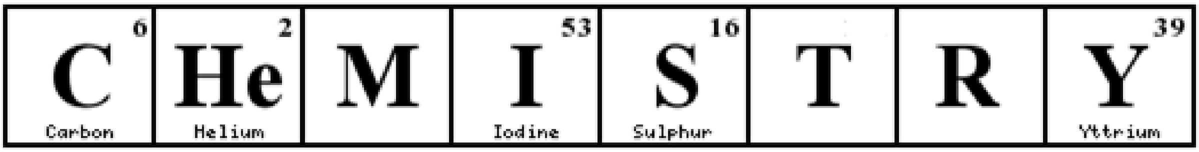
NONSUCH HIGH SCHOOL FOR GIRLS



Bridging Work 2026

The aims of this Bridging work are:

Objective 1: *To review key terminology that will support you accessing A-level Chemistry vocabulary in the first half-term.*

Objective 2: *To practise calculations that you will have covered in GCSE, that will give you a solid foundation for the deeper application in A-level Chemistry.*

Objective 3: *To introduce wider reading and associated skills*

This work has three parts:

1. **Literacy activity** – identifying key terminology from the first A-level module that is taught – Module 2: Foundations in chemistry
2. **Practise calculations** from GCSE Chemistry
3. A Chemistry **wider reading task**

There will be assistance in our Chemistry Drop-In sessions on the first two weeks of the new term. These will be held in S9 on Tuesday and Thursday lunchtimes – all are welcome.

Further reading and advice can be found in our 6th Form Chemistry Handbook.

We look forward to meeting you in September.

1. Literacy activity

Part 1: Fill in the Blanks

1. The **atomic number** of an element is the number of _________ in the nucleus.
2. The **mass number** is the total number of _________ and _________ in an atom.
3. Atoms of the same element that have different numbers of neutrons are called __________.
4. The **relative atomic mass** compares the average mass of an atom to __________ of the mass of a carbon-12 atom.
5. The **m/z** value in mass spectrometry stands for __________.

Part 2: Multiple Choice

6. Which of the following releases H^+ ions in solution?

   a) Alkali
   b) Acid
   c) Neutral substance
   d) Salt

7. A strong acid is one that:

   a) Partially dissociates in solution
   b) Fully dissociates in solution
   c) Does not dissociate at all
   d) Releases OH^- ions

8. What is the role of a reducing agent?

   a) Electron pair acceptor
   b) Electron pair donor
   c) Proton donor
   d) Proton acceptor

Part 3: Matching

Match the term in Column A to the correct definition in Column B.

Column A
9. Orbital
10. Neutralisation
11. Standard solution
12. Ionic bond
13. Covalent bond

Column B
a) Reaction of H^+ and OH^- ions to form water
b) A solution with an exact known concentration
c) Region in an atom that can hold 2 electrons with opposite spins
d) Electrostatic attraction between positive and negative ions
e) Electrostatic attraction between a shared pair of electrons and the bonded atoms

Part 4: Short Answer

14. Explain what is meant by **electronegativity**.

____

____

15. Describe the difference between a **strong acid** and a **weak acid** in terms of dissociation.

____

____

16. What does **Avogadro's number** represent?

____

____

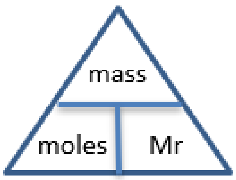
2. Practise calculations

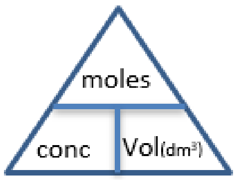
The answers are provided so that you can identify areas to review. You must show your workings, to gain marks. You may need to use some lined paper and a calculator.

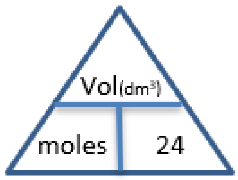
Write the formulae for the following ionic compounds.

1 Sodium bromide
2 Magnesium sulphate
3 Potassium carbonate
4 Ammonium sulphide
5 Calcium nitrate
6 Iron(III) hydroxide
7 Iron(II) sulphate
8 Copper(II) carbonate
9 Aluminium sulphate
10 Calcium hydroxide

The following calculations can be completed using the knowledge you have from GCSE. You may find the equations below helpful:







$1dm^3 = 1000cm^3$

Basic calculations involving formulae and equations

11 What is the mass of 4 moles of sodium chloride?
12 How many moles is 37g of calcium hydroxide?
13 What is the mass of 0.125 moles of copper(II) oxide?
14 0.1 moles of a substance weighs 4g. What is the mass of 1 mole?

Using the Avogadro Constant 6×10^{23}

15 How many water molecules, H_2O, are there in 1 drop of water? Assume 1 drop of water is $0.05cm^3$, and that the density of water is $1gcm^{-3}$

16 Which of the following contains the greatest number of stated particles?
   a. molecules of hydrogen in 1g of hydrogen gas, H_2
   b. atoms of helium in 1g of helium gas, He
   c. atoms of beryllium in 1g of beryllium, Be

Using moles to find formula

17 1.24g of phosphorus was burnt completely in oxygen to give 2.874g of phosphorus oxide. Find a) the empirical formula of the oxide and b) the molecular formula given that 1 mole of the oxide weighs 284g.

18 An organic compound contained 66.7% C, 11.1% H, 22.2% O by mass. Its relative formula mass was 72. Find a) the empirical formula of the compound, and b) the molecular formula of the compound.

Calculations from equations

19 Titanium is manufactured by heating titanium(IV) chloride with sodium

$TiCl_4 + 4Na \rightarrow Ti + 4NaCl$

What mass of sodium is required to produce 1 tonne of titanium?

20 2.67g of aluminium chloride was dissolved in water and an excess of silver nitrate solution was added to give a precipitate of silver chloride.

$AlCl_{3(aq)} + 3AgNO_{3(aq)} \rightarrow Al(NO_3)_{3(aq)} + 3AgCl_{(s)}$

What mass of silver chloride precipitate would be formed?

Calculations involving gases

21 Hydrogen and oxygen react according to the equation:

$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$

What volume of air is needed for the complete combustion of 500cm^3 of hydrogen? (take care – air is only about 20% oxygen, so you'll need 5 times more air than you will oxygen).

22 What volume of carbon dioxide is produced by the complete combustion of 1dm^3 of butane, C_4H_{10}?

$2C_4H_{10(g)} + 13O_{2(g)} \rightarrow 8CO_{2(g)} + 10H_20_{(l)}$

23 1 mole of any gas occupies 24.0dm^3 at rtp.

a Calculate the mass of 200cm^3 of chlorine gas, Cl_2, at rtp.

b Calculate the volume occupied by 0.16g of oxygen, O_2, at rtp

c If a gas has a density of 1.42gdm^{-3} at rtp, calculate the mass of 1 mole of the gas

Calculations involving solutions

24 Some dilute sulphuric acid, H_2SO_4, had a concentration of 4.90gdm^{-3}. What is its concentration in moldm^{-3}?

25 What is the concentration in gdm^{-3} of some potassium hydroxide, KOH, solution with a concentration of 0.200moldm^{-3}?

ANSWERS

Basic calculations involving formulae and equations

11 234g
12 0.5 moles
13 10g
14 40g

Using the Avogadro Constant 6 x 10^{23}

15 1.67 x 10^{21}
16 Which of the following contains the greatest number of stated particles?
- a. 0.5 moles
- b. 0.25 moles
- c. 0.11moles

Using moles to find formula

17 P_2O_5, molecular formula is P_4O_{10}
18 C_4H_8O, molecular formula is the same

Calculations from equations

19 1.92 tonnes
20 8.60g

Calculations involving gases

21 1250cm^3
22 4dm^3
23 1 mole of any gas occupies 24.0dm^3 at rtp.
- a. 0.592g
- b. 0.12dm^3
- c. 34.1g

Calculations involving solutions

24 0.05moldm$^-$3
25 11.2gdm^{-3}

Now highlight areas to review – then complete your review over the summer.

Area of syllabus	Review	Completed
Formula of ionic compounds		
Basic calculations involving formulae and equations		
Using the Avogadro Constant 6 x 10^{23}		
Using moles to find formula		
Calculations from equations		
Calculations involving gases		
Calculations involving solutions		

3. Wider Reading Task

Read the chemistry article and answer the following questions.

More than 20 organic compounds found on Mars – many for the first time

BY REBECCA TRAGER21 APRIL 2026

An international team of researchers has identified more than 20 organic molecules in clay-bearing sandstones on Mars that are about 3.5 billion years old. The compounds discovered include benzothiophene – a known component of meteoritic macromolecular carbon that represents the largest confirmed underivatised aromatic molecule to be identified as indigenous to the Red Planet. The ester methyl benzoate was also detected, along with naphthalene, as well as single and dicyclic aromatic molecules. Finding these substances on Mars, including several widely considered building blocks for the origin of life on Earth, suggests that prebiotic chemistry could have existed there once.

Source: © NASA/JPL-Caltech/MSSS

Nasa's Curiosity Mars rover took this selfie at a location named Mary Anning after the 19th century British palaeontologist. This was the site of the chemical experiment uncovering diverse organic molecules on Mars, which scientists believe was a site where ancient conditions would have been favorable to supporting life, if it was ever present

The Curiosity rover detected aromatic and cyclic molecules with methyl and ester/carboxylic acid functional groups, and sulfur-, oxygen-, and nitrogen-bearing organics, including the first discovery of a possible *N*-heterocycle on Mars. The rover identified these organic molecules using its suite of on-bo

These complex chemicals could have been generated geologically or biologically on Mars, or they could have been formed on meteorites and been delivered to the planet, Williams explains. 'The story our findings tell is that there is complex organic carbon preserved in the very near subsurface of Mars, where we thought radiation would have destroyed all of that,' she says. 'The organics that rained down on Mars might have been present very early on in Mars's history, even at the time when life was originating on Earth.'

Janice Bishop, a chemist and planetary scientist with the SETI Institute who was not involved in this research, is enthusiastic about its findings. 'Detection of a variety of complex organics on Mars is really exciting because it implies the presence of molecules that could be important for prebiotic chemistry or life,' she states. 'Observation of *N*-complexes is important because these can lead to formation of nucleic acids and amino acids, which are the building blocks of life as we know it on Earth,' Bishop adds.

These promising results come as space future missions are planned that will search for organic compounds. The European Space Agency's Rosalind Franklin mission to Mars, which is expected to land on Mars in November 2030, has a newer, more powerful mass spectrometer than Curiosity and there are plans to drill much deeper into the subsurface of the planet. 'That gives you a whole different suite of organics you can search for that probably aren't destroyed by radiation,' Williams says.

Nasa's Dragonfly expedition to Saturn's moon Titan is slated to touchdown in 2034 and will also be searching for prebiotic chemistry there. 'Even though we're not searching for life on Titan, it is a world that is dominated by organic molecules,' Williams explains. She is not currently on either of those two missions but hopes to get involved closer to their launches.

Mars is special because it provides a window into an ancient era that is no longer recorded on Earth, Williams says. 'You are starting to see the things that were maybe raining down on the planet that were the feedstock for prebiotic chemistry and life as we know it,' she says. 'And you're getting to see that paused in time in the rocks on Mars.' On Earth, those rocks have largely been recycled due to plate tectonics, Williams explains, and those that still exist are heavily metamorphosed.

Nevertheless, Williams is clear that while her team has found the building blocks of life on Mars she cannot say whether they derive from past life. To provide this clarity, multiple lines of evidence must come together to support such an interpretation. 'Sample return from Mars would enable us to investigate these samples in a far more robust way … and perhaps we could detect those more complex molecules if they existed because we have cutting-edge instruments on Earth,' Williams states.

In the meantime, she suggests that scientists could look for large, complex molecules on other planets that could not possibly form abiotically, including hopanoids, a class of terpenoid, and sterols. 'It makes sense that if there were life on Mars potentially its biochemistry would be similar, if not the same, to terrestrial life,' Williams says. 'But we only have one data point.'

'This discovery clearly demonstrates that sedimentary rocks on Mars really do preserve a record of the organic inventory of surface environments from billions of years ago,' says Briony Horgan, a planetary science professor at Purdue University, US. 'The diversity of organics detected in these very careful experiments suggest that Mars hosted complex organic compositions.' She notes that other experiments published by the Curiosity rover science team also demonstrate that these organics cannot be solely attributed to input from interplanetary dust particles, which has been the go-to explanation for a long time. With the addition of more recent findings of potential biosignatures in

Jezero crater sediments by the Perseverance rover on Mars, Horgan says this is ‘a really exciting combination of results’.

Update: Comment from Briony Horgan was added on 23rd April 2026.

References

A Williams *et al*, *Nat. Commun.*, 2026, DOI: 10.1038/s41467-026-70656-0

Chemistry Topic:	
Title of Article:	
Source:	**Date of Publication:**
Chemistry strand: Organic/inorganic/physical?	
Summary of Article: 1. *Read the text* 2. *Break it down into sections* 3. *Identify the key points in each section* 4. *Write the summary* 5. *Check the summary against the article*	

In your opinion, what are the 3 most important pieces of information you gathered from the article?	
1	
2	
3	

The article refers to the ester methyl benzoate. Draw three different structures of methyl benzoate.		
Molecular structure	Structural formula	Displayed formula

Specification Links		
How does this article link to what you studied at GCSE? *(Be clear and specific)*		
What key words have been used in this article? Select 5 key words and complete their definitions below.		
Keyword:		**Definition:**
1		
2		
3		
4		

5		

Date Completed:

Feedback from your teachers:

✅ Core Task Check

Literacy: ☐ Incomplete ☐ Complete ☐ Accurate
Calculations: ☐ Incomplete ☐ Complete ☐ Correct ☐ Working shown ☐ Marked
Article review: ☐ Incomplete ☐ Complete ☐ Detailed ☐ Highly detailed

🎯 Colour Criteria (tick best fit)

🟠 Orange

☐ Literacy / calculations incomplete
☐ Review incomplete (sections missing)

🟡 Yellow

☐ Core tasks partly complete
☐ Review lacks detail or is partially completed
☐ Keywords basic

🟢 Green

☐ Literacy complete
☐ Calculations complete & marked
☐ All review sections completed
☐ Limited detail / simple keywords

🔵 Blue

☐ Literacy accurate; calculations correct with working
☐ Review detailed; summary clear
☐ Facts categorised
☐ Clear specification link
☐ 1–2 complex definitions

🟣 Purple

☐ All work accurate and well-checked
☐ Review exceptionally detailed
☐ Summary precise
☐ 3 well-categorised facts
☐ Strong specification links
☐ 5 complex definitions

✅ Final Outcome

Colour awarded: ☐ 🟠 ☐ 🟡 ☐ 🟢 ☐ 🔵 ☐ 🟣

✍ Feedback

Strengths:

Improvements / Targets:

☐ Add more detail ☐ Improve subject vocabulary ☐ Strengthen specification links
☐ Improve calculations ☐ Complete missing sections

Specific target: