

Year 1 Chemistry



Summer Holiday work

Bridging the gap between *GCSE* and *A-Level*

Name:.....

You should complete this work ready for starting Year 1 *A-Level* Chemistry. If there are any questions that you cannot do, even after using your *GCSE* notes and revision guide, then you **must** speak to your new Chemistry tutor and arrange support for these topics.

The following topics you should have studied at GCSE will be used and extended during the first year of A Level:

- Structure of the atom
- Ionic and covalent bonding and structure
- Alkanes and alkenes
- Rates of Reaction
- Chemical formula
- Balancing equations
- Empirical formula
- Reactivity trends in Group 2 and Group 7
- Exothermic and endothermic reactions

Use your GCSE notes and your revision guide (if you have one) to write down some key points under each heading in your Chemistry note book or your lovely new Chemistry folder. You can then have a go at the following questions for each section.

Completing this work will ensure you are prepared and ready to start Chemistry.

Structure of the Atom

Q1 Complete the table:

Particle	Relative Mass	Relative Charge
Proton	1	
Neutron		
Electron	1/2000	

Q2 What is the charge on an ion formed when an atom loses two electrons?

Q3 What is the charge on an ion formed when an atom gains two electrons?

Q4 Draw diagrams to show the electron arrangements in:

Carbon

Fluorine

Q5 Draw diagrams to show the electron arrangements in:

Magnesium

Sulfur

Q6 Use the format 2,8,8,2 to write the electron arrangements for

Lithium Sodium

Potassium Beryllium

Magnesium Calcium

Ionic and covalent Bonding

Q7 Draw diagrams to show clearly how a magnesium atom reacts with an oxygen atom to form magnesium oxide

Q8 Draw diagrams to show clearly the bonding in calcium chloride (CaCl_2)

Q9 Draw "dot and cross" diagrams to show the covalent bonding in the following molecules:

Hydrogen (H₂)

Chlorine (Cl₂)

Ammonia (NH₃)

Water (H₂O)

Oxygen (O₂)

Ethene (CH₂CH₂)

Alkanes and Alkenes

Q10 Draw the structures of:

C₅H₁₂

C₆H₁₄

Name

Name

Q11 Complete the general formula of the alkanes

C_nH

Q12 Complete the general formula of the alkenes

C_nH

Rates of Reaction

Q13 Write down as many ways as you can think of to speed up the rate of a chemical reaction

Chemical Formula

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-}

Q14 Use the table of ions to deduce the formulae of the following ionic compounds

Sodium chloride

Calcium bromide

Sodium carbonate

Aluminium oxide

Iron(II) chloride

Potassium oxide

Aluminium chloride

Potassium nitrate

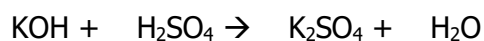
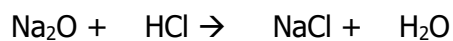
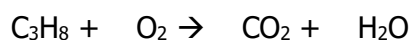
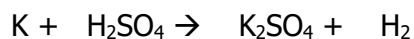
Aluminium sulfate

iron(III) nitrate

Balancing Equations

Q15 Write a balanced symbol equation for the combustion of methane in oxygen
Methane + oxygen → carbon dioxide and water

Q16 Balance the following symbol equations



Empirical formula

Q17 Calculate the molecular formula of a compound containing 52.2% carbon, 13.0% hydrogen and 34.8% oxygen if the relative formula mass of the compound is 46
(Relative atomic mass values: C=12, H=1, O=16)

Reactivity trends in Group 2 and Group 7

Q18 The following are descriptions of the reactions of Be and Ca with cold water. Use them to predict the reactions of Mg and Sr

Beryllium will not react with cold water at all. Calcium reacts slowly with cold water to produce hydrogen gas and calcium hydroxide.

Reaction of magnesium

Reaction of strontium

Q19 Explain if a reaction would occur if you mixed the following halogens and halide solutions. (If there is no reaction, write "no reaction", if a reaction occurs explain why)

Chlorine and bromide

Bromide and iodide

Iodine and chloride

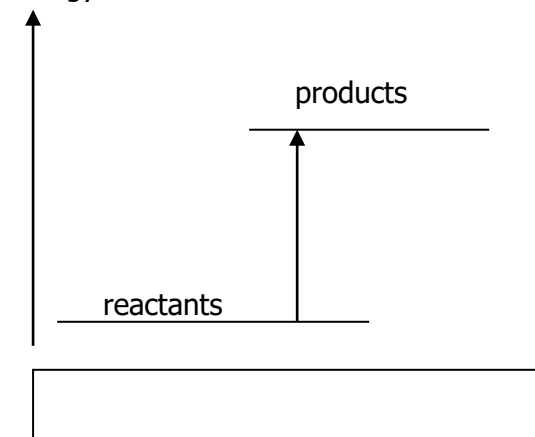
Iodine and bromide

Chlorine and iodide

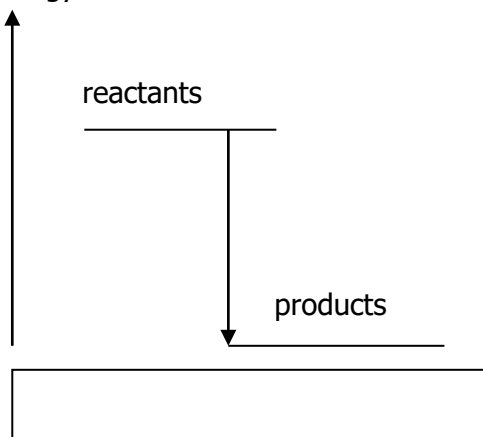
Exothermic and endothermic reactions

Q20 Label these enthalpy profile diagrams correctly as **exothermic** or **endothermic**.

Energy



Energy



Maths Skills

Algebra is probably the most important maths skill you will need for A-level Chemistry. You need to be fast and accurate at rearranging equations

$$\mathbf{A = BC}$$

Rearrange the equation and make B the subject of the expression

Rearrange the equation and make C the subject of the expression

$$\mathbf{AB = CDE}$$

Rearrange the equation and make A the subject of the expression

Rearrange the equation and make C the subject of the expression

$$\mathbf{A = B-CD}$$

Rearrange the equation and make D the subject of the expression

$$\mathbf{A = B \times C^2}$$

Rearrange the equation and make C the subject of the expression

$$\mathbf{A = -BC /nD}$$

Rearrange the equation and make $/nD$ the subject of the expression

Then make D the subject of the expression