Chemistry for University Study [Mid-term]

2024

Examination Paper

Sample Assessment

Answer ALL questions in section A, section B and section C.

Time: 2 hours

The maximum mark for this paper is 100.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination.

Candidates are allowed to use a scientific calculator during this examination.

Section A – 25 MCQs Total 25 marks

Answer all the questions in this section – there is just ONE (1) correct answer for each multiple-choice question unless stated otherwise.

Marks

Question 1 (AC 1.1.1)

Which is the smallest unit of matter that participates in chemical reactions? **1**

a. Molecule
b. Atom
c. Ion
d. Element

Mark Scheme
b. Atom

Question 2 (AC 1.1.3)

How many atoms are in one mole of carbon atoms? **1**

a. 12
b. 6.022×10^{23}
c. It depends on the isotope
d. None of the above

Mark Scheme
a. 12

Question 3 (AC 2.3.3)

What is the empirical formula for glucose (C6H12O6)? **1**

a. CO_2
b. CH_2O
c. $C_6H_{12}O_6$
d. None of the above

Mark Scheme
b. CH_2O

		Marks
Question 4 (AC 2.3.2)		
What is the balanced equation for the combustion of methane (CH_4)?		**1**
a.	$CH_4 + O_2 \rightarrow CH_3O + H_2O$	
b.	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	
c.	$CH_4 + O_2 \rightarrow CO_2 + 2H_2O$	
d.	None of the above	
	Mark Scheme ***$CH_4 + O_2 \rightarrow CO_2 + 2H_2O$***	
Question 5 (AC 2.1.1)		
Which element is used as the standard for the unified atomic mass unit?		**1**
a.	Hydrogen	
b.	Carbon-12	
c.	Oxygen	
d.	Helium	
	Mark Scheme ***b. Carbon-12***	
Question 6 (AC 2.1)		
The relative atomic mass of an element is approximately equal to:		**1**
a.	The number of protons in its nucleus	
b.	The number of neutrons in its nucleus	
c.	The average mass of its atoms compared to 1/12 the mass of carbon-12	
d.	The sum of the masses of its protons and neutrons	
	Mark Scheme ***c. The average mass of its atoms compared to 1/12 the mass of carbon-12***	

		Marks
Question 7 (AC 2.1.2)		
Choose the INCORRECT definition:		**1**
a.	Relative atomic mass (Ar): Average mass of an atom of an element compared to u.	
b.	Relative isotopic mass: Mass of an isotope compared to u.	
c.	Relative molecular mass (Mr): Mass of a molecule compared to u.	
d.	Relative formula mass: Mass of a formula unit of a compound compared to u.	
	Mark Scheme ***a. Relative atomic mass (Ar): Average mass of an atom of an element compared to u.***	
Question 8 (AC 2.2)		
Which statement best defines the term mole in terms of the Avogadro constant (NA)?		**1**
a.	NA is the number of atoms in one mole of any element.	
b.	One mole of any substance contains NA molecules.	
c.	The mass of one mole of a substance is its relative formula mass in grams.	
d.	The Avogadro constant tells us the number of atoms in 12 grams of carbon-12	
	Mark Scheme ***b. One mole of any substance contains NA molecules.***	
Question 9 (AC 2.3.3)		
From an experiment, you find that 1.2 g of carbon reacts with 3.2 g of oxygen to produce 4.4 g of carbon dioxide. Calculate the empirical formula of the compound.		**1**
a.	*CO2*	
b.	*CO*	
c.	C2O	
d.	*C3O2*	
	Mark Scheme ***a. CO2***	

		Marks
Question 10 (AC 2.5.1)		
What is electronegativity?		**1**
a.	The size of an atom b	
b.	The power of an atom to attract electrons to itself	
c.	The number of electrons in an atom	
d.	The energy required to remove an electron from an atom	
	Mark Scheme ***c. The power of an atom to attract electrons to itself***	
Question 11 (AC 2.5.2)		
Which factor influences electronegativity in terms of nuclear charge, atomic radius, and shielding?		**1**
a.	Atomic radius only	
b.	Nuclear charge and atomic radius	
c.	Nuclear charge, atomic radius, and shielding	
d.	Nuclear charge only	
	Mark Scheme ***c. Nuclear charge, atomic radius, and shielding***	
Question 12 (AC 2.5.3)		
Which group in the periodic table generally has higher electronegativity values?		**1**
a.	Alkali metals	
b.	Halogens	
c.	Noble gases	
d.	Alkaline earth metals	
	Mark Scheme ***b. Halogens***	

		Marks
Question 13 (AC 2.7)		
What is metallic bonding		**1**
a.	Sharing of electrons between nonmetals	
b.	Transfer of electrons between metals and nonmetals	
c.	Electrostatic attraction between positive metal ions and delocalized electrons	
d.	Formation of covalent bonds in metals	
	Mark Scheme ***c. Electrostatic attraction between positive metal ions and delocalized electrons***	
Question 14 (AC 2.9.1)		
What theory is used to explain the shapes of molecules and bond angles?		**1**
a.	Bohr's theory	
b.	VSEPR theory	
c.	Quantum theory	
d.	Dalton's theory	
	Mark Scheme ***b. VSEPR theory***	
Question 15 (AC 3.2.3)		
What does the ideal gas law (pv = nRT) represent?		**1**
a.	The relationship between pressure and volume only	
b.	The relationship between volume and temperature only	
c.	The relationship between pressure, volume, and temperature for ideal gases	
d.	The relationship between the number of moles and gas constant only	
	Mark Scheme ***c. The relationship between pressure, volume, and temperature for ideal gases***	

		Marks
Question 16 (AC 3.4.2)		
What does a negative value of activation energy indicate?		**1**
a.	The reaction is slow	
b.	The reaction is spontaneous	
c.	The reaction is endothermic	
d.	The reaction is exothermic	
	Mark Scheme ***d. The reaction is exothermic***	
Question 17 (AC 3.5)		
Which law states that the total enthalpy change for a chemical reaction is the same regardless of the route taken?		**1**
a.	Avogadro's Law	
b.	Boyle's Law	
c.	Hess's Law	
d.	Charles's Law	
	Mark Scheme ***c. Hess's Law***	
Question 18 (AC 3.4.2)		
What is the role of a catalyst in a chemical reaction concerning the activation energy and reaction rate?		**1**
a.	Increases activation energy, increases reaction rate	
b.	Decreases activation energy, increases reaction rate	
c.	Increases activation energy, decreases reaction rate	
d.	Decreases activation energy, decreases reaction rate	
	Mark Scheme ***b. Decreases activation energy, increases reaction rate***	

		Marks
Question 19 (AC 3.6.3)		
What is a redox process?		**1**
a.	A physical change	
b.	A process involving electron transfer	
c.	A change in temperature	
d.	A change in colour	
	Mark Scheme ***b. A process involving electron transfer***	
Question 20 (AC 3.6.3)		
What is the term for a reaction where an element simultaneously undergoes oxidation and reduction?		**1**
a.	Redox reaction	
b.	Disproportionation reaction	
c.	Combination reaction	
d.	Decomposition reaction	
	Mark Scheme ***b. Disproportionation reaction***	
Question 21 (AC 3.8.2)		
According to Le Chatelier's principle, if a change is made to a system at dynamic equilibrium, the position of equilibrium moves to:		**1**
a.	Maximise the change	
b.	Neutralise the change	
c.	Minimise the change	
d.	Reverse the change	
	Mark Scheme ***c. Minimise the change***	

		Marks
Question 22 (AC 3.8.4)		
If the equilibrium constant Kc for a reaction is 1.5, what does this indicate about the concentrations of products and reactants at equilibrium?		**1**
a.	The concentration of products is greater than the concentration of reactants	
b.	The concentration of reactants is greater than the concentration of products	
c.	The concentrations of products and reactants are approximately equal	
d.	The reaction is not at equilibrium	
	Mark Scheme ***c. The concentrations of products and reactants are approximately equal***	
Question 23 (AC 3.8.3)		
How does an increase in temperature generally affect the equilibrium constant (KK) for an exothermic reaction?		**1**
a.	Increases KK	
b.	Decreases KK	
c.	Has no effect on KK	
d.	Changes unpredictably.	
	Mark Scheme ***b. Decreases KK***	
Question 24 (AC 3.8.10)		
In the Haber process for ammonia synthesis, what role does temperature play, and how does Le Chatelier's principle explain this choice?		**1**
a.	Low temperature, promoting the exothermic reaction; Le Chatelier's principle predicts an increase in ammonia yield	
b.	High temperature, promoting the exothermic reaction; Le Chatelier's principle predicts an increase in ammonia yield	
c.	Low temperature, promoting the endothermic reaction; Le Chatelier's principle predicts an increase in ammonia yield	
d.	High temperature, promoting the endothermic reaction; Le Chatelier's principle predicts an increase in ammonia yield	
	Mark Scheme ***c. Low temperature, promoting the endothermic reaction; Le Chatelier's principle predicts an increase in ammonia yield***	

		Marks
Question 25 (AC 3.8.10)		
How does an increase in pressure affect the Haber process, according to Le Chatelier's principle?		**1**
a.	Increases ammonia production	
b.	Decreases ammonia production	
c.	No effect on ammonia production	
d.	Converts ammonia into nitrogen gas	
	Mark Scheme ***a. Increases ammonia production***	

	Marks
SECTION B – 21 questions Total 45 marks long answer questions Answer ALL questions	
Question 26 (AC 1) General introduction of the whole topic	
Differentiate between intensive **and** extensive properties, providing examples of each.	**2**
Mark Scheme ***Intensive properties, like density and boiling point, are independent of the amount of matter, (1 mark) while extensive properties, like mass and volume, depend directly on the amount of matter present. (1 mark).***	
Question 27 (AC 1.1)	
What are atoms **and** molecules?	**2**
Mark Scheme ***Atoms are the smallest units of elements and consist of a nucleus (protons and neutrons) surrounded by electrons (1 mark). Molecules are composed of two or more atoms chemically bonded (1 mark)***	
Question 28 (AC 1.2)	
How do isotopes of an element differ?	**2**
Mark Scheme ***Isotopes of an element have the same number of protons, determining their chemical properties, (1 mark) but they differ in atomic mass due to varying numbers of neutrons. (1 mark)***	
Question 29 (AC 1.3.3)	
In the S, P, D and F subshells, give the maximum number of electrons?	**2**
Mark Scheme ***(1 mark for 2 correct answers, 2 marks for all FOUR (4) correct answers:) S subshell: Can hold a maximum of TWO (2) electrons.*** ***P subshell: Can hold a maximum of SIX (6) electrons.*** ***D subshell: Can hold a maximum of TEN (10) electrons.*** ***F subshell: Can hold a maximum of FOURTEEN (14) electrons.***	

	Marks
Question 30 (AC 1.3.9)	
What is a free radical **and** how are free radicals formed?	**2**
Mark Scheme ***A free radical is a chemical species with one or more unpaired electrons in its outer shell. (1 mark)*** ***Free radicals are often formed by the cleavage of covalent bonds, leaving an unpaired electron on each fragment. (1 mark)***	
Question 31 (AC 2.2)	
Define the mole **and** explain its importance in stoichiometry.	**2**
Mark Scheme ***The mole is a unit used to express the amount of a substance, containing Avogadro's number (6.022 x 10^{23}) particles. (1 mark)*** ***It is crucial in stoichiometry for counting, converting between mass and moles, balancing equations, and determining the quantities of reactants and products in chemical reactions. (1 mark)***	
Question 32 (AC 2.1)	
What is relative atomic mas **and** give its equation?	**2**
Mark Scheme ***The Relative atomic mass (Ar) is the weighted average mass of an atom of an element relative to one-twelfth (1/12th)the mass of an atom of carbon-12. (1 mark)*** ***Ar = $\frac{\text{sum of (Isotopic masses x percentage abundance)}}{\text{Total percentage abundance}}$ (1 mark)***	

	Marks
Question 33 (AC 2.1.1)	
Differentiate between relative atomic mass (Ar), relative isotopic mass, and relative molecular mass (Mr).	**3**
Mark Scheme ***Relative Atomic Mass (Ar): The average mass of atoms of an element compared to the mass of a carbon-12 atom, which is assigned a mass of exactly 12 atomic mass units (amu). (1 mark)*** ***Relative Isotopic Mass: The mass of a single isotope of an element compared to the mass of a carbon-12 atom. (1 mark)*** ***Relative Molecular Mass (Mr): The average mass of a molecule compared to the mass of a carbon-12 atom. (1 mark)***	
Question 34 (AC 2.2)	
Use the Avogadro constant (6.022×10^{23}) to convert 2 grams of sodium (Na) to moles.	**2**
Mark Scheme ***2 grams Na / 22.99 g/mol Na (1 mark) = 0.0868 mol Na (1 mark)***	
Question 35 (AC 2.2)	
How many moles are present in 1.21 x 1025 molecules of NH3?	**2**
Mark Scheme ***No. of moles = No. Of particles / Avogadro constant (1 mark)*** ***= 1.21 x 1025 / 6.02 x 1023 = 20.10 moles (1 mark)***	

	Marks
Question 36 (AC 2.3.3)	
Differentiate between molecular and empirical formulae **and** write the formulae for each	**2**
Mark Scheme ***Molecular formulae are formulae that show how many atoms of each element are present. E.g., A glucose molecule would be - C6H12O6. (1 mark)*** ***Empirical formulae show the proportion of each element in a molecule. E.g., A glucose molecule would be - CH2O. (1 mark)***	
Question 37 (AC 2.3.4)	
Provide an example of a compound that exists in both anhydrous and hydrated forms.	**2**
Mark Scheme ***Copper sulfate (1 mark) exists in anhydrous form as $CuSO_4$ and in hydrated forms such as $CuSO_4 \cdot 5H_2O$. (1 mark)***	
Question 38 (AC 2.4)	
State what is meant by the term "*reacting masses*" **and** define percentage yield in the context of reacting masses.	**2**
Mark Scheme ***Reacting masses refer to the amounts of substances participating in a chemical reaction. (1 mark)*** ***Percentage yield is a measure of the efficiency of a chemical reaction and is calculated by dividing the actual yield by the theoretical yield and multiplying by 100. (1 mark)***	
Question 39 (AC 2.5.3)	
How does electronegativity change across a period in the periodic table?	**2**
Mark Scheme ***Electronegativity generally increases across a period from left to right. (1 marks) This is because moving across a period, the effective nuclear charge increases, leading to a stronger attraction for electrons in the outermost shell. (1 mark)***	

	Marks
Question 40 (AC 2.5.4)	
Explain the role of electronegativity difference in predicting bond types.	**2**
Mark Scheme ***Electronegativity difference is the numerical gap between the electronegativity values of two atoms. A larger difference indicates a greater tendency for ionic bonding, (1 mark) while a smaller difference suggests covalent bonding.(1 mark) It helps predict the sharing or transfer of electrons in a chemical bond.***	
Question 41 (AC 2.6.1)	
How are ions formed in the context of ionic bonding?	**2**
Mark Scheme ***Ions are formed through the transfer of electrons from one atom to another. The atom losing electrons becomes a positively charged ion (cation),(1 mark) while the one gaining electrons becomes a negatively charged ion (anion). (1 mark)***	
Question 42 (AC 3.1)	
Define the solid, liquid, and gaseous states of matter.	**3**
Mark Scheme ***Solids have strong forces of attraction in between them which allows them to form a regular lattice arrangement. All particles keep their position, only vibrate slightly in the same place. (1 mark)*** ***Liquids have weaker forces than solids, but stronger than gases. This allows them to move around each other, but they still keep in contact. So they have a certain volume but a variable shape. (1 mark)*** ***Gases have the weakest forces of all and are far apart filling any container they are in. They move around in random motion, moving faster as heat increases colliding with anything in their way including other particles and the container. (1 mark)***	

	Marks
Question 43 (AC 3.2.2)	
Explain the relationship between breaking **and** making bonds and energy changes in a reaction.	**2**
Mark Scheme ***Breaking bonds absorbs energy (endothermic), (1 mark) and making bonds releases energy (exothermic), leading to overall energy changes during a reaction. (1 mark)***	
Question 44 (AC 3.4.2)	
How is the enthalpy change indicated on a reaction pathway diagram?	**2**
Mark Scheme ***The enthalpy change is represented by the difference in energy levels between the reactants and products (1 mark), showing whether the reaction is exothermic or endothermic (1 mark)***	
Question 45 (AC 3.4.7)	
In an experiment, 1.1g of an organic liquid fuel was completely burned in oxygen. The heat formed during this combustion raised the temperature of 110g of water from 290K to 335K. Calculate the standard enthalpy of combustion ΔcH of the fuel, where its Mr is 55.	**3**
Mark Scheme ***Step 1: Amount of heat given out by the fuel using the equation q = mcΔT*** ***= 110 x 4.18 x (335-290)= 20691J or 20.691kJ (1 mark)*** ***Step 2: Find the mass of fuels that produced this heat.*** ***n = mass / Mr = 1.1 / 55 = 0.02 moles of fuel (1 mark)*** ***Step 3: The standard enthalpy of combustion involves 1 mole of fuel. So ΔcH = q / n*** ***= - 20.691kJ / 0.02*** ***= -1034.55 kJ mol-1 (1 mark)*** ***(q is negative here as combustion is an exothermic reaction).***	

	Marks
Question 46 (AC 3.6.1)	
In a compound, what is the oxidation number of the alkaline earth metals (Group 2) **and** can the oxidation number of an element change within a compound or ion?	**2**
Mark Scheme **A.** ***The oxidation number of alkaline earth metals in compounds is +2. (1 mark)*** **B.** ***Yes, the oxidation number of an element can change within a compound or ion, depending on the specific bonding and electron distribution. (1 mark)***	

	Marks
SECTION C – 5 questions Total 30 marks long answer questions **Answer ALL questions**	
Question 47 (AC 1.1.7)	
Describe the trends in atomic radius across a period and down a group in the periodic table. How do factors such as effective nuclear charge and energy levels contribute to these variations?	**6**
Mark Scheme ***Across a period, atomic radius generally decreases due to an increase in effective nuclear charge (1 mark). Electrons are added to the same energy level, leading to a stronger attraction to the nucleus. (1 mark)*** ***Down a group, atomic radius increases because electrons occupy higher energy levels, resulting in a larger atomic size (1 mark). The influence of additional energy levels outweighs the increased nuclear charge. (1 mark)*** ***Effective nuclear charge, representing the net positive charge felt by outer electrons, plays a crucial role in these trends, pulling electrons closer to the nucleus and reducing atomic size (1 mark). Across a period, the increasing effective nuclear charge tends to reduce atomic radius, while down a group, the addition of energy levels counteracts this effect, leading to an overall increase in atomic radius. (1 mark)***	

	Marks
Question 48 (AC 1.4.1 & 1.4.2)	
State what ionisation energy is **and** give equations to illustrate the first, second, third and fourth ionisation energy of Beryllium.	**5**
Mark Scheme ***Ionisation energy is the energy required to remove ONE (1) mole of electrons from ONE (1) mole of atoms in the gaseous state, resulting in the formation of a positively charged ion. (1 mark & 4 marks for the FOUR (4) equations)***	

Ionisation Energy	Equation
First	$Be\,(g) \longrightarrow Be^{+}(g) + e^{-}$
Second	$Be^{+}(g) \longrightarrow Be^{2+}(g) + e^{-}$
Third	$Be^{2+}(g) \longrightarrow Be^{3+}(g) + e^{-}$
Fourth	$Be^{3+}(g) \longrightarrow Be^{4+}(g) + e^{-}$

	Marks
Question 49 (AC 2.5.1 & 2.5.2)	
What is electronegativity **and** explain TWO (2) factors that affect electronegativity.	**7**
Mark Scheme ***Electronegativity is the tendency of atoms to attract electrons to themselves. (1 mark)*** ***Several factors that affect electronegativity are:*** ***<u>Nuclear charge: (2 marks)</u>*** ***There is attraction between the positively charged protons in the nucleus and the negatively charged electrons found in the energy levels of an atom.*** ***The increase in the number of protons leads to the increase in nuclear attraction for the electrons in the outer shells.*** ***Hence, an increase in the nuclear charge results in an increase in electronegativity.*** ***<u>Atomic radius: (2 marks)</u>*** ***The distance between the nucleus and the electron in the outermost shell is the atomic radius.*** ***Electrons closer to the nucleus are more strongly attracted towards its positive nucleus, and electrons that are further away from the nucleus are less strongly attracted towards the nucleus.*** ***Hence, an increased atomic radius results in a decreased electronegativity.*** ***<u>Shielding: (2 marks)</u>*** ***The effect of the nuclear charge can be shielded by the filled energy levels, causing the outer electrons to be less attracted to the nucleus.*** ***Hence, the addition of extra shells and subshells in an atom will cause the outer electrons to have less attractive force of the nucleus.*** ***So, an increased number of inner shells and subshells will result in a decreased electronegativity.***	

	Marks
Question 50 (AC 3.2.3)	
A. Illustrate **and** explain the ideal gas equation. B. Also, suppose there are TWO (2) moles of an ideal gas occupying a volume of 3.00 L at a temperature of 300 K. What is the pressure of the gas?	**6**
Mark Scheme ***A. The ideal gas equation can be used to calculate the volume or Mr of a gas.*** ***The equation is: pV = nRT, where-*** ***p = Pressure measured in pascals (Pa)*** ***V = Volume measured in m3*** ***n = Number of moles (mol)*** ***R = The gas constant, 0.0821L·atm/mol·K*** ***T = Temperature measured in Kelvin (K) (3 marks)*** ***B. pV = nRT*** ***p = nRT / V*** ***p = (2 moles x 0.0821L·atm/mol·K x 300K) / 3.00L*** ***p = 16.42 atm*** ***So, the pressure of the gas is approximately 16.42 atm. (3 marks)***	

	Marks
Question 51 (AC 3.7.3)	
Explain how Le Chatelier's principle can be qualitatively applied to predict the effects of changes in temperature, concentration, and pressure change.	**6**
Mark Scheme ***<u>Effects of Changes on a System at Equilibrium:</u>*** 1. ***Temperature Changes: (2 marks)*** ***Effect on Exothermic Reactions: If the reaction is exothermic (produces heat), increasing the temperature will shift the equilibrium position towards the left (towards the reactants) to absorb the excess heat. Conversely, decreasing the temperature will shift it to the right.*** ***Effect on Endothermic Reactions: For endothermic reactions (absorb heat), increasing the temperature will shift the equilibrium to the right (towards the products) to absorb more heat, while decreasing the temperature will shift it to the left.*** 2. ***Concentration Changes: (2 marks)*** ***Addition of Reactants or Products: If more reactants are added, the equilibrium will shift to the right to consume the added reactants. If products are added, the equilibrium will shift to the left to consume the added products.*** ***Removal of Reactants or Products: Removing reactants will shift the equilibrium to the left, while removing products will shift it to the right, as the system tries to replace the removed substances.*** 3. ***Pressure Changes: (2 marks)*** ***Increasing Pressure: In a gaseous system, increasing pressure will shift the equilibrium towards the side with fewer moles of gas to reduce the pressure. Conversely, decreasing pressure will shift it towards the side with more moles of gas.*** ***No Effect for Equal Moles: If the number of moles of gas is equal on both sides of the equilibrium, changes in pressure will have a minimal effect.***	

End of paper

Learning Outcomes matrix

Question	Learning Outcomes / Assessment Criteria assessed	Marker can differentiate between varying levels of achievement
Section A		
1	1.1.1	Yes
2	1.1.3	Yes
3	2.3.3	Yes
4	2.3.2	Yes
5	2.1.1	Yes
6	2.1	Yes
7	2.1.2	Yes
8	2.2	Yes
9	2.3.3	Yes
10	2.5.1	Yes
11	2.5.2	Yes
12	2.5.3	Yes
13	2.7	Yes
14	2.9.1	Yes
15	3.2.3	Yes
16	3.4.2	Yes
17	3.5	Yes
18	3.4.2	Yes
19	3.6.3	Yes
20	3.6.3	Yes
21	3.8.2	Yes
22	3.8.4	Yes
23	3.8.3	Yes
24	3.8.10	Yes
25	3.8.10	Yes
Section B		
26	LO 1 in general	Yes
27	1.1	Yes
28	1.2	Yes
29	1.3.3	Yes
30	1.3.9	Yes
31	2.2	Yes
32	2.1	Yes
33	2.1.1	Yes
34	2.2	Yes
35	2.2	Yes
36	2.3.3	Yes
37	2.3.4	Yes
38	2.4	Yes
39	2.5.3	Yes
40	2.5.4	Yes
41	2.6.1	Yes

42	3.1	Yes
43	3.2.2	Yes
44	3.4.2	Yes
45	3.4.7	Yes
46	3.6.1	Yes
Section C		
47	1.1.7	Yes
48	1.4.1 & 1.4.2	Yes
49	2.5.1 & 2.5.2	Yes
50	3.2.3	Yes
51	3.7.3	Yes

Learning Outcome	Pass (40-59%)	Merit (60-69%)	Distinction (70-100%)
1.Be able to define, analyse and discuss the atom and its particles as well as isotopes, electrons, energy levels, atomic orbitals and ionisation energy.	Demonstrates an adequate awareness and understanding of concepts, terminology and processes with a reasonable discussion and application of principles and satisfactory reference to theory and science.	Demonstrates a consistent and accurate awareness and understanding of concepts, terminology and processes with a detailed discussion and application of principles and precise reference to theory and science.	Demonstrates an outstanding awareness and understanding of concepts, terminology and processes with a highly comprehensive and sophisticated discussion and application of principles and critical and meticulous reference to theory and science.
2.Be able to define, analyse and discuss atoms, molecules, stoichiometry and chemical bonding.			
3.Be able to define, analyse and discuss states of matter, energy changes in chemistry as well as electrochemistry and chemical equilibria.			
4.Be able to define, analyse and discuss the kinetics of reactions.			
5.Be able to recognise, analyse and discuss the Periodic Table and chemical periodicity with focus on Group 2 and Group 17 elements.			
6.Be able to recognise, analyse and discuss Hydrocarbons, compounds (Halogen, Hydroxy, Carbonyl), Esters,			

Carboxylic acids and their derivatives.			
7.Be able to recognise, analyse and discuss nitrogen compounds, polymerisation, organic synthesis and analytical techniques.			