Hellesdon Sixth Form

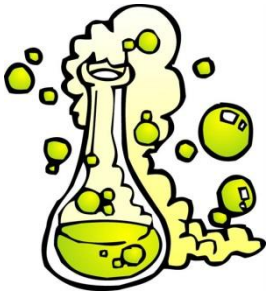
Your next step

WENSUM TRUST

A-level Chemistry

Name: _____

Chemistry Expectations 2024-2026



1. I will attend my Chemistry lessons appropriately dressed for practical work, no exposed legs or open toe shoes, with the understanding that incorrect laboratory dress will result in me being asked to leave the lesson.
2. I will follow health and safety rules of the laboratory including no food or drink. Laboratory coats, goggles and gloves, if required, will be worn at all times during a practical experiment.
3. I will track the lesson objectives each lesson by completing the course content book. Any objectives missed due to absence will result in the work being covered independently outside of the classroom.
4. I will regularly check my understanding of a topic by completing, marking and tracking in my student tracker booklets the book and practice questions, as they are covered in class, and I will make the necessary amendments to improve my work.
5. I will join RSC Chemnet to help develop my understanding of Chemistry in the wider world and to support my studies.
6. I will complete all homework on time and produce it in lesson when requested.
7. I am responsible for completing and maintaining my tracker sheets; these will be available for inspection at all times in lessons. If I need any additional copies of these, or homework books, I will be responsible for printing my own from Show my Homework.

Teacher:

Student:

Chemistry A Level Bridging Work

Welcome to A-level Chemistry!

This bridging work is designed to help you bridge the gap between your GCSE Science studies and the AS/A Level Chemistry course. It includes a list of topics from GCSE that will be helpful for you to review and practise.

Why do bridging work?

Because we want you to be successful and what it takes to be successful at GCSE is different from being successful at A-level. Although you have fewer subjects there are different skills at post-16 and the volume of work is greater because the detail and depth is more demanding.

Bridging work should help you gauge whether the subject is for you, so you can change your mind at enrolment – as long as there is space and you meet the entry criteria. We would rather you study courses that interest you and you are sufficiently qualified to study.

Is the bridging work assessed?

Yes. In September, your subject teacher will ask you for your bridging work and it will be assessed. Teachers can diagnose your strengths and weaknesses and begin to support you in a more targeted way. Bridging work also assesses your work ethic and so the sixth form team will pick up on anyone with a low work ethic and support you accordingly.

Chemistry A-level

Studying Chemistry at A-level will require you to be highly organised and effective with your own independent work. Not only will you have to balance the workload of this subject and the other subjects you have chosen, we require you to commit and do the very best that you can.

Anyone not completing the work or producing poor quality will be spoken to and asked to re-consider if this is the correct course for you. Please use resources such as the internet, library and your Chemistry GCSE notes to help you complete this booklet.

As part of your AS/A-Level studies you will have twelve 50-minutes lessons per fortnight in your timetable. In these lessons you will cover all the theory and practical work required for the course. You are also expected to spend additional hours on your Chemistry work outside of lessons. This will include homework tasks, pre-reading, independent study tasks, making additional notes, reviewing lesson materials and reading around the subject.

To support your learning, you will need to purchase a textbook for the current AS/A Level course. Your teachers are, of course, an excellent source of support both in and out of lessons.

To complete this module of work:

1. Use your GCSE knowledge to answer the questions in section A.
2. Use the mark scheme provided to mark and correct your answers to the section A questions, in a separate colour. Study the answers and mark scheme carefully to help you understand what level of explanation you are expected to demonstrate when answering this type of AS/A Level question.
3. Use your knowledge and what you have learnt from the previous task to answer the questions in section B.
4. Section C involves tasks that you should have the ability to do based on prior knowledge. If you cannot complete these you will need to go over these topics before starting to ensure a solid foundational knowledge ready for your first units of study.
5. Section D involves a research topic – watching a groundbreaking series on the history of chemistry and constructing a timeline.

You should bring all the work with you to your first year 12 Chemistry lesson in September.

Key areas from your GCSE Chemistry that you will need for A Level Chemistry:

1) Atomic structure – protons, neutrons, electrons, mass number, isotopes etc.

2) Periodic table – overall arrangement in groups and periods; trends in reactivity down groups and across periods.

3) Ionic, covalent and metallic structures: bonding (including dot and cross diagrams), structure, and how properties relate to structure.

4) Formulae of ions and formulae of ionic compounds.

5) Calculations – relative atomic mass, relative molecular mass, moles, mole calculations, limiting reactants; calculations with Avogadro's Constant. If you have done triple science: titrations, gas volumes, atom economy, percentage yield.

6) Organic compounds: alkanes and alkenes, fractional distillation of crude oil and cracking. If you have done triple science: alcohols, carboxylic acids and esters. If you have not done triple science please look these up here to start with: https://www.youtube.com/watch?v=vVwLa1fRsVY (videos 68, 69 and 70).

7) Rates of reaction – collision theory, how to speed up reactions, catalysts etc.

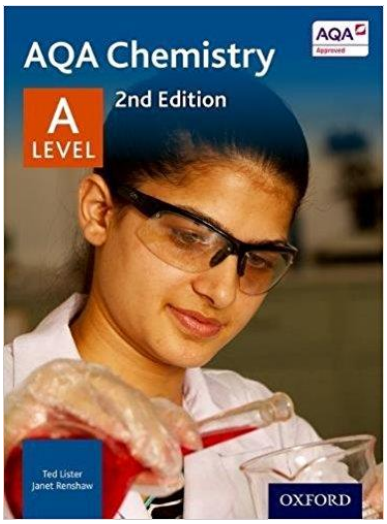
8) Energy level diagrams for endo- and exothermic reactions; calculation of energy changes given bond energies for reactants and products.

The Chemistry Department have attached a PDF of some key pages from the 'Head Start to A-Level Chemistry' book. Read these pages and answer the questions at the bottom. The content will be reviewed in the relevant lessons.

Required text book:

AQA A Level Chemistry (2nd edition)

Authors: Ted Lister, Janet Renshaw
Publisher: Oxford University Press (including Nelson Thornes)



- ISBN 978-0-19-835182-5

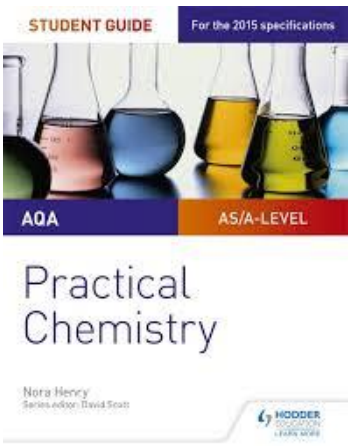
- £44.99

- This can bought at a discounted price from the Chemistry department from September.

You might also want to buy:

Practical Chemistry by Nora Henry

- ISBN 978-1-4718-8514-3



All students will need to have by their first lesson:

1. A large lever arched file with dividers and plastic wallets. Your "Chemistry Expectations" should be at the front of your file.
2. An A4 refill pad.
3. A pencil case with pens, pencils, rubber, sharpener.
4. A ruler and a scientific calculator.
5. Join RSC ChemNet for free at myrsc.org/chemnet
6. Watch this referencing guide from Leeds University. All practical work must have researched references. https://library.leeds.ac.uk/info/1402/referencing/47/referencing_explained

Useful websites:

www.chemguide.co.uk
www.chemrevise.org/revision-guides/
www.creative-chemistry.co.uk
www.getrevising.co.uk
www.knockhardy.org.uk/sci.htm
https://www.savemyexams.co.uk/a-level-chemistry-aqa/
www.s-cool.co.uk
www.bbc.co.uk/schools/cgsebitesize/chemistry
www.rsc.co.uk
www.amazing-grades.com

Year 11 to Year 12 Chemistry A-Level Bridging Unit
Section A Questions

- **Try to answer these questions using your GCSE knowledge, then check and mark your answers in a different colour.**
- **You need to bring the marked and corrected questions to your first Chemistry lesson in September**

1. (a) Define the term *atomic number* of an element.

.....

(1)

(b) Give the symbol, including mass number and atomic number, for an atom of an element which contains 12 neutrons and 11 electrons.

.....

(2)

(c) How many neutrons are there in one ^{27}Al atom?

.....

(1)

(d) Define the term *relative atomic mass* of an element.

.....

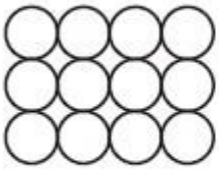
.....

(2)

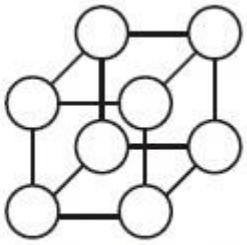
(Total 6 marks)

2. At room temperature, both sodium metal and sodium chloride are crystalline solids which contain ions.

(a) On the diagrams for sodium metal and sodium chloride below, mark the charge for each ion.



Sodium metal



Sodium chloride

(2)

(b) (i) Explain how the ions are held together in solid sodium metal.

.....

.....

(ii) Explain how the ions are held together in solid sodium chloride.

.....

.....

(iii) The melting point of sodium chloride is much higher than that of sodium metal. What can be deduced from this information?

.....

.....

(3)

(c) Explain why sodium metal is malleable (can be hammered into shape).

.....

.....

(1)

(d) Sodium chlorate, $NaClO_3$, contains 21.6% by mass of sodium, 33.3% by mass of chlorine and 45.1% by mass of oxygen.

(i) Use the above data to show that the empirical formula of sodium chlorate is $NaClO_3$

.....

.....

.....

.....

..... **(2)**

(ii) Sodium chlorate may be prepared by passing chlorine into hot aqueous sodium hydroxide. Balance the equation for this reaction below.

…… Cl_2 + …… NaOH → …… NaCl + $NaClO_3$ + $3H_2O$

(1)

(Total 9 marks)

3. (a) Give the relative mass and relative charge of a neutron.

Relative mass .....

Relative charge.....

(2)

(b) In terms of the number of their fundamental particles, what do two isotopes of an element have in common and how do they differ?

In common .....

Difference .....

(2)

(c) Give the complete atomic symbol, including mass number and atomic number, for an atom of the isotope with 22 neutrons and 19 electrons.

..... **(2)**

(Total 6 marks)

4. (a) Describe the bonding in metals.

.....

.....

.....

(2)

(b) Explain why the melting point of magnesium is higher than that of sodium.

.....

.....

.....

.....

(3)

(c) Explain how metals conduct electricity.

.....

.....

.....

(2)

(Total 7 marks)

Use the mark scheme at the back of the booklet to mark this section

Year 11 to Year 12 Chemistry A Level Bridging Unit Section B Questions

- **Use your knowledge and what you have learnt from the previous task in section A to answer the questions in this section.**
- **You should complete these questions and bring the answers with you to your first Chemistry lesson in September.**

1. (i) Showing the outer electrons only, draw a dot-and-cross diagram to indicate the bonding in calcium oxide (CaO).

(2)

(ii) Describe the type and strength of the bonding in solid calcium oxide.

.....

.....

.....

.....

(3)

(iii) Use ideas about solids, liquids and gases to describe the changes that take place as calcium oxide is heated from 25°C (room temperature) to a temperature above its melting point.

.....

.....

.....

.....

(3)

(iv) State **two** properties of calcium oxide that depend on its bonding.

.....

.....

.....

(2)

(Total 10 marks)

2. (a) Give the relative charge and relative mass of an **electron**.

Relative charge.....

Relative mass .....

(2)

(b) Isotopes of chromium include ^{54}Cr and ^{52}Cr

(i) Give the number of protons present in an atom of ^{54}Cr

.....

(ii) Deduce the number of neutrons present in an atom of ^{52}Cr

.....

(2)

(c) (i) State what is meant by the term *empirical formula*.

.....

.....

(ii) A chromium compound contains 28.4% of sodium and 32.1% of chromium by mass, the remainder being oxygen. Calculate the empirical formula of this compound.

.....

.....

.....

.....

(4)

(Total 8 marks)

3. (a) Complete the following table:

	Relative mass	Relative charge
Proton		
Electron		

(2)

(b) An atom of element **Q** contains the same number of neutrons as are found in an atom of ^{27}A1. An atom of **Q** also contains 14 protons.

(i) Give the number of protons in an atom of ^{27}A1.

.....

(ii) Deduce the symbol, including mass number and atomic number, for this atom of element **Q**.

.....

(3)

(c) Define the term *relative atomic mass* of an element.

.....

.....

(2)

(Total 7 marks)

4. (a) (i) Describe the bonding in a metal (you may draw a diagram if it helps).

.....

.....

.....

(ii) Explain why magnesium has a higher melting point than sodium.

.....

.....

.....

(4)

(b) Why do diamond and graphite both have high melting points?

.....

.....

.....

.....

(3)

(c) Why is graphite a good conductor of electricity?

.....

(1)

(d) Why is graphite soft?

.....

.....

.....

(2)

(Total 10 marks)

5. (a) Butane, C_4H_{10}, is a hydrocarbon which is used as a fuel.

(i) Explain what is meant by the term *hydrocarbon*.

.....

.....

(ii) Explain what is meant by the term *fuel*.

.....

.....

(iii) Write an equation for the **complete** combustion of butane.

.....

(v) Under what conditions would you expect **incomplete** combustion to occur?

..... **(4)**

(b) Ethane (C_2H_6) can be cracked in the presence of a catalyst to produce ethene (C_2H_4) and hydrogen.

(i) Write an equation for this reaction.

.....

(ii) Give a suitable catalyst for this reaction.

.....

(iii) State **one** reason why cracking is important.

.....

(3)

(Total 7 marks)

Year 11 to Year 12 Chemistry A-Level Bridging Unit Section C Tasks

Rearranging Formulae task

When solving chemistry problems you will often be required to rearrange an equation to solve for an unknown. You would have seen this in Physics when trying to calculate speed.

Speed (m/s) = distance (m) / time (s)

We can re-write this to show distance and time as follows:
Distance (m) = speed (m/s) x time (s) **Time (s) = distance (m) / speed (m/s)**

You will encounter the following equations in the first topic.

Rearrange the following:

a) mol = mass / Mr

Mass =

Mr =

b) Volume (dm^3) = mol x 24 (this equation applied at room temperature and pressure only; the volume occupied by 1 mol of any gas in these conditions is 24 dm^3)

mol =

c) C = mol / V (where C = concentration and V = volume in dm^3)

mol =

V =

Units for C =

d) There are 1000 cm3 in 1 dm^3. Convert the following:

1	250 cm^3 = _____ dm^3	4	0.8 dm^3 = _____ cm^3
2	30 cm^3 = _____ dm^3	5	10 dm^3 = _____ cm^3
3	500 cm^3 = _____ dm^3	6	0.0065 dm^3 = _____ cm^3

SI Units

To communicate with other scientists, chemists must know and use the same units of measurements. SI units stands for *Systeme International*, and you must use the correct units when leaving your answers. Look through the following website for more information: http://www.npl.co.uk/reference/measurement-units/

Task - Converting to SI

Convert the following into SI units

1. 67 cm
2. 30 minutes
3. 100 °c
4. - 27 °c
5. 0.1 g
6. 2.7 tonnes
7. 12 g carbon into moles

Handling Numbers

The ability to work with numbers is essential for Chemistry and the level of accuracy is very important. The numbers we use in Chemistry range from being extremely small to very large, and you must be able to deal with these.

Decimal Places – dp

Your calculator can produce lots of digits after the decimal place, and you will need to record the answer accurately and appropriately to score marks in an exam. The answer will also need to be rounded up or down. Make sure you give the answer to the number of decimal places the exam question has asked for. If in doubt, 2 dp is the norm.

Significant Figures – SF

Significant figures are useful when quoting numbers when decimal places are not appropriate. These numbers tell you about the magnitude of a figure. You will need to count the significant figure as soon as you come across a non-zero number reading from left to right.

Examples to 3 SF:

3.81	0.0000381	3.81	3.00

Standard Form

Some numbers are far too large to write out in full so a shorthand called 'standard form' or 'scientific notion' is used.

Examples:
1.0 x 106 = 1, 000 000
1.0 x 106 = 0.00 0001

Significant figures and standard form task

Significant Figures

You need to be able to quote answers to the correct number of significant figures.

1) Write the following numbers to the quoted number of significant figures.

a) 345789 4 sig figs ..... d) 6 3 sig figs .....

b) 297300 3 sig figs ..... e) 0.001563 3 sig figs .....

c) 0.07896 3 sig figs ..... f) 0.01 4 sig figs .....

2) Complete the following sums and give the answers to 3 significant figures.

a) 6125 x 384..... d) 750 ÷ 25 .....

b) 25.00 x 0.01..... e) 0.000152 x 13 .....

c) 13.5 + 0.18..... f) 0.0125 x 0.025 .....

Standard Form

You need to be able to work with numbers in standard form.

3) Write the following numbers in non standard form.

a) 1.5×10^{-3} ..... d) 0.0534×10^{4}.....

b) 0.046×10^{-2} ..... e) 10.3×10^{5} .....

c) 3.575×10^{5}..... f) 8.35×10^{-3} .....

4) Write the following numbers in standard form.

a) 0.000167 ..... d) 34500.....

b) 0.0524..... e) 0.62.....

c) 0.000000015..... f) 87000000 .....

5) Complete the following calculations and give the answers to 3 significant figures.

a) $6.125 \times 10^{-3} \times 3.5$ .....

b) $4.3 \times 10^{-4} + 7.0$.....

c) $4.0 \times 10^{8} + 35000$.....

d) $0.00156 + 2.4 \times 10^{3}$.....

e) $6.10 \times 10^{-2} - 3.4 \times 10^{-5}$ .....

Balancing equations task

Look at the following equations – some need balancing, others do not. Balance the equations that need it.

1) __C + __O_2 -→ __CO
2) __Na + __O_2 → __Na_2O
3) __H_2 + __O_2 → __H_2O
4) __Na + __I_2 → __NaI
5) __CH_4 + __O_2 → __CO_2 + __H_2O
6) __SO_2 + __O_2 → __SO_3
7) __Fe_2O_3 + __C → __Fe + __CO
8) __Fe_2O_3 + __CO → __Fe + __CO_2
9) __NH_3 + __O_2 → __NO + __H_2O
10) __Fe_3O_4 + __H_2 → __Fe + __H_2O
11) __C + __CO_2 → __CO
12) __Fe + __S → __FeS
13) __Ca + __H_2O → __CaOH + __H_2
14) __Al + __Cl_2 → __$AlCl_3$
15) __Fe + __HCl → __$FeCl_2$ + __H_2

Relative formula mass task

Use a Periodic Table to work out the relative formula mass of the following compounds

NaOH : Na + O + H = 23 + 16 + 1 = 40

$CuSO_4$ .....

$Mg(HCO_3)_2$.....

NH_4NO_3 .....

$CuCO_3$ .....

$Ca(OH)_2$ .....

H_2SO_4 .....

C_3H_8.....

HgO .....

$NH_4Fe(SO_4)_2.12H_2O$.....

$K_4Fe(CN)_6$.....

$Al_2(SO_4)_3$ .....

If you have any questions or queries relating to the task or the course in general then please e-mail Mr Scarborough or Mrs Glaster or Mr Earl

jscarboroug6yrn@nsix.org.uk
tglaister9rt9@nsix.org.uk
mearl3nre@nsix.org.uk
mmartino78rv@nsix.org.uk
mearl3nre@nsix.org.uk

Year 11 to Year 12 Chemistry A Level Bridging Unit

Answers to Section A Questions

- **Use these answers to check your answers to the section A questions.**
- **Study the answers and mark scheme carefully to help you understand what level of understanding you are expected to demonstrate when answering this type of AS/A Level question.**

1. (a) number of protons in one atom or nucleus **(1)**

Allow protons & electrons do not allow protons + electrons or electrons

(b)

$^{23}_{11}$ **(1)** Na **(1)**

OR Na $^{23}_{11}$ or Na (1) + unambiguous statement of mass no. and atomic no.

(c) 14 **(1)**

(d)

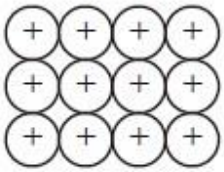
$$\frac{\text{average mass of an atom (or isotope)}}{\text{mass of 1 atom of } ^{12}\text{C}}$$ **(1)** × 12 **(1)**

Reference to mass number not mass C.E. = 0
OR stated in moles
OR compared with 1/12 of a ^{12}C atom or relative to ^{12}C when taken as 12

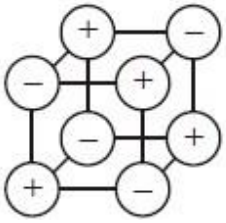
[6]

2. (a)

[Diagrams must be complete and accurate



(1)



(1)

(b) (i) Attraction/electrostatic forces/bonds/attractions between (positive) **(1)** ions/lattice and delocalised/free electrons/sea of electrons.

[Not metallic bonding] [Not just 'forces']

(ii) Electrostatic attractions/forces between ions or attractions between (oppositely charged) ions/ Na^+ & Cl **(1)**

[Not ionic bonding]

(iii) (Here) the ionic bonding in NaCl is stronger/requires more energy to **(1)** break than the metallic bonding in Na

Accept 'bonding/forces of attraction in NaCl is stronger than in Na'

(c) Layers can slide over each other– idea that ions/atoms/particles move **(1)**

[Not molecules] [Not layers separate]

(d)

(i)	Na	Cl	O	
	$\frac{21.6}{23}$	$\frac{33.3}{35.5}$	$\frac{45.1}{16}$	1
	0.9(39)	0.9(38)	2.8(2)	
Hence:	1	1	3	1

Accept backwards calculation, i.e. from formula to % composition, and also accept route via M_r to 23; 35.5; 48, and then to 1:1:3

[If % values incorrectly copied, allow 1mark only]

[If any wrong A_r values/atomic numbers used = CE = 0]

(ii) $3Cl_2 + 6NaOH \rightarrow 5NaCl + NaClO_3 + 3H_2O$ **(1)**

[9]

3. (a) *Relative mass* 1 **(1)**

Relative charge 0 **(1)**

(b) *In common* number of protons (or electrons) **(1)**

Difference number of neutrons **(1)**

(c) $^{41}_{19}$ **(1)** K **(1)**

[6]

4. (a) Lattice of metal / +ve ions/ cations / atoms **(1)**

Not +ve nuclei/centres

Accept regular array/close packed/tightly packed/uniformly arranged

(Surrounded by) delocalised electrons **(1)**

Note: Description as a 'giant ionic lattice' = CE

(b) Greater nuclear or ionic charge or more protons **(1)**

Smaller atoms / ions **(1)**

Accept greater charge density for either M1 or M2

More delocalised electrons / e^- in sea of e^- / free e^- **(1)**

Stronger attraction between ions and delocalised/free electrons etc. **(1)**

Max 3

Note: 'intermolecular attraction/ forces' or covalent molecules = CE

Accept stronger 'electrostatic attraction' if phrase prescribed elsewhere

Ignore references to m/z values If Mg or Na compared to Al, rather than to each other, then: ***Max 2***

*Treat description that is effectively one for Ionisation Energy as a '**contradiction**'*

(c) (Delocalised) electrons

(1) Move / flow in a given direction (idea of moving non-randomly) **or** under the influence applied pd *QoL mark* **(1)**

Allow 'flow through metal'

Note: 'Carry the charge'; 'along the layers'; 'move through the metal'

[7]