

Multiple-Choice Practice Questions

for AS / A Level Year 1 Edexcel Chemistry

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Contents

Thank You for Choosing ZigZag Education.....	ii
Teacher Feedback Opportunity.....	iii
Terms and Conditions of Use.....	iv
Teacher's Introduction	1
Student's Introduction	2
Section A Questions	3
Practical and mathematical skills.....	3
Topic 1: Atomic structure and the periodic table.....	5
Topic 2: Bonding and structure	8
Topic 3: Redox.....	11
Topic 4: Inorganic chemistry and the periodic table	12
Topic 5: Formulae, equations and amounts of substance	14
Topic 6: Organic chemistry I.....	17
Topic 7: Modern analytical techniques I	24
Topic 8: Energetics I.....	26
Topic 9: Kinetics I	28
Topic 10: Equilibrium I	29
Section A Full Answers	30
Section A Quick Answers	57
Section B Questions.....	58
Practical and mathematical skills.....	58
Topic 1: Atomic structure and the periodic table.....	60
Topic 2: Bonding and structure	63
Topic 3: Redox.....	65
Topic 4: Inorganic chemistry and the periodic table	67
Topic 5: Formulae, equations and amounts of substance	69
Topic 6: Organic chemistry I.....	72
Topic 7: Modern analytical techniques I	79
Topic 8: Energetics I.....	81
Topic 9: Kinetics I	83
Topic 10: Equilibrium I	84
Section B Quick Answers.....	85

Teacher's Introduction

For the AS and A Level Year 1 Chemistry course, the Edexcel exam board includes an emphasis on multiple-choice questioning which is assessed in both papers at AS, and in Paper 1 and Paper 2 at A Level.

Chemistry students sometimes find the multiple-choice questions testing; the format of the questions often challenges how complete the students' understanding is of the course and requires quick and accurate problem-solving to complete all the questions in the time given. This multiple-choice bank resource has been designed with the intention of providing students with the opportunity to review their multiple-choice skills and to practise and familiarise themselves with the questioning format with an extensive spread of multiple-choice questions from the AS and Year 1 A Level courses.

The resource is split into two sections:

Section A: Multiple-choice Question Bank 1

This section includes over 100 multiple-choice questions that span each topic making up the AS and Year 1 A Level course. The questions mimic the exam style of the Edexcel exam board and reflect the depth, difficulty and format of the questions the student will face in their upcoming exam.

A mark scheme is provided at the end of the resource, which includes the answers along with worked solutions. The step-by-step solutions, and additional commentary to accompany them, give students an opportunity to identify the areas that still need improvement, and also to see where any mistakes were made and correct themselves for next time.

Section B: Multiple-choice Question Bank 2

This section includes another set of multiple-choice questions that similarly span each topic that makes up the AS and Year 1 A Level course. The questions deliberately mimic those presented to the student in Section A; this has been done so that, after working through the worked solutions of Section A, students can complete another set of questions and directly compare their attempts. The format allows students to correct their mistakes from Section A, identify areas where they have improved their understanding, and highlight areas that still require further work.

A mark scheme for Section B is also provided at the end of the resource. This mark scheme does not include worked solutions.

Remember!

Always check the exam board website for new information, including changes to the specification and sample assessment material.

S Wainwright, October 2017

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Student's Introduction

Aim:

This pack is designed to help you practise your multiple-choice questions and, with the worked solutions, allow you to build effective strategies for completing these questions. Multiple-choice questions now appear on both AS Chemistry papers and on Paper 1 and Paper 2 at A Level. Therefore, this pack aims to provide you with the tools to confidently tackle your upcoming exam.

Structure:

The pack is comprised of two sections. Each section contains over 100 multiple-choice questions that mimic the structure and level of the questions you will be required to answer in your exam. The questions in each section cover the AS and A Level Year 1 Chemistry courses in topic order, including aspects of:

- Physical chemistry
- Inorganic chemistry
- Organic chemistry

After the questions there are two sections of answers. The answers to Section A provide worked solutions and additional commentary that indicates where you went wrong and provides an indication of how the problem should have been approached. This will allow you to identify your mistakes and develop strategies on how to tackle future questions. The answers to Section B do not provide any worked solutions.

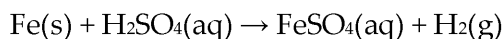
How to use this pack:

- You should first complete the questions in Section A.
- After you have completed the questions in Section A, you can proceed by self-marking your solutions against the worked answers and commentary given in the answers section. You should work through the solutions to Section A, taking note of your mistakes and ensuring that you understand where you went wrong, before continuing with Section B.
- After completing Section B, you can proceed by self-marking your solutions against the answers section. Additionally, you can compare your answers to those obtained in Section A to assess whether you have improved your skills and identify areas that still need further work.

Section A Questions

Practical and mathematical skills

- 1) Which of the descriptions below is an appropriate experimental design for the following reaction over time?



- A Perform the experiment in a conical flask and measure the time it takes for the iron to dissolve in the sulfuric acid.
- B Perform the experiment in a conical flask on a balance. Place a bung in the flask and measure the mass loss every minute.
- C Perform the experiment in a conical flask with a gas syringe and measure the volume of gas collected every minute.
- D Perform the experiment and collect the hydrogen in a boiling tube. Perform a 'squeaky pop' test to confirm that the gas is hydrogen.

- 2) Find the mean of the following values:

2.1 cm³ 2.6 cm³ 1.7 cm³ 3.2 cm³

- A 9.6 cm³
- B 0.42 cm³
- C 2.4 cm³
- D 4.8 cm³
- 3) A measurement taken on a burette in cm³ needs to be converted into dm³. How should it be converted?
- A Divide by 1000
- B Multiply by 10
- C Divide by 10
- D Multiply by 1000
- 4) Convert 0.0050052 into standard form.

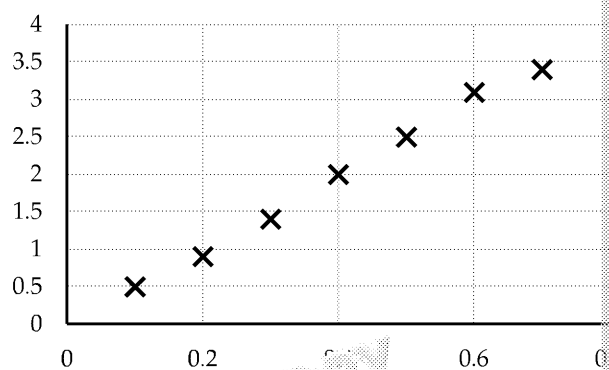
- A 50052
- B 500.52×10^{-5}
- C 5.0052×10^{-3}
- D 5.0052

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5) Find the gradient of a line of best fit for this graph.



A 0.7

B 3

C 0.2

D 5

6) Which of the following conclusions can be drawn from this data?

Time (s)	Volume (m ³)
0	0
10	16
20	32
30	37
40	39

A The volume doubles when the time doubles.

B Volume is proportional to time.

C Volume is inversely proportional to time.

D There is a positive correlation between volume and time.

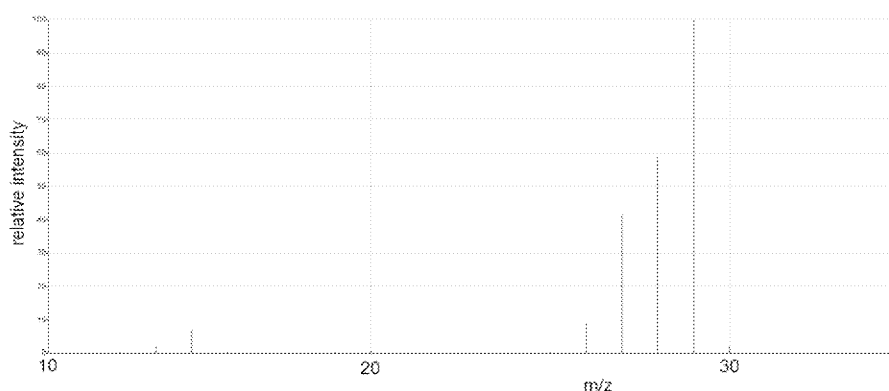
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Topic 1: Atomic structure and the periodic table

- 7) Which of these atoms has the most neutrons?
- A ${}^7\text{Li}$
 - B ${}^{10}\text{Be}$
 - C ${}^{11}\text{Be}$
 - D ${}^{12}\text{C}$
- 8) An atom or ion with 8 protons, 10 electrons and 8 neutrons could be represented by
- A ${}^{10}\text{O}^{2-}$
 - B ${}^{16}\text{O}$
 - C ${}^{18}\text{O}$
 - D ${}^{16}\text{O}^{2-}$
- 9) What are 'relative molecular mass', 'relative formula mass' and 'relative atomic mass'?
- A The mass of one atom of ${}^{12}\text{C}$
 - B 12 times the mass of a ${}^{12}\text{C}$ atom
 - C One twelfth of the mass of a ${}^{12}\text{C}$ atom
 - D 12 grams of ${}^{12}\text{C}$ atoms
- 10) Find the relative formula mass of the molecule which gives the following mass spectrum.



- A 29
 - B 14
 - C 45
 - D 44
- 11) Find the relative atomic mass of iron given that its isotopic abundances are:
- ${}^{54}\text{Fe}$ 45.0 %
 - ${}^{56}\text{Fe}$ 91.754 %
 - ${}^{57}\text{Fe}$ 2.119 %
 - ${}^{58}\text{Fe}$ 0.282 %
- A 55.9
 - B 56.3
 - C 56.0
 - D 55.8

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12) Predict which period 3 element has the following ionisation energies in kJ mol⁻¹

First	577.5
Second	1816.7
Third	2744.8
Fourth	11577
Fifth	14 842

- A Na
- B Al
- C Si
- D P

13) Which has the highest first ionisation energy?

- A Magnesium
- B Boron
- C Chlorine
- D Calcium

14) Which of the following statements is true?

- A First and second ionisation energies increase down group 2, so elements are less reactive.
- B First and second ionisation energies increase down group 2, so elements are more reactive.
- C First and second ionisation energies decrease down group 2, so elements are more reactive.
- D First and second ionisation energies decrease down group 2, so elements are less reactive.

15) Which of the following statements is true?

- 1 A d-orbital holds 2 electrons.
- 2 A p-subshell holds 6 electrons.
- 3 The third shell holds 10 electrons.

- A Only 1
- B Only 2
- C 1 and 2
- D 1, 2 and 3





















16) What is the correct electron configuration of Ni, in order of filling?

- A $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 5p^6 6s^2 7d^8$
- B $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$
- C $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$
- D $1s^2 2s^2 2p^2 3s^2 3p^2 3d^2 4s^2$

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17) Which diagram correctly represents the electronic configuration of Ar?

- A 1s  2s  2p  3s  3p 
- B 1s  2s  2p  3s  3p 
- C 1s  2s  2p  3s  3p 
- D 1s  2s  2p  3s  3p 

18) An element has 28 protons. Which block of the periodic table does this element belong to?

- A s
B p
C d
D f

19) Which of the following statements is not true?

- A Aluminium conducts electricity much better than silicon because silicon is a semimetal.
- B Silicon and carbon both form similar structures, so have similar melting points.
- C Carbon and nitrogen form covalent bonds, so they have similar boiling points.
- D Neon and argon cannot form compounds and so have very low boiling points.

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Topic 2: Bonding and structure

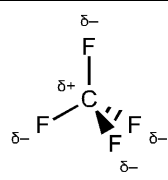
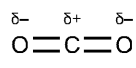
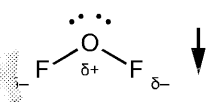
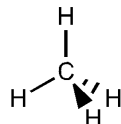
2A Bonding

20.			
A	✗	The structure is correct, but the description is incorrect.	Each potassium ion and is electrostatic
B	✓	KCl is ionic, so the electron structure should show that one electron from potassium has moved to chlorine, forming two ions. The ions are in giant ionic structures. Each positive ion is attracted to the negative ions in all directions and vice versa.	
C	✗	KCl is a covalent compound.	It is a compound of there must be ionic
D	✗	This is not a dative covalent bond.	Dative covalent bond donates both electron
21.			
A	✗	Double bond not shown	Carbon is group 4 so bonding. In this structure between the carbon, each carbon.
B	✗	Double bond not shown	
C	✓		
D	✗	Too many electrons per carbon	
22.			
A	✗	SO ₃ is trigonal planar.	
B	✗	BF ₃ is trigonal planar.	
C	✓	NH ₃ is pyramidal due to the lone pair on the nitrogen repelling the bonding pairs in the N-H bonds.	
D	✗	SF ₆ is octahedral.	
23.			
A	✗	$3.0 - 2.5 = 0.5$	Electronegativity is elements in the bond
B	✗	$2.1 - 2.0 = 0.1$	
C	✗	$3.0 - 2.5 = 1.0$	
D	✓	$3.0 - 1.5 = 1.5$	Two oxygen atoms so the polarity will be In AlCl ₃ , the difference in electronegativities is are very polar.

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24.			
A	✗	The C–F bond is very polar, but CF ₄ is symmetrical so the dipoles cancel out.	
B	✗	C=O bonds are polar, but CO ₂ is symmetrical so the dipoles cancel out.	
C	✓	The O–F bond is polar, and F ₂ O has a bent structure due to the lone pairs on oxygen, so the molecule is polar overall.	
D	✗	C–H bonds are not polar, and CH ₄ is symmetrical so the dipoles would cancel.	
25.			
A	✗	Hydrogen bonding does not occur between CH ₄ .	Hydrogen bonding occurs when hydrogen is attached to a highly electronegative atom (F, O, or N) which are all very electronegative.
B	✓	Induced dipole–dipole interactions exist between all molecules.	
C	✗	Covalent bonding does not occur between molecules.	Be careful — the question asks about interactions <i>between</i> molecules, not within.
D	✗	Neither 2 nor 3 occurs between molecules.	See A and C.
26.			
A	✓	Water molecules are <i>further apart</i> in ice, which is why ice is less dense than liquid water.	
B	✗	This is true.	
C	✗	This is why ice floats on water.	
D	✗	The open lattice structure of ice means that water molecules are further apart in ice than in liquid water, so the density of ice is less than the density of liquid water.	
27.			
A	✗	This is the opposite order.	Stronger intermolecular forces lead to a higher boiling point, as more thermal energy is required to overcome them.
B	✓	H ₂ O has hydrogen bonding. F ₂ has induced dipole–dipole interactions. Br ₂ has a greater degree of induced dipole–dipole interactions because it contains more electrons and is larger.	
C	✗	Not considered hydrogen bonding.	H ₂ O will have the strongest intermolecular forces because H ₂ O can form hydrogen bonds.
D	✗		

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28.			
A	✗	This is very short so will have a low boiling point.	The number of carbons and branching both affect boiling point. Short molecules like methane boil due to a low degree of intermolecular forces. As carbons are added to a molecule mean higher intermolecular forces and so more thermal energy is required to overcome these forces. Branching limits how close molecules can get and so C will have a lower boiling point than B.
B	✓	This is long and not branched so will have a high boiling point.	
C	✗	This has more carbons than B but is more branched, so will have a lower boiling point.	
D	✗	This is shorter than B so will have a lower boiling point.	
29.			
A	✓	Reactivity is not determined by hydrogen bonding between molecules.	Hydrogen bonding allows alcohols to be dissolved by water. Hydrogen bonding increases the thermal energy required to separate molecules. Hydrogen bonding increases the intermolecular forces, so more thermal energy is required to separate the molecules.
B	✗	Hydrogen bonding allows alcohols to be dissolved by water.	
C	✗	Hydrogen bonding increases the thermal energy required to separate molecules.	
D	✗	Hydrogen bonding increases the intermolecular forces, so more thermal energy is required to separate the molecules.	
30.			
A	✓	False	In graphite, carbon atoms are covalently bonded — not metal. The delocalised electrons are delocalised in graphite, which is why graphite is able to conduct electricity.
B	✗	True	There is no special relationship between nuclei and delocalised electrons. All electrons are attracted to all nuclei, both delocalised and in the shells.
C	✗	True	Metallic bonding describes all metals.
D	✗	True	The electrons move through the metallic lattice structure, as they are delocalised.

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