ETONBURY ACADEMY

A Level Chemistry

Summer Bridging Work

A-level Chemistry

Chemistry is a 'link' science which connects concepts across sciences such as Biology and Physics and can open the door to a range of careers, such as drug discovery, forensic toxicologist and environmental analyst. With ever enhancing technologies and analytical techniques, Chemistry is a science which allows questions to be answered such as how a reaction starts and finishes and how we can make changes to benefit ourselves in the future.

The skills developed in Chemistry are applicable in a range of careers, including planning and conducting experiments, collecting and analysing a range of quantitative and qualitative data and assessing risks.

Studying Chemistry after your GCSEs really develops your practical and mathematical skills. If you enjoy doing experiments in the lab, then you are going to love it!

Subject content for the course can be found here:
https://www.ocr.org.uk/qualifications/as-and-a-level/chemistry-a-h032-h432-from-2015/specification-at-a-glance/

Course prerequisite
In order to ensure you have the required work ethos necessary to succeed on the A-level chemistry course, you must complete the tasks below and bring your completed answers to the first chemistry lesson in September.

Before starting in September, you should read an article about chemistry or a popular science book and come ready to discuss this in your first lesson.

Below you will find a vast list of books, magazines, journals and websites that would be great for expanding your knowledge of chemistry.

Books

- Richard Feynman: The Pleasure of Finding Things Out
- Hugh Aldersey-Williams: Periodic Tales
- Sam Kean: The Disappearing Spoon
- Oliver Sachs: Uncle Tungsten
- John Emsley: The Shocking History of Phosphorus: A Biography of the Devil's Element
- David Follows: Essential Pre-University Physical Chemistry

Magazine/Journals

- Scientific American
- New Scientist
- The Mole

Places of Interest

- Royal Society of Chemistry - Burlington Arcade, Regents Street London
- Science Museum, London
- Museum of the HIstory of Science, Oxford
- Curie Museum, Paris

Websites

- http://www.periodicvideos.com/ - Periodic Table of Videos by Martyn Poliakoff
- www.rsc.org.uk - Royal Society of Chemistry
- www.icheme.org - Institution of Chemical Engineers
- https://www.sciencefocus.com/ BBC Science focus

Task 1 – About the A-level course

Go to the exam board website and find out about the course you will be studying (I recommend the 'specification at a glance' page.)

1. What are the different modules in the course?

2. Looking at the content overview of each module, which topics are you most excited to learn about?

3. Which topics are you most nervous about?

4. How many exams will you sit at the end of year 13, and what percentage is each worth?

5. How is practical work assessed?

Task 2: Balancing Equations

Balance the following equations:

1. ____ Fe + ____ H_2S0_4 $\longrightarrow$ ____ $Fe_2(SO_4)_3$ + ____ H_2

2. ____ C_2H_6 + ____ O_2 $\longrightarrow$ ____ H_2O + ____ CO_2

3. ____ KOH + ____ H_3PO_4 $\longrightarrow$ ____ K_3PO_4 + ____ H_2O

4. ____ SnO_2 + ____ H_2 $\longrightarrow$ ____ Sn + ____ H_2O

5. ____ NH_3 + ____ O_2 $\longrightarrow$ ____ NO + ____ H_2O

6. ____ KNO_3 + ____ H_2CO_3 $\longrightarrow$ ____ K_2CO_3 + ____ HNO_3

7. ____ B_2Br_6 + ____ HNO_3 $\longrightarrow$ ____ $B(NO_3)_3$ + ____ HBr

8. ____ BF_3 + ____ Li_2SO_3 $\longrightarrow$ ____ $B_2(SO_3)_3$ + ____ LiF

9. ____ $(NH_4)_3PO_4$ + ____ $Pb(NO_3)_4$ $\longrightarrow$ ____ $Pb_3(PO_4)_4$ + ____ NH_4NO_3

10. ____ $SeCl_6$ + ____ O_2 $\longrightarrow$ ____ SeO_2 + ____ Cl_2

Task 3: Calculating Moles

1. Calculate the moles, mass or molar mass for the questions in the table below:

Calculate the number of moles present in:	**Calculate the mass of:**	**Calculate the molar mass of the following substances:**
a) 2.3 g of Na	a) 0.05 moles of Cl_2	a) 0.015 moles, 0.42 g
b) 2.5 g of O_2	b) 0.125 moles of KBr	b) 0.0125 moles, 0.50 g

2. Calculate the moles or concentration for the questions in the table below:

Calculate the number of moles present in each of the following solutions:	**Calculate the concentration of the following solutions:**
a) 25 cm^3 of 0.1 mol dm^{-3} HCl	a) 0.05 moles of HCl in 20 cm^3
b) 40 cm^3 of 0.2 mol dm^{-3} HNO_3	b) 0.01 moles of NaOH in 25 cm^3
c) 10 cm^3 of 1.5 mol dm^{-3} NaCl	c) 0.002 moles of H_2SO_4 in 16.5 cm^3

3. Calculate the moles, volume or mass for the questions in the table below:

Calculate the number of moles present in:	**Calculate the volume of gas occupied by:**
a) 48 dm^3 of O_2	a) 0.05 moles of Cl_2
b) 1.2 dm^3 of CO_2	b) 0.25 moles of CO_2
c) 200 cm^3 of N_2	c) 28g of N_2

4. What mass of hydrogen is produced when 192g of magnesium is reacted with hydrochloric acid?

$$Mg + 2\,HCl \rightarrow MgCl_2 + H_2$$

5. What volume of hydrogen is produced when 195 g of potassium is added to water?

$$2\,K + 2\,H_2O \rightarrow 2\,KOH + H_2$$

6. What mass of calcium carbonate is required to produce 1.2 dm^3 of carbon dioxide?

$$CaCO_3 \rightarrow CaO + CO_2$$

7. The pollutant sulphur dioxide can be removed from the air by reaction with calcium carbonate in the presence of oxygen. What mass of calcium carbonate is needed to remove 480 dm^3 of sulphur dioxide?

$$2\,CaCO_3 + 2\,SO_2 + O_2 \rightarrow 2\,CaSO_4 + 2\,CO_2$$

8. 25 cm^3 of a solution of sodium hydroxide reacts with 15 cm^3 of 0.1 mol/dm^3 HCl. What is the molar concentration of the sodium hydroxide solution?

$$HCl + NaOH \rightarrow NaCl + H_2O$$

Task 4: Structure and Bonding

Predict the bonding type for the substances below and draw the dot cross diagram:

a) NaCl

b) $MgCl_2$

c) Na_2O

d) Cl_2

e) NH_3

f) CH_4

g) CO_2

h) H_2O

Describe the bonding in the following compounds and briefly describe their main physical properties (including melting/boiling point and electrical conductivity).

a) magnesium

b) diamond

c) silicon dioxide

d) magnesium oxide

e) carbon dioxide

f) graphite

g) sodium nitrate

h) water

i) helium