



Task 1 - Independent research

Your task is to use your current knowledge from GCSE and carry out more research to create and present a learning resource about ONE topic from the list below:

1. **The history of the structure of the atom** (*hints: Greek atom, John Dalton, Joseph John (JJ) Thomson, Ernest Rutherford, Neils Bohr, James Chadwick, Today's Atomic structure*)
2. **The history of the arrangement of the periodic table** (*hints: Ancient Greeks, Berzelius, DÖbereiner 'triads', De Chancourtois, Meyer, Newland's octaves, Mendeleev, Ramsay, Today's periodic table and trends*)
3. **Analytical techniques: Paper chromatography, Gas chromatography, Mass spectrometry and Infrared spectroscopy** (*hints: What can these techniques do? How do they work? Can they be used together? How can Scientists interpret data given? (spectra) How are these techniques useful today? Relevant Advantages/ disadvantages of each technique? use ful websites: BBC Bitesize, Chemguide and Chemwiki*)

You should display your work neatly and include as much relevant scientific detail as possible. Try to be as creative as possible...you want to impress us on your first day! 😊

Ideas to help you are:

Comic strip, stop motion animation, PowerPoint, song, poem, creative story, film, spoof documentary (think David Attenborough in the Amazon!), a role play, a photo story with music, words and voiceover, news report/ interviews etc

Your project **MUST** be ready to present to the rest of the class on the FIRST Chemistry lesson of Year 12.

It should be 5-10 minutes long.



Task 2-Fundamental Chemistry skills



During the first year of A level Chemistry, we build on the knowledge that you learnt at GCSE level. Therefore it is important that you already know the basics in order to understand more advanced work. Answer the following questions to recap GCSE work:

1. The structure of the Atom

- Draw the structure of an atom?
- What is the relative charge and mass of each sub-atomic particle?
- What is the difference between Atomic Number and Mass Number?
- What are Isotopes?
- Why is the Relative Atomic Mass for chlorine not a whole number?
- How do you calculate Relative Formula Mass? Give a specific example.
- What a mole?
- What equations links the number of moles; mass of a substance; and Relative Atomic Mass?
- How are electrons arranged in an atom?

2. Chemical Bonds: Ionic and Covalent Structures

- What is ionic bonding?
- How are ionic compounds formed? Draw a diagram of a specific example.
- What are the physical properties of ionic structures?
- What is covalent bonding?
- How are covalent compounds formed? Draw a diagram of a specific example.
- What are the physical properties of simple covalent and giant covalent structures?
- What are Groups and Periods in the Periodic Table?

3. Hydrocarbon Molecules

- What is a hydrocarbon?
- What is fractional distillation?
- What happens with the combustion of hydrocarbons?
- What are alkanes? Draw and name a specific example.
- What are alkenes? Draw and name a specific example.
- What is polymerisation?
- What is cracking?

4. Rates of Reaction

- a. What is meant by Rate of Reaction?
- b. How can we measure the rate of a reaction?
- c. What 5 factors affect the rate of a reaction?

5. Reversible Reactions

- a. What is a reversible reaction?
- b. What is equilibrium?
- c. What is meant by yield, and what factors can change the yield in a reversible reaction?

6. Symbol Equations

- a. How do you balance a chemical equation? Give a tricky example!

7. Calculating Formulae

- a. What is the difference between empirical formula and molecular formula?
- b. How do you calculate empirical formulae?

8. Reactivity and The Periodic Table

- a. How are elements arranged in the periodic table?
- b. What are the main trends in reactivity and properties in the Period Table?

9. Chemical Reactions

- a. What is Addition?
- b. What is Dehydration?
- c. What is Displacement?
- d. What is Disproportionation?
- e. What is Addition?
- f. What is Hydrogenation?
- g. What is Neutralisation?
- h. What is Oxidation?
- i. What is Reduction?
- j. What is REDOX?
- k. What is Precipitation?
- l. What is Substitution?
- m. What is Thermal Decomposition?

10. Energy and Chemistry

- a. What is an exothermic reaction?
- b. What is an endothermic reaction?
- c. How do they relate to breaking & making bonds?



Task 3-Key definitions



During A level Chemistry you will be required to recall some key definitions. These must be learnt word for word for you to gain marks in your exams. Over the summer, learn the definitions for the following words:

1. **Relative isotopic mass** = the mass of an isotope compared with one-twelfth of the mass of an atom of carbon-12.
2. **Relative atomic mass, A_r** = The weighted mean mass of an atom of an element compared with one-twelfth of the mass of an atom of carbon-12.
3. **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. **Standard enthalpy change of formation**= the enthalpy change that takes place when one mole of a compound is formed from its elements under standard conditions, with all reactants and products in their standard states.
5. **Standard enthalpy change of combustion**= the enthalpy change that takes place when one mole of a substance reacts completely with oxygen under standard conditions, with all reactants and products in their standard states.
6. **Enthalpy change of neutralisation**= the energy change that accompanies the reaction of an acid by a base to form one mole of $H_2O(l)$, under standard conditions, with all reactants and products in their standard states.
7. **Standard conditions are 100kPa and 298K**
8. **Homologous series**= a series of organic compounds with the same functional group but each successive member differing by CH_2
9. **Electrophile**= an electron pair acceptor
10. **Nucleophile**= an electron pair donor

Don't worry too much about understanding these terms. You will be taught about them throughout the course but be prepared to be tested on the definitions at the start of your course (and throughout!) This is also a good opportunity to find out what revision techniques work best for you. 😊

Strategies to help you:

Flashcards, re-writing the definition out and checking each time, asking a relative/ friend to help you, making a poster and reading it every day, mind maps etc



Task 4-Mathematical skills



Throughout A level Chemistry you will meet several topics that require good mathematical skills. A lot of these skills you have already done at GCSE level! Over the summer, make sure you familiarise yourself with the following skills:

Unit conversions	Calculate mean average
Decimal places	Percentage error
Significant figures	Calculate enthalpy change
Standard form	Plot graphs
Percentage yield	Draw line of best fit
Atom economy	Calculate gradient
Balance equations (ratios)	Carry out mole calculations.

This is not a complete list of skills required for A level Chemistry, however we feel that most of the skills listed above have been met at GCSE level and you will have a big advantage if you revise them over the summer. There will be some opportunities to have help with these during the course but be prepared to be tested on these skills at the start of the course in September.

Additional notes to help you:

Please see the practical and mathematical skills guide for worked examples and practice questions



Task 5-Development of practical skills



Chemistry is a practical subject and having good practical skills is fundamental to understanding the nature of chemistry. During the course you will be given plenty of opportunities to develop your planning skills, practical skills and collect and analyse data.

As you will be starting the new A level Chemistry specification, throughout the course you will be expected to keep a record of most practical work carried out in lessons. These practical assignments must be written to a high standard and kept neat and in a logical order. These will count towards your Practical Endorsement certificate. Skills in planning, implementing, analysing and evaluating, will also be assessed in the written exams.

You must make sure that you familiarise yourself with the following skills:

1. Identifying variables
2. Choosing the correct equipment
3. Writing a risk assessment
4. Writing a method
5. Following written instructions
6. Use a range of equipment and materials safely and correctly
7. Keep appropriate records of experiments
8. Make and record observations/ measurements
9. Present information and data in a scientific way
10. Carry out any relevant calculations

Additional notes to help you:

Please see the practical and mathematical skills guide for worked examples and practice questions