

Marking Scheme
3E Chemistry WA 1 2026

Mark scheme will use these abbreviations

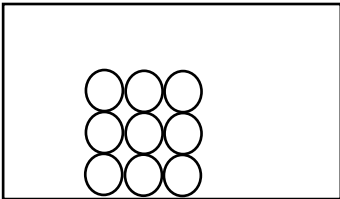
/	alternatives
+	statements on both sides of the + are needed for that mark
R	reject
A	accept (for answers correctly cued by the question)
lg	ignore as irrelevant
ref	with reference to
ecf	error carried forward
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point
ORA	or reverse argument
OWTTE	or words to that effect
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)
()	the word / phrase in brackets is not required but sets the context

Section A – MCQ

1	2	3	4	5
A	D	A	C	D

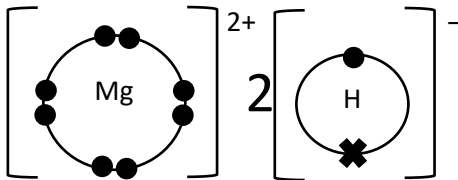
Section B – Structured Questions

Qn	Marking Scheme						Marks
6a	experiment	gas 1	gas 2	water level at U			
				increases	remains the same	decreases	
	1	carbon dioxide (CO ₂)	propane (C ₃ H ₈)		✓		
	2	carbon dioxide (CO ₂)	ammonia (NH ₃)			✓	
6b	1. Nitrogen has a relative <u>molecular mass of 28</u>, which is lower than that of carbon dioxide, which has a relative <u>molecular mass of 44</u>, but higher than that of ammonia, which has a relative <u>molecular mass of 17</u>. 2. As such, nitrogen <u>diffuses out of the porous pot faster than carbon dioxide diffuses in in the left beaker but slower out of the porous pot than ammonia gas diffuses in in the right beaker</u>, causing water level at U to decrease. ACCEPT 1 m ammonia & carbon dioxide molecular mass calculated correct & correct use of diffusion concept						2

7a	argon and carbon dioxide	1
7b	• Particles close together and orderly arrangement • At least 3 by 3 arrangement 	
7c	1. Oxygen particles change from <u>sliding past one another</u> to <u>moving rapidly in any direction</u>. 2. Oxygen particles change from being <u>close together</u> and disorderly, to <u>far apart</u> and disorderly. ACCEPT: 1m for liquid arrangement + movement	2
7d	1. Argon has an electronic configuration of <u>2, 8, 8</u>. 2. It is unreactive as it has a <u>fully-filled valence shell</u>.	2

Section C – Free Response Questions

Qn	Marking Scheme					Marks																
8ai	<table><tr><th>isotope</th><th>number of protons</th><th>number of neutrons</th><th>number of electrons</th><th>nuclide notation</th></tr><tr><td>hydrogen</td><td>1</td><td>0</td><td>1</td><td>${}^1_1\text{H}$</td></tr><tr><td>deuterium</td><td>1</td><td>1</td><td>1</td><td>${}^2_1\text{H}$</td></tr><tr><td>tritium</td><td>1</td><td>2</td><td>2</td><td>${}^3_1\text{H}$</td></tr></table>	isotope	number of protons	number of neutrons	number of electrons	nuclide notation	hydrogen	1	0	1	${}^1_1\text{H}$	deuterium	1	1	1	${}^2_1\text{H}$	tritium	1	2	2	${}^3_1\text{H}$	1
isotope	number of protons	number of neutrons	number of electrons	nuclide notation																		
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ACCEPT D for deuterium & T for tritium																						
8aii	1. Hydrogen, deuterium and tritium atoms contain <u>one proton</u> each 2. Deuterium atom has one more neutron than hydrogen atom, while tritium atom has two more neutrons than hydrogen atom / Hydrogen atom has one neutron, deuterium atom has two neutrons while tritium atom has three neutrons. 1m – understanding of isotope 1m – use of data					2																
8aiii	They all have <u>one positively-charged proton and one negatively-charged electron/ equal number of positively-charged protons and negatively-charged electrons.</u>					1																
8aiv	1. D₂O has similar chemical properties as H₂O, hence heavy water will not disrupt biological processes/ used in the same way in the body 2. Deuterium atoms are twice as heavy as compared to hydrogen atoms, hence they can be detected using analytical techniques like Mass Spectrometry. ACCEPT: heavier and link it back to Mass Spectrometry (detect)					2																

	REJECT: monitor 1m for stating both correct properties without providing sufficient explanations to support												
8bi		<table><tr><th>name of ion</th><th>chemical symbol</th><th>number of electrons</th></tr><tr><td>hydrogen ion</td><td>H⁺</td><td>0</td></tr><tr><td>hydride ion</td><td>H⁻</td><td>2</td></tr></table>	name of ion	chemical symbol	number of electrons	hydrogen ion	H ⁺	0	hydride ion	H ⁻	2		1
name of ion	chemical symbol	number of electrons											
hydrogen ion	H ⁺	0											
hydride ion	H ⁻	2											
8bii				2									
8c	1. Like Group 1 metals, hydrogen atom only contains 1 electron in its valence shell. 2. However, hydrogen atoms can gain or lose 1 electron to form hydride / hydrogen ions, while Group 1 atoms only lose 1 electron to form ions with +1 charge. 1m for explaining using electrons OR ions for marking point 2 (do not need to talk about both)			2									
9a	Silver chloride is insoluble in water while most ionic compounds are soluble in water. REJECT: insoluble in water and ethanol, solubility property			1									
9b	1. Silver chloride has a giant ionic lattice structure, 2. with strong electrostatic forces of attraction/ strong ionic bonds, 3. which requires a large amount of energy to overcome/ break, resulting in a high melting and boiling point.			3									