carbonate ion	CO ₃ ²⁻
silver ion	Ag ⁺
zinc ion	Zn ²⁺

3. Write out and learn key definitions

Relative atomic mass (A_r) - the weighted mean mass of an atom of an element compared with 1/12th of the mass of an atom of carbon-12

Relative isotopic mass - the mass of an isotope compared with 1/12th of the mass of an atom of carbon-12

Isotope - atoms of the same element with the same number of protons but with different numbers of neutrons and different masses

Empirical formula - the simplest whole number ratio of atoms of each element present in a compound

Molecular formula - the actual number and type of atoms of each element in a molecule

First ionisation energy - the energy required to remove one electron from each atom in one mole of gaseous atoms of an element to form one mole of gaseous $1+$ ions

4. Write out and learn the bonding types

Ionic bond - the electrostatic attraction between positive and negative ions.

Covalent bond - attraction between a shared pair of electrons and the nuclei of the bonded atoms

Metallic bonding – the electrostatic attraction between positive metal ions and delocalised electrons

Intermolecular force – an attractive force between molecules

And finally...

The most successful Chemistry students are those that ask for help. Think back to your chemistry / science and maths GCSEs and the work you have just completed, and write down anything you are unsure of and think you may need extra help with.