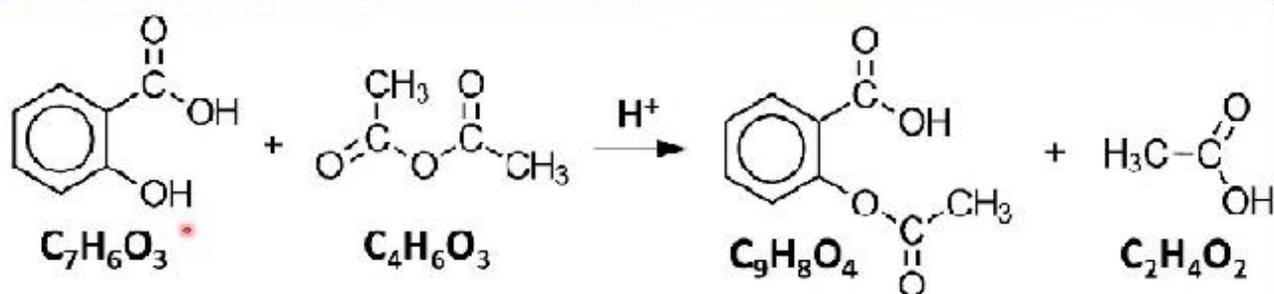


Name: .....

# Yr 11 to Yr 12 Transition work



## **Course Overview:**

**Exam Board:** Edexcel

This GCE Advanced Level (A Level) qualification will take two years and is assessed by 3 exams at the end of the course:

1. Advanced Inorganic and Physical Chemistry (30% of the qualification)
2. Advanced Organic and Physical Chemistry (30% of the qualification)
3. General and Practical Principles in Chemistry (40% of the qualification)

There is also a Practical Endorsement which will assess pupils across a minimum of 12 Core Practicals on a 'Pass or Fail' basis. This will appear as a separate result on Award Certificates.

Note: a minimum of 20% of the marks on each of the 3 papers is awarded for mathematics at GCSE level or above.

## **Course Delivery:**

The course will be delivered as 4 x 1 hour sessions per week. This will include:

- 1 Hour of Inorganic and Physical Teaching
- 1 Hour of Organic and Physical Teaching
- 1 Hour of Practical Work
- 1 Hour of Exam-question based Workshop

In addition to this contact time, students are expected to complete 5-6 hours per week of directed independent study, this includes:

- Preparation for Practical (researching equipment and techniques)
- Practical discussion questions to check understanding
- Exam-style questions
- Independent Revision

## **Assessment of Prior Knowledge:**

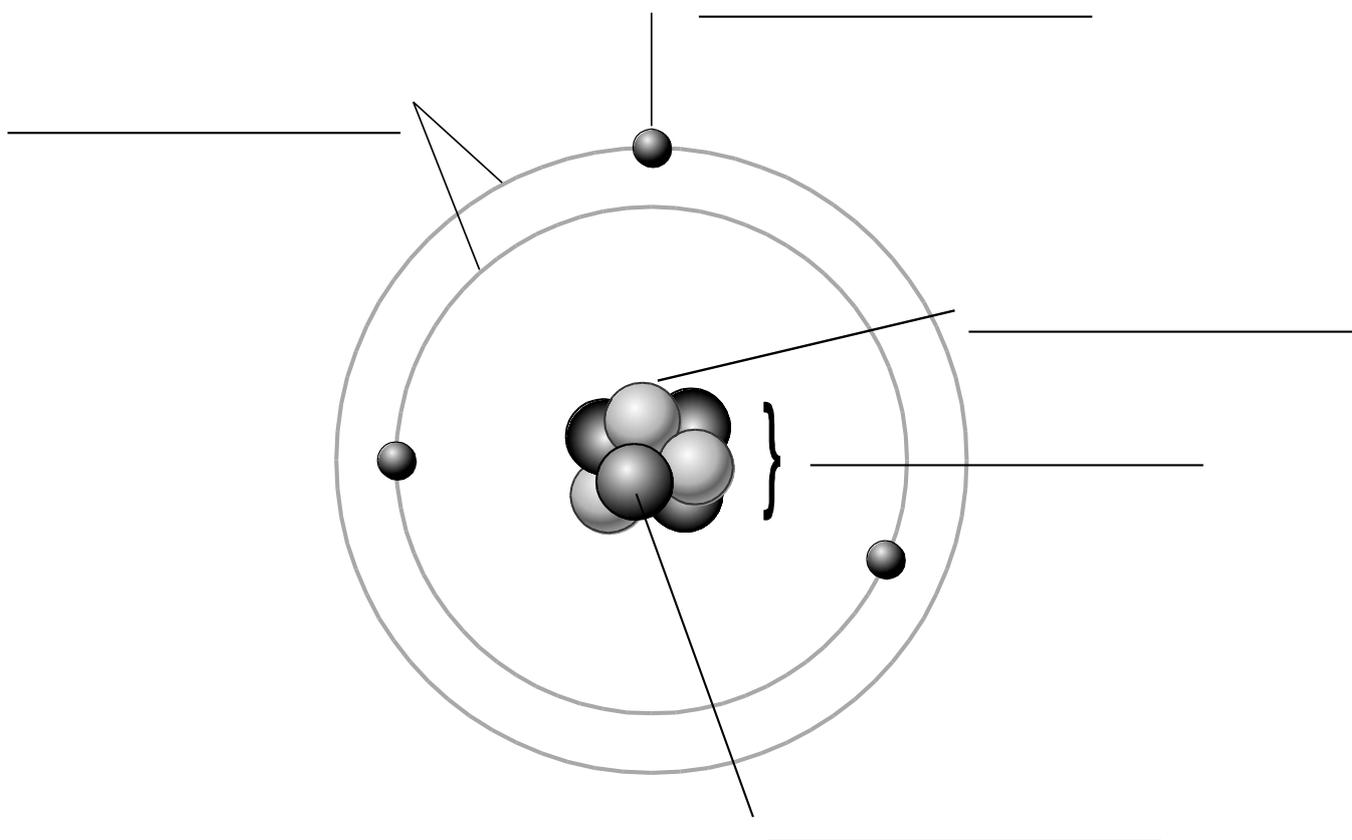
Students will sit a 1 hour Chemistry Paper at GCSE Level during their first lesson in September. This will ensure that students have the necessary foundation of knowledge to complete the course.

It is expected that students revise for this test as Summer Work, and should focus on the following areas:

- i. Structure of the atom and isotopes
- ii. The periodic table
- iii. Intramolecular bonding (ionic, covalent and metallic)
- iv. Empirical formulae
- v. Calculation using moles
- vi. Alkanes and alkenes
- vii. Functional groups and homologous series
- viii. Bond energy
- ix. Rate of reaction
- x. Dynamic equilibrium
- xi. Atom economy
- xii. Titration

## Transition Work:

1. Complete the diagram below:



2. Complete the table below:

Subatomic particle	Relative charge	Relative mass
	+1	1
neutron		
electron		

3. Write the equation that links moles, mass and relative atomic mass

4. Write the equation that link moles, concentration and volume

5. Define Rate of Reaction

6. Define Exothermic

7. Define Endothermic

8. Describe how concentration affects the rate of reaction

9. Describe how temperature affects the rate of reaction

10. Describe how temperature affects the rate of reaction

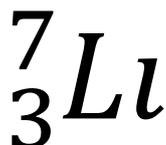
## Preparing for your A-Level Topics

### Topic 1 – Electronic structure, how electrons are arranged around the nucleus

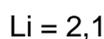
A periodic table can give you the proton / atomic number of an element, this also tells you how many electrons are in the atom. You will have used the rule of electrons shell filling, where:

The first shell holds up to 2 electrons, the second up to 8, the third up to 8 and the fourth up to 18 (or you may have been told 8).

So, for Lithium...



Atomic number =3, electrons = 3, arrangement 2 in the first shell and 1 in the second or



At A level you will learn that the electron structure is more complex than this and can be used to explain a lot of the chemical properties of elements.

The 'shells' can be broken down into 'orbitals', which are given letters: 's' orbitals, 'p' orbitals and 'd' orbitals.

You can read about orbitals here:

<http://www.chemguide.co.uk/atoms/properties/atomorbs.html#top>

Now that you are familiar with s, p and d orbitals try these problems, write your answer in the format:

1s<sup>2</sup>, 2s<sup>2</sup>, 2p<sup>6</sup> etc.

Q1.1 Write out the electron configuration of:

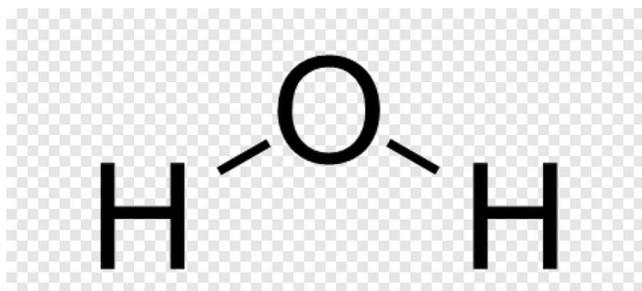
a) Ca   b) Al   c) S   d) Cl   e) Ar   f) Fe   g) V   h) Ni   i) Cu   j) Zn   k) As

Q1.2 Extension question, can you write out the electron arrangement of the following ions: a) K<sup>+</sup>

b) O<sup>2-</sup>   c) Zn<sup>2+</sup>   d) V<sup>5+</sup>   e) Co<sup>2+</sup>

## Topic 2 – The shapes of molecules and bonding.

Have you ever wondered why your teacher drew a water molecule like this?



The lines represent a covalent bond, but why draw them at an unusual angle? If you are unsure about covalent bonding, read about it here: <http://www.chemguide.co.uk/atoms/bonding/covalent.html#top>

At A level you are also expected to know how molecules have certain shapes and why they are the shape they are. You can read about shapes of molecules here:

<http://www.chemguide.co.uk/atoms/bonding/shapes.html#top>

Q2.1 Draw a dot and cross diagram to show the bonding in a molecule of aluminium chloride ( $\text{AlCl}_3$ )

Q2.2 Draw a dot and cross diagram to show the bonding in a molecule of ammonia ( $\text{NH}_3$ ) Q2.3

What is the shape and the bond angles in a molecule of methane ( $\text{CH}_4$ )?

## Topic 3 – Chemical equations

Balancing chemical equations is the stepping stone to using equations to calculate masses in chemistry.

There are loads of websites that give ways of balancing equations and lots of exercises in balancing. Some of the equations to balance may involve strange chemicals, don't worry about that, the key idea is to get balancing right.

<http://www.sciencegeek.net/Chemistry/taters/EquationBalancing.htm>



## Answers:

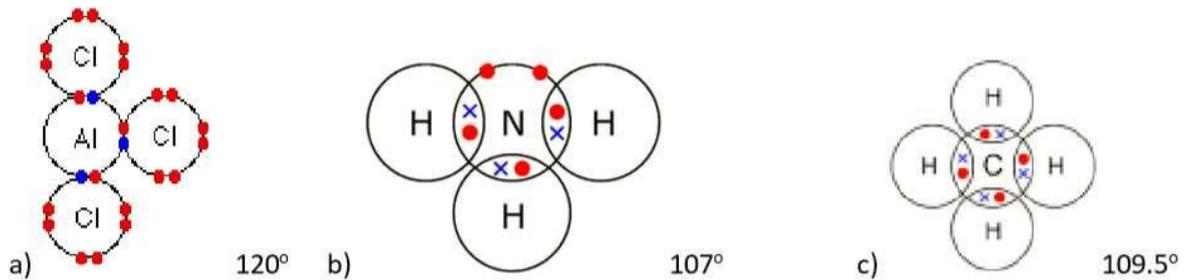
Mark your work using green pen.

### Topic 1:

- Q1.1a)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$     b)  $1s^2 2s^2 2p^6 3s^2 3p^1$     c)  $1s^2 2s^2 2p^6 3s^2 3p^4$     d)  $1s^2 2s^2 2p^6 3s^2 3p^5$   
e)  $1s^2 2s^2 2p^6 3s^2 3p^6$     f)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2$     g)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$   
h)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$     i)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$     j)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$   
k)  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^3$

- Q1.2a)  $1s^2 2s^2 2p^6 3s^2 3p^6$     b)  $1s^2 2s^2 2p^6 3s^2 3p^6$     c)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$   
d)  $1s^2 2s^2 2p^6 3s^2 3p^6$     e)  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$

### Topic 2:



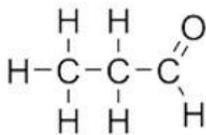
### Topic 4:

Q4.1 1-chlorobutane

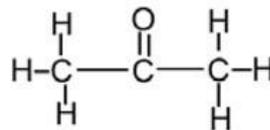
Q4.2 react ethene with water vapour at high temperature and pressure with a phosphoric acid catalyst

Q4.3

propanal



propanone



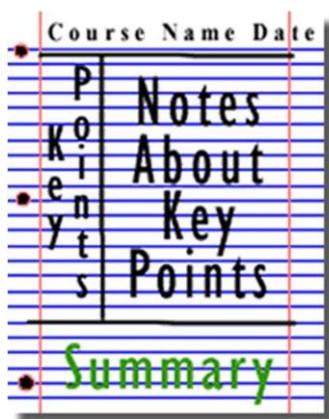
The carbon atom joined to oxygen in propanal has a hydrogen attached to it, it does not in propanone.

## Optional Extra – Independent Research

### Research activities

Use your online searching abilities to find out as much about the topic below as you can. Remember if you are a prospective A level chemist; you should aim to push your knowledge. Make a 1-page summary for each one you research using Cornell notes:

<http://coe.jmu.edu/learningtoolbox/cornellnotes.html>



Task 1: The chemistry of fireworks

What are the component parts of fireworks? What chemical compounds cause fireworks to explode? What chemical compounds are responsible for the colour of fireworks?

Task 2: Why is copper sulphate blue?

Copper compounds like many of the transition metal compounds have got vivid and distinctive colours – but why?

Task 3: Aspirin

What was the history of the discovery of aspirin, how do we manufacture aspirin in a modern chemical process?

Task 4: The hole in the ozone layer

Why did we get a hole in the ozone layer? What chemicals were responsible for it? Why were we producing so many of these chemicals? What is the chemistry behind the ozone destruction?

Task 5: ITO and the future of touch screen devices

ITO – indium tin oxide is the main component of touch screen in phones and tablets. The element indium is a rare element and we are rapidly running out of it. Chemists are desperately trying to find a more readily available replacement for it. What advances have chemists made in finding a replacement for it?

## Practice Exam – Style Questions:

Q1.

This question is about sodium sulfide.

(a) Complete the electronic configuration of sulfur.

1s<sup>2</sup> 2s<sup>2</sup>

(1)

(b) Sulfur reacts with sodium to form the compound sodium sulfide, Na<sub>2</sub>S.

(i) Draw a dot-and-cross diagram for sodium sulfide ; only the outer electrons need be shown. Include the charges present.

(2)

(ii) Which statement about the electrical conductivity of sodium sulfide is correct?

(1)

- A it conducts when solid and liquid
- B it conducts when solid but not when liquid
- C it conducts when liquid but not when solid
- D it does not conduct when solid or liquid

(iii) The melting temperature of sodium sulfide is higher than that of sodium chloride, even though both contain ionic bonding.

Explain this difference in melting temperature.

(2)

.....

.....

.....

.....

.....

.....

.....

Q2.

Which of the following species contains the same number of electrons as neutrons?

- A  $^{11}_5\text{B}$
- B  $^{23}_{11}\text{Na}^+$
- C  $^{24}_{12}\text{Mg}^{2+}$
- D  $^{19}_9\text{F}^-$

(Total for question = 1 mark)

Q3.

Sodium and chlorine react together to produce sodium chloride. The bonding in the product is different from that in both of the reactants. Evidence for the type of bonding present can be obtained in a number of different ways.

Sodium chloride is ionically bonded. What is meant by the term **ionic bond**?

(1)

.....

.....

.....

Q4. A particle with a **single** positive charge and with the electronic configuration  $1s^2 2s^2 2p^6$  is

- A a sodium ion.
- B a fluoride ion.
- C an oxide ion.
- D a potassium ion.

(Total for question = 1 mark)

Q5. Which one of the following elements undergoes the change in electronic configuration shown when it forms the stated ion?

Atom  $1s^2 2s^2 2p^6 3s^2 3p^3$       Ion  $1s^2 2s^2 2p^6 3s^2 3p^6$

- A B to  $\text{B}^{3+}$
- B Al to  $\text{Al}^{3+}$
- C N to  $\text{N}^{3-}$
- D P to  $\text{P}^{3-}$

(Total for question = 1 mark)