



Mark Scheme (Results)

November 2021

Pearson Edexcel International GCSE

In Chemistry (Single Award) (4SS0) Paper 1C

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks									
1 (a)	<table border="1"> <thead> <tr> <th></th> <th>Proton</th> <th>Electron</th> </tr> </thead> <tbody> <tr> <td>Relative mass</td> <td>1</td> <td>1/1700 to 1/2000 (or 0.0005 to 0.0006)</td> </tr> <tr> <td>Relative charge</td> <td>(+)1</td> <td>-1</td> </tr> </tbody> </table>		Proton	Electron	Relative mass	1	1/1700 to 1/2000 (or 0.0005 to 0.0006)	Relative charge	(+)1	-1	<p>all 4 correct = 2 marks 2 or 3 correct = 1 mark 0 or 1 correct = 0 marks</p> <p>ALLOW +1 for relative mass of proton but REJECT -1</p>	2
	Proton	Electron										
Relative mass	1	1/1700 to 1/2000 (or 0.0005 to 0.0006)										
Relative charge	(+)1	-1										
(b) (i)	<table border="1"> <tbody> <tr> <td>Atomic number of atom</td> <td>7</td> </tr> <tr> <td>Mass number of atom</td> <td>15</td> </tr> <tr> <td>Group number of element in Periodic Table</td> <td>5</td> </tr> </tbody> </table>	Atomic number of atom	7	Mass number of atom	15	Group number of element in Periodic Table	5	1 mark for each correct row	3			
Atomic number of atom	7											
Mass number of atom	15											
Group number of element in Periodic Table	5											
(ii)	nitrogen	1										
(iii)	3-	ACCEPT -3, N ³⁻ , N ⁻³	1									
Total for question 1 = 7 marks												

Question number	Answer	Notes	Marks
2 (a)	(i) (simple) distillation	REJECT fractional distillation	1
	(ii) M1 a way of cooling side arm/test tube M2 (so) water vapour/steam cools/condenses	ALLOW any method of cooling eg beaker of ice around beaker ALLOW use a condenser	2
(b)	(i) M1 correct measurement of distance moved by the spot common to A and C M2 correct measurement of distance moved by the solvent M3 use and evaluation of $R_f = \frac{\text{distance moved by spot}}{\text{distance moved by solvent}}$	ALLOW 2.2-2.5 ALLOW 7.3-7.5 eg $\frac{2.3}{7.4} = 0.31$ ALLOW 1-4 sig fig but must be correctly rounded ALLOW ECF from M1 M2 as long as only one spot distance in M1 and $R_f < 1$	3
	(ii) use a different solvent	ALLOW any named solvent e.g. ethanol	1
Total for question 2 = 7			

Question number	Answer	Notes	Marks
3 (a)	(i) evaporation	ALLOW evaporating / boiling	1
	(ii) condensation	ALLOW condensing	1
	(iii) sublimation	ALLOW subliming	1
(b)	(i) ring of solid drawn closer to the hydrochloric acid end of the tube		1
	(ii) diffusion	ALLOW diffusing	1
	(iii) $\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$		1
	(iv) Any two from: M1 (gas particles) move in random directions OWTTE M2 (gas particles) collide with air / other particles M3 (gas particles) collide with the walls / sides (of the tube) OWTTE	ALLOW do not travel in straight lines ALLOW air / other particles slow them down IGNORE any references to rate of reaction	2
Total for question 3 = 8 marks			

Question number	Answer	Notes	Marks
4 (a)	glowing splint relights		1
(b)	M1 filter off the solid M2 dry the solid M3 same mass of solid / 1 g of solid	ALLOW decant/pour off liquid	3
(c)	M1 (smooth) curve above original curve M2 levels out at 40 cm ³ (before 150 sec)		2
Total for question 4 = 6 marks			

Question number	Answer	Notes	Marks
5 (a)	<p>Test for sodium ions</p> <p>M1 do a flame test</p> <p>M2 yellow flame</p> <p>Test for carbonate ions</p> <p>M3 add acid</p> <p>M4 (bubble the) gas/carbon dioxide into limewater</p> <p>M5 which turns cloudy</p>	<p>ALLOW any description of a flame test</p> <p>ALLOW orange or yellow-orange</p> <p>ALLOW any named acid</p> <p>ALLOW aqueous calcium hydroxide</p> <p>M4 dep on M3</p> <p>ALLOW milky / white precipitate</p> <p>M5 dep on mention of limewater</p>	5
(b)	<p>M1 giant (ionic structure/lattice)</p> <p>M2 strong forces/attraction between (oppositely charged) ions</p> <p>M3 large amount of (thermal/heat) energy to overcome the forces/attraction</p>	<p>ALLOW strong ionic bonds but REJECT if between atoms/molecules</p> <p>ACCEPT large amount of (thermal/heat) energy required to break the bonds IGNORE more energy</p> <p>No M3 if reference to overcoming / breaking intermolecular forces /covalent bonds</p>	3
Total for question 5 = 8 marks			

Question number	Answer	Notes	Marks
6 (a)	M1 magnesium loses two electrons M2 (each of two) chlorine atoms gains one electron	ACCEPT magnesium becomes 2.8 ACCEPT (each of two) chlorine atoms becomes 2.8.8 M1 and M2 can be scored from correct diagrams No M1 M2 if reference to covalent bonding or sharing electrons	2
(b) (i)	M1 $\frac{(35 \times 70) + (37 \times 30)}{100}$ M2 35.6(0)	correct answer of 35.6(0) with or without working scores 2	2
(ii)	(both isotopes have) the same electron configuration / arrangement	ALLOW (both isotopes have) the same number of electrons (in their outer shell)	1
(c) (i)	M1 exothermic M2 the temperature increases	ALLOW heat energy is given out	2
(ii)	Any one from: polystyrene is a (good) insulator to reduce/prevent heat loss (to the surroundings)	IGNORE references to safety	1
(iii)	M1 $\Delta T = 27.5$ M2 $100 \times 4.2 \times 27.5$ M3 = 11 550	ALLOW ecf from M1 ALLOW 2 or more significant figures ALLOW ecf from M2 Correct answer 11 550 with or without working scores 3 115.5 scores 2	3
Total for question 6 = 11 marks			

Question number	Answer	Notes	Marks
7 (a)	M1 X is darker in colour than kerosene ORA M2 X has higher boiling point than kerosene ORA M3 X is more viscous than kerosene ORA		3
(b) (i)	M1 $3 \text{ CO}_2 + 9 \text{ H}_2\text{O}$ M2 10 O_2	M2 dep on M1	2
(ii)	carbon monoxide reduces the capacity of the blood to transport oxygen OWTTE	ACCEPT correct references to haemoglobin / carboxyhaemoglobin	1
(iii)	An explanation including any three of the following: M1 (common impurity in fuels is) sulfur M2 (sulfur) burns/combusts/reacts (in air/ oxygen) to form sulfur dioxide/ SO_2 M3 sulfur dioxide/ SO_2 dissolves in/reacts with rain/water (to form) M4 acid rain		3
(c) (i)	M1 single bond between the carbons and each carbon single bonded to two hydrogens M2 two extension bonds and n after the bracket	M2 dep on M1	2
(ii)	M1 poly(ethene) is unreactive/does not react/inert M2 (so) non-biodegradable/does not decompose/does not break down (in landfill sites)	ALLOW takes many years or a long time to decompose/break down OWTTE ALLOW reference to space is limited in landfill sites OWTTE	2
Total for question 7 = 13			

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