



Hardenhuish School

'A High Performing Specialist Academy'



A Level Chemistry Introduction and Induction Tasks

Introduction: Welcome to A Level Chemistry! The Chemistry department consists of Dr Ovens (Curriculum Leader for Chemistry) and Mr Wiggall, you will probably either know us already or have met one or both of us at your sixth form induction day. Enjoy your holidays and we look forward to seeing you in a few weeks!

At Hardenhuish School we study OCR Chemistry B (Salters). You can find more information from their website here: <http://www.ocr.org.uk/qualifications/as-a-level-gce-chemistry-b-salters-h033-h433-from-2015/>

The first module that we study in A Level Chemistry includes the following topics:

<ul style="list-style-type: none">○ Atomic structure, atomic spectra and electron configurations○ Fusion reactions○ Mass spectroscopy and isotopes○ The periodic table and Group 2 chemistry	<ul style="list-style-type: none">○ Bonding and the shapes of molecules○ Chemical equations and amount of substance (moles)○ Ions: formulae, charge density, tests○ Titrations and titration calculations
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Induction Task: What we learn at A-Level builds on what you have learned already at GCSE. To be prepared for September, your induction task looks at some key areas that we have identified from GCSE:

- 1) Writing equations (of various types) that are linked to the GCSE course.
- 2) Calculations linked to the masses of solids, concentration of solutions and volumes of gases.
- 3) Writing a typed report (up to 2 sides of A4) concerning the use of chemistry and specific chemicals in a particular context.
- 4) *For students who completed the GCSE Combined Science course.* To review the GCSE Separate Chemistry topics which you did not cover at GCSE (received on Year 12 Induction day) . Use online sources and revision guides to review the topics and complete a RAG (Red, Amber, Green) rating of the specification statements in order for teachers to provide some focused support in September.

Deadline: All tasks to be handed in to your teacher during your first week in September

Expected time commitment: 3 to 4 hours

Queries: If you have any queries about the tasks please contact Dr Ovens by emailing aco@hardenhuish.wilts.sch.uk

Task 1: Writing equations (of various types) that are linked to the GCSE course.

For each of these descriptions write:

- (i) The word equation
- (ii) The balanced equations (with state symbols)
- a) Sodium reacts with water to form sodium hydroxide and hydrogen gas
- b) Calcium carbonate forms bubbles when it reacts with hydrochloric acid
- c) Copper oxide reacts with sulfuric acid to form a blue solution

For each of these descriptions write:

- (i) The overall balanced equation (with state symbols)
- (ii) The half-equations
- d) Chlorine reacting with bromide ions (all in solution)
- e) Zinc metal reacting with a solution of copper (II) ions
- f) Iron metal reacting with oxygen to form iron (III) oxide

Task 2: Calculations linked to the masses of solids, concentration of solutions and volumes of gases

Part 1 - For these examples calculate the number of moles present in the sample
(1 mole of a gas occupies 24 dm³ at room temperature and pressure)

- a) 10 g of sodium hydroxide, NaOH
- b) 1.6 g of methane, CH₄
- c) 20 g of hydrogen
- d) 18 g of glucose
- e) 25 cm³ of 0.5 mol dm⁻³ ammonium hydroxide solution
- f) 5 cm³ of 0.002 mol dm⁻³ bromine solution
- g) 100 cm³ of 9.8 g dm⁻³ sulfuric acid in solution
- h) 250 cm³ of 26.5 mol dm⁻³ sodium carbonate solution
- i) 2 dm³ of argon gas
- j) 36 dm³ of octane

Part 2 - For these examples calculate the mass of the specified chemical present in the sample

(1 mole of a gas occupies 24 dm³ at room temperature and pressure)

- a) 3 moles of ethane
- b) 1.5 moles of lithium hydroxide
- c) 0.01 moles of iron (II) sulfate
- d) 10 cm³ of 1.2 gdm⁻³ sucrose in solution
- e) 25 cm³ of 40 gdm⁻³ sodium thiosulfate solution
- f) 100 cm³ of 0.1 moldm⁻³ sulfuric acid
- g) 50 cm³ of 0.5 moldm⁻³ copper (II) sulfate solution
- h) 4 dm³ of helium gas
- i) 48 dm³ of propene

Task 3:

Writing a typed report (up to 2 sides of A4) concerning the use of chemistry and specific chemicals in a particular context.

Your report should be on one of the following topics (we will be looking at some of these further in year 12). You should provide information about the books and online resources you use for writing the report.

Option 1 - Hydrocarbon fuels

Our hydrocarbon fuels are overwhelmingly obtained from crude oil which is processed by fractional distillation and cracking. Explain how these processes occur and the use of their products in at least two of the following examples:

- Fuels for vehicles
- For making polymers
- In forming the chemical feedstocks used for other reactions (e.g. ethanol)

Option 2 - Obtaining and using metals

The properties of metals and alloys can vary massively and lead to a wide range of applications in the world around us. Methods used to obtain these metals depend on their reactivity and their applications depend on the bonding within the metal. Explain at least one method used to extract metals and one application of them from the lists below.

Methods of extraction:

- Reduction of metal oxides using carbon
- Displacement reactions (e.g. scrap iron and copper solutions from mines)
- Electrolysis

Applications:

- Forming alloys (e.g. different types of steel)
- Use in catalytic converters