PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 2: STATES OF MATTER AND MIXTURES: STATES OF MATTER (PAPER 1)

SCORE	PERCENTAGE
/68	%

STEMUP

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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking • simple covalent / simple molecular (1) • (because) <u>weak</u> intermolecular forces (of attraction) (1) • (so) only a small / low amount of {energy/heat} is needed (to break these forces) (1)	reject ionic / ions for MP1 & MP2 only ignore covalent alone allow weak intermolecular bonds reject weak covalent bonds reject hydrogen bonds reject weak (intermolecular) forces between bonds ignore less {energy / heat} reject breaking {covalent / ionic} bonds	**(3)** **AO1.1**

Question number	Answer	Mark
(ii)	**C** less less is the only correct answer **A** is incorrect as the particles will have less energy **B** is incorrect as the particles will move less **D** is incorrect as the particles will have less energy and move less	**(1)** **AO1.1**

Question number	Answer	Mark
(iii)	**B** Fractional distillation **A**, **C** and **D** are not correct as they would not separate oxygen and nitrogen	**(1)** **AO2.2**

(**QU03b 1SC0/1CH, June 2025**)

Q2.

Question Number	Answer	Additional guidance	Mark
	particles at A: white circles only, none touching (1) particles at B: white circles only, randomly arranged, more circles than in A (1)	 reject 'strings' of particles if black circles are present in both boxes allow 1 mark if arrangement of particles in both boxes is otherwise correct.	**(2)** AO 2 1

(**Q16 1SC0/1CF, June 2018**)

Q3.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	A description including carbon (1) atom(s) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	covalent Ignore giant molecular		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	fractional distillation (2)	distillation fractionation	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)	**A** 0.25		**(1)**

Question Number		Indicative Content	Mark
QWC	*** (d)**	A description/explanation including some of the following points content could be shown in diagram(s) **practical procedure** • ignite magnesium /put magnesium in (Bunsen) flame • use of tongs/crucible / tube or gas jar of {oxygen/air} • lift lid (to let air in)- if crucible used • magnesium burns/oxidises/exothermic reaction • (bright) white {flame/light} • white powder/ash/solid formed **bonding** • magnesium atoms have 2 electrons in the outer shell • magnesium atoms {lose/transfer} electrons • form Mg^{2+}/ions with positive charge • oxygen atoms have 6 electrons in the outer shell • oxygen atoms gain electrons • forms O^{2-}/ions with negative charge • {8 electrons in /full/complete} outer shell • two electrons transferred/gained/lost • ions with opposite charges attract each other/ Mg^{2+} attracts O^{2-} ions	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. magnesium burns / magnesium atoms lose electrons • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. magnesium burns with a white flame / magnesium forms positive ions and oxygen forms negative ions • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description including the experiment and bonding e.g. magnesium burns with a white flame, magnesium atoms give their 2 outer electrons to oxygen atoms • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for Question = 12 marks)

(**Q05 1SC0/1CF, June 2014**)

Q4.

Question Number	Answer	Additional guidance	Mark
	An explanation linking from B to C: graph flat because • particles in solid use energy to {break out of lattice / break (intermolecular) bonds (between particles) / particles becoming randomly arranged / turn solid to liquid} (1) and any three from from A to B: graph rises because • particles in solid in a lattice / fixed (mean) positions (1) • vibrate more (rapidly) (as temperature increases) (1) from C to D: graph rises because • particles in liquid move past one another / randomly (1) • particles move more (rapidly) (as temperature increases) (1)	 may be shown as a diagram / on graph may be shown as a diagram / on graph ignore references to gas / evaporation / boil	**(4)** AO 3 2a AO 3 2b

(**Q10 1SC0/1CH, June 2018**)

Q5.

Question Number	Answer	Additional guidance	Mark
	An explanation linking • physical changes do not result in formation of a new substance / chemical change results in formation of a new substance (1) • physical change is easily reversed / chemical change is not easily reversed (1)	 allow no chemical **reaction** has taken place ignore you can see the change	**(2)** AO 1 1

(**Q17 1SC0/1CF, June 2018**)

Q6.

Question number	Answer	Additional guidance	Mark
	A description including any three from: SOLUTION • (the ions) are (freely) moving (1) • (the ions) are randomly arranged (1) SOLID • (the ions) are fixed/ not moving/ vibrating (1) • (the ions) are in a regular arrangement/ lattice/ giant structure (1)	allow atoms or particles for ions reject molecules once allow suitable diagrams (could score MP2, MP4) ignore any reference to bonding allow liquid for solution ignore flowing ignore have less energy allow in rows/ tightly packed/ close together	**AO1 1 (3)**

(**QU05d 1SC0/1CH, June 2023**)

Q7.

Question number	Answer	Additional guidance	Mark
	• particles are same size when they should be different sizes (1) • model is in 2D but crystal is 3D (1)	Allow reverse statements giving correct information.	**(2)**

(**Q05ai 1SC0/1CH, SAM 2016**)

Q8.

Question number	Answer	Additional guidance	Mark
	Arrangement – 1 mark max in a solid (particles are): • regularly arranged/ close(r) / in lattice / fixed (position) (1) OR in a liquid (particles are): • randomly arranged / further apart (1) **Movement – 1 mark max** in a solid (particles): • vibrate / do not move (around) (1) OR In a liquid (particles): • move (1)	answer for one state will be taken to imply opposite for other; but if both given, both must be correct OR one correct and one an ignore allow uniformly arranged / in a fixed shape / (tightly) packed together / in lines / in layers / in rows / ordered / organised ignore compact(ed) / attached / bonded / particles touching allow spread out / space between particles reject do not move much "They" is assumed to mean particles allow suitable diagrams allow answers in either space	**(2) AO1-1**

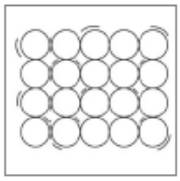
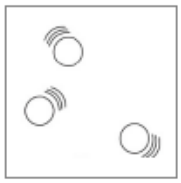
(**Q01a 1SC0/1CF, June 2022**)

Q9.

Question number	Answer	Mark
	An answer that provides a description by making reference to **two** of the following points: • molecules become closer (1) • molecules lose energy (1) • molecules slow down (1)	**(2)**

(**Q01ci 1SC0/1CF, SAM 2016**)

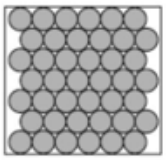
Q10.

Question number	Answer	Additional guidance	Mark
(i)	 solid (1) (regular arrangement and touching)  gas (1) (widely spaced, fewer shown)		2

Question number	Answer	Additional guidance	Mark
(ii)	condensing / condensation		1

(**Q03d 1SC0/1CF, Nov 2020**)

Q11.

Question number	Answer	Additional guidance	Mark
		all particles should be arranged regularly allow overlapping circles should be at least 3 rows/columns, each row can be directly over the one below	(1) AO 1-1

(**Q01a 1SC0/1CF, June 2024**)

Q12.

Question number	Answer	Additional guidance	Mark
	An explanation linking: • (when heated) changes to a solid (1) • (when cooled) stays solid / doesn't change back / change is permanent / change is irreversible (1)	allow it does not {boil / form gas}/ colour change (must be goes white if specified) / new substance forms ignore 'changes state' / (chemical) reaction occurs allow doesn't go back to liquid / cannot change back	(2) AO2-1

(**Q01d 1SC0/1CF, June 2022**)

Q13.

Question number	Answer	Mark
(i)	**D** fast random is the only correct answer **A** is incorrect as particles move fast and are random in a gas **B** is incorrect as particles move fast in a gas **C** is incorrect as particles are random in a gas	(1) AO 1-1

Question number	Answer	Additional guidance	Mark
(ii)	the boiling point of wax is higher than the boiling point of water / the boiling water is not hot enough	comparison needed allow (water) not {heated/hot} enough / temperature not hot enough	(1) AO 2-1

(**Q01c 1SC0/1CF, June 2024**)

Q14.

Question number	Answer	Mark
	• Bunsen burner (1) • test tube (1)	(2)

(**Q01aii 1SC0/1CF, SAM 2016**)

Q15.

Question number	Answer	Mark
(i)	**C** freezing is the only correct answer **A** is incorrect as condensing is gas to liquid **B** is incorrect as evaporating is liquid to gas **D** is incorrect as melting is solid to liquid	(1) AO 1-1

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking: • it is reversible (1) • no new substance is made (1)	 allow a description of reversible / not a permanent change allow the {substance / compound} does not change /it is only a change of state / not a chemical reaction / it is the same product ignore no {bonds/intermolecular forces} are broken	(2) AO 2-1

(**Q01b 1SC0/1CF, June 2024**)

Q16.

Question number	Answer	Additional guidance	Mark
	evaporation	do not accept 'boiling'	(1)

(**Q01b 1SC0/1CF, SAM 2016**)

Q17.

Question number	Answer	Mark
	liquid solid gas • all three correct (2) • one/two correct (1)	(2)

(**Q01ai 1SC0/1CF, SAM 2016**)

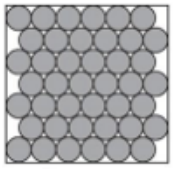
Q18.

Question number	Answer	Mark
	C freezing The only correct answer is **C**. **A** is incorrect because condensation is when a gas changes into a liquid. **B** is incorrect because evaporation is when a liquid changes into a gas. **D** is incorrect because melting is when a solid changes into liquid.	**(1)**

(**Q01a 1SC0/1CF, June 2019**)

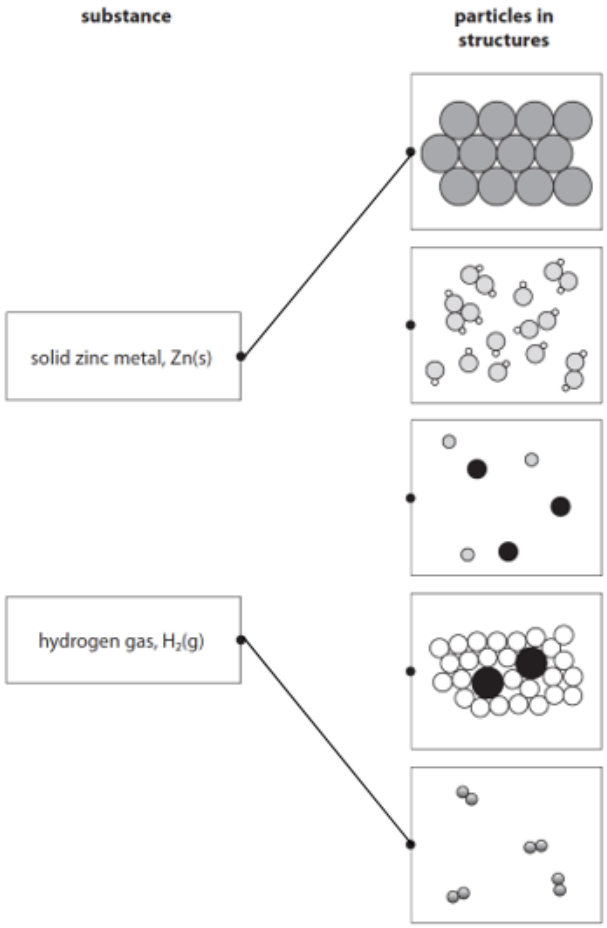
Q19.

Question number	Answer	Mark
(i)	**C** melting is the only correct answer **A**, B and **D** are not correct because they are names for other changes of state	**(1)** **AO1-1**

Question number	Answer	Additional guidance	Mark
(ii)	**B** 	is the only correct answer **A**, **C** and **D** are not the arrangement of particles in the solid state of a pure substance	**(1)** **AO1-1**

(**QU02a 1SC0/1CF, June 2025**)

Q20.

Question number	Answer	Mark
	 Each line 1 mark Do not award mark if more than one line joins the left hand boxes with those on the right (2)	(2)

(**Q01d 1SC0/1CF, June 2019**)

Q21.

Question Number	Answer	Mark
	C 30 2403 **The only correct answer is C** ***A*** *is not correct because it will be a solid above 80 °C* ***B*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C* ***D*** *is not correct because it will be a liquid at 20 °C and gas at 80 °C*	**(1)** AO 1 1

(**Q08 1SC0/1CH, June 2018**)

Q22.

Question number	Answer	Additional guidance	Mark
(i)	freezing / solidifying / solidification	ignore frozen	(1) AO1

Question number	Answer	Mark
(ii)	<table><tr><td>the molecules move faster in water than in ice</td><td>✓ (1)</td></tr><tr><td>the molecules are more randomly arranged in ice than in water</td><td></td></tr><tr><td>the molecules start moving when water becomes ice</td><td></td></tr><tr><td>the molecules are arranged regularly in ice but not in water</td><td>✓ (1)</td></tr><tr><td>the molecules have more energy in ice than in water</td><td></td></tr></table> Allow any marks in the boxes. If three boxes are ticked, give **one** mark **only** if **both** correct boxes are ticked If four or five boxes ticked, no marks awarded	(2) AO1

(**Q01a 1SC0/1CF, Nov 2021**)

Q23.

	Answer	Acceptable answers	Mark
	A description to include • green (1) • (and) red (1)	{combination of / mixture of / two} colours (1) note: if all three colours mentioned (1)	**(2)**

(**Q14 1SC0/1CF, June 2013**)

Q24.

Question number	Answer	Mark
(i)	2 / two (minutes)	(1)

Question number	Answer	Additional guidance	Mark
(ii)	6 - 2 (= 4) / 4 / four (minutes)	Any other manipulation of numbers leading to the answer 4 scores 0	(1)

(**Q01b 1SC0/1CF, June 2019**)

Q25.

Question number	Answer	Additional guidance	Mark
(i)	evaporation / evaporating	allow boiling / vaporisation do not allow boiling point / bpt	AO1-1 (1)

Question number	Answer	Additional guidance	Mark
(ii)	56 (°C)		AO3-1 (1)

Question number	Answer	Additional guidance	Mark
(iii)	6 (minutes)		AO3-1 (1)

Question number	Answer	Additional guidance	Mark
(iv)	answers between 49 and 51 score 1 mark with or without working. 75 – 25 = 50 (1)	allow readings between 74 and 76	AO3-1 (1)

(**Q01b 1SC0/1CF, June 2023**)

Q26.

Question number	Answer	Additional guidance	Mark
(i)	**Z**	allow z	**(1)**

Question number	Answer	Additional guidance	Mark
(ii)	**Y**	allow y	**(1)**

(**Q01c 1SC0/1CF, June 2019**)

Q27.

Question number	Answer	Mark
	D melting is the only correct answer **A** is not correct as condensing is gas to liquid **B** is not correct as evaporating is liquid to gas **C** is not correct as freezing is liquid to solid	**(1)** **AO1-1**

(**Q01b 1SC0/1CF, June 2022**)