

# Blue Coat School SIXTH FORM



## SUBJECT TRANSITION BOOK

2024-2025

# CHEMISTRY

STUDENT NAME:

SCHOOL:

This booklet has been prepared by Chemistry staff for you to read and the work contained in it will ensure that you get off to the best possible start in this subject area. It is very important that you read this booklet carefully over the summer and have a thorough attempt to complete the work and submit it at the start of the year to your subject teacher in the very first lesson. This will be the first impression you create and is a real indicator of how seriously you are prepared to be in your studies.

## A-Level Chemistry

### This subject is taught at:

Blue Coat School

### The key staff are:

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## Course Details

**Course Title:** A-level Chemistry

**Exam board:** AQA

**Exam Code:** AS –7404

**A –level** – 7405

**Exam Board web site:** [www.aqa.org.uk](http://www.aqa.org.uk)

**Assessment method:** The *Chemistry AS* qualification is a stand-alone qualification and is assessed by two written examinations based on content and practical work. The *Chemistry A level* is assessed by three written examinations. These examinations will assess content from both years of the course. Two of the examinations are based mainly on the content and one paper is based on practical work and some of the content.

**Minimum requirement:** Standard entry requirements of five 9-6 grades including English language and mathematics. Students should have gained **at least a grade 7** in GCSE Additional Science or GCSE Chemistry **AND** at least a grade 6 in GCSE Mathematics.

### About the course

Chemistry allows you to develop a range of skills requested by both employers and universities. For instance, a successful GCE level chemist will be an effective problem-solver and be able to communicate efficiently both orally and with the written word. Handling data will be a key part of your work, allowing you to demonstrate information retrieval skills as well as use of numeracy and ICT. You will build up a range of practical skills that require creativity and accuracy as well as developing a firm understanding of health and safety issues. As chemistry is a subject in which much learning stems from experimental work it is likely that you will need to work effectively as part of a group, developing team participation and leadership skills. As you become more skilled you will take responsibility for selecting appropriate qualitative and quantitative methods, recording your observations and findings accurately and precisely as well as critically analysing and evaluating the methodology, results and impact of your own and others' experimental and investigative activities.

## AS Chemistry: The AS is a separate qualification.

**Paper 1** is 50% of AS and assesses **Relevant Physical chemistry** topics (Atomic structure, Amount of substance, Bonding, Energetics, Chemical equilibria, Le Chatelier's principle and  $K_c$ , Oxidation, reduction and redox equations), **Inorganic chemistry** (Periodicity, Group 2, the alkaline earth metals, Group 7(17), the halogens) and **Relevant practical skills**

**Paper 2** is 50% of AS and assesses **Relevant Physical chemistry topics** (Amount of substance, Bonding, Energetics, Kinetics, Chemical equilibria, Le Chatelier's principle and  $K_c$ ), **Organic chemistry** (Introduction to organic chemistry, Alkanes, Halogenoalkanes, Alkenes, Alcohols, Organic analysis), **Relevant practical skills**

## A-level Chemistry:

**Paper 1** is 35% of the A level and assesses **Relevant Physical chemistry** topics (Atomic structure, Amount of substance, Bonding, Energetics, Chemical equilibria, Le Chatelier's principle and  $K_c$ , Oxidation, reduction and redox equations, Equilibrium constant  $K_p$  for homogeneous systems, Electrode potentials and electrochemical cells, Acids and bases ), **Inorganic chemistry** (Periodicity, Group 2, the alkaline earth metals, Group 7(17), the halogens, Properties of Period 3 elements and their oxides, Transition metals, Reactions of ions in aqueous solution), **Relevant practical skills**.

**Paper 2** is 35% of the A level and assesses **Relevant Physical chemistry** topics (Amount of substance, Bonding, Energetics, Kinetics, Chemical equilibria, Le Chatelier's principle and  $K_c$ , Rate equations), **Organic chemistry** (Introduction to organic chemistry, Alkanes, Halogenoalkanes, Alkenes, Alcohols, Organic analysis, Optical isomerism, Aldehydes and ketones, Carboxylic acids and derivatives, Aromatic chemistry, Amines, Polymers, Amino acids, proteins and DNA, Organic synthesis, Nuclear magnetic resonance spectroscopy, Chromatography), **Relevant practical skills**

**Paper 3** is 30% of the A level and assesses any content and any practical skills

### Academic and Career Pathways

Chemistry is essential for students wishing to follow a career in medicine, dentistry, veterinary science, pharmacy and chemical engineering

### What equipment will be needed for the subject?

An A4 ring binder.

Dividers

Lined paper

Pens, pencils, rulers

A scientific calculator.

**Please complete the following assignments on separate sheets of paper over summer ready to hand in on the very first lesson in this subject. Make sure you show all working out for the calculations**

## Activity 1 – What do atoms look like?

No one as yet has been able to look inside atoms to see what they are really like. The picture of an atom we have in our mind is neither 'the truth' nor 'the right answer', but a good working **model** which helps explain many phenomena.

Much evidence has been gathered to support the present model of an atom. As more evidence comes to light, the model may change, and it is very likely to become more detailed.

We can sometimes explain things using only a simplified model of the atom. Thinking of atoms as tiny spheres is sufficient to explain states of matter, but this model is not detailed enough to explain why metals tend to react with non-metals. Models can be simple or elaborate, depending on the job they do. Keep this in mind as your ideas and understanding of Chemistry develop.

### **How was the current model of the atom developed?**

A number of scientists collected evidence, which when put together, contributed to the current model of the atom. Prepare a report (PowerPoint, leaflet, essay, poster etc.) on the work of **two** scientists from the list below.

Use textbooks, internet to help you find out the relevant information.

Remember to reference your work- you will need to quote the book name and publisher or full website of your source.

The scientists are:

1. Leucippus (of Miletus c490 BCE) and Democritus (of Abdera c470-380 BCE)
2. Robert Boyle (1627-1691)
3. John Dalton (1766-1844)
4. Joseph J. Thompson
5. Ernest Rutherford
6. James Chadwick
7. Neils Bohr

THE spdf ORBITALS (An artistic rendition)				Joel M Williams ©2013 JW HW	
TYPE	SET	INDIVIDUAL ORBITALS			COLLECTIVE
f	Cubic				
	General				
d	Common				
	"Tri-torus"				
p					
s					

Using your report answer these questions:

1. List your sources; remember that to work at a higher level it is vital to put the information in your own words.
2. What experiments were carried out?
3. What was found out?
4. What conclusions were drawn from the results?
5. Compare the theories of your two scientists. In what ways are they similar? In what ways are they different?
6. Over time the theories have changed. What reasons could there be for this?

## Activity 2: Mathematical techniques essential for A-level Chemistry

Complete all the questions on this page as they are some of the essential mathematical techniques needed when studying A-level Chemistry. **These are the most commonly used techniques but, they are NOT the only mathematical skills that you will need when studying Chemistry. Answer questions on a separate sheet of paper. Show all your working when answering these questions.**

- Convert the following quantities:  
(a) 0.5kg to g (b)  $100\text{cm}^3$  to  $\text{dm}^3$  (c) 101000Pa to kPa (d) 37minutes to seconds
- Write down the following masses in standard form:  
(a) 0.0053g (b) 740g (c) 0.238g (d) 0.0904g
- If  $a = 9 \times 10^{-6}$  and  $b = 1.34 \times 10^{-3}$  Calculate  $a + b$ ,  $a - b$ ,  $ab$ , and  $a/b$  giving your answers in standard form.
- Write down the number of significant figures in each of the following masses:  
(a) 1.0023g (b) 740g (c) 0.0000238g (d) 0.0904g
- Write down each of the following quantities to 3 significant figures:  
(a)  $9.5685\text{cm}^3$  (b)  $0.0057739\text{mol dm}^{-3}$  (c)  $37659\text{dm}^3$  (d) 56.036g
- Round off the following quantities to 2 decimal places:  
(a) 0.5634g (b)  $23.166\text{cm}^3$  (c)  $0.0072\text{dm}^3$  (d)  $0.0782\text{mol dm}^{-3}$
- If  $a = 3$ ,  $b = 7$ ,  $c = 5$ , and  $d = 2$  calculate  $2a(c + b)$ ,  $(d + c)/3a$ ,  $0.5c + 2b/a$ , and  $0.6a \times 3.5b/d$ . Give all your answer to 2 significant figures.
- Find the simplest whole number ratio for each of the following. The numbers come from experiments so there will be some small random errors which mean that you can round the numbers a little bit.  
a) 1.5 : 1 b) 1 : 1.98 c) 4.97 : 1 d) 1 : 2.52
- Find the percentage of carbon in each of the following compounds:  
(a)  $\text{CH}_4$  (b)  $\text{CaCO}_3$  (c)  $\text{C}_6\text{H}_{12}\text{O}_6$  (d)  $\text{CH}_3\text{COOH}$
- Temperature can be converted from degrees Celsius ( $^{\circ}\text{C}$ ) to Kelvins (K) using the formula  
 $T_K = T_C + 273$  where  $T_K$  represents temperature in Kelvins and  $T_C$  represents temperature in degrees Celsius. Use this formula to convert the following temperatures:  
(a)  $25^{\circ}\text{C}$  to K (b)  $-20^{\circ}\text{C}$  to K (c) 373K to  $^{\circ}\text{C}$  (d) 150K to  $^{\circ}\text{C}$
- Draw a graph for the data given in the table below:



Concentration of nitric acid ( $\text{mol dm}^{-3}$ )	0	0.1	0.2	0.3	0.4	0.5	0.6
Volume of carbon dioxide collected ( $\text{cm}^3$ )	0	10	25	39	61	62	84

- (a) From the information in the table and on the graph what is your conclusion about what happened during this experiment?
- (b) Are there any anomalous results in this set of data? What would you do with the anomalous results when drawing your graph?
12. Ali dissolved 1.35g of  $\text{CuSO}_4$  in  $25\text{cm}^3$  of water. Ali poured the solution into a volumetric flask and he poured more water to make up the volume of the solution to  $250\text{cm}^3$ .
- (a) How many moles of  $\text{CuSO}_4$  did Ali dissolve to make this solution?
- (b) What is the concentration of the solution in the volumetric flask?



# Reading List

## Textbooks

AS and A2 Chemistry from Oxford University Press

Maths Skills for Chemistry (Nelson Thornes, ISBN 978-1-4085-2119-9)

AS and A2 Chemistry from Nelson-Thornes

AS and A2 Chemistry from Collins

Any A-level chemistry book

New Scientist

Chemistry Review

## Web-sites

[www.chemguide.co.uk](http://www.chemguide.co.uk)

[www.rsc.org](http://www.rsc.org)

[www.royalsociety.org](http://www.royalsociety.org)

[www.a-levelchemistry.co.uk](http://www.a-levelchemistry.co.uk)

[www.mp-docker.demon.co.uk](http://www.mp-docker.demon.co.uk)

[www.docbrown.info/](http://www.docbrown.info/)

[www.chemsheets.co.uk](http://www.chemsheets.co.uk)

## Current affairs

On interview for any Science related subject at University level you will be expected to be familiar with Science issues that are in the news. It is a good idea to read a quality newspaper (a weekend one is usually best) and watch the news and current affairs programmes.

Periodic Table of the Elements

1 IA H Hydrogen 1.008	2 IIA He Helium 4.003											13 IIIA B Boron 10.811	14 IVA C Carbon 12.011	15 VA N Nitrogen 14.007	16 VIA O Oxygen 15.999	17 VIIA F Fluorine 18.998	18 VIIIA Ne Neon 20.180																																																																																																																																																																																																																																																																																										
3 Li Lithium 6.941	4 Be Beryllium 9.012											19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.63	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80																																																																																																																																																																																																																																																																														
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98.906	44 Ru Ruthenium 101.07	45 Rh Rhodium 101.07	46 Pd Palladium 106.36	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29	55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanide Series	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.084	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.387	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222																																																																																																																																																																																																																																																																								
87 Fr Francium 223	88 Ra Radium 226	89-103 Actinide Series	104 Rf Rutherfordium 261	105 Db Dubnium 262	106 Sg Seaborgium 263	107 Bh Bohrium 264	108 Hs Hassium 265	109 Mt Meitnerium 266	110 Ds Darmstadtium 267	111 Rg Roentgenium 268	112 Cn Copernicium 269	113 Nh Nihonium 270	114 Fl Flerovium 271	115 Uup Ununpentium 272	116 Lv Livermorium 273	117 Uus Ununseptium 274	118 Uuo Ununoctium 276	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400

Legend:

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Semimetal
- Nonmetal
- Base Metal
- Halogen
- Noble Gas
- Lanthanide
- Actinide