



Pearson
Edexcel

Mark Scheme (Results)

Summer 2021

Pearson Edexcel International GCSE

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

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Question Paper Log Number 66635

Publications Code 4SS0_1C_2106_MS

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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
(a)	(paper) chromatography		1
1 (b) (i)	B filtration A is incorrect as P is not used for crystallisation C is incorrect as P is not used for fractional distillation D is incorrect as P is not used for simple distillation		1
(ii)	C fractional distillation A is incorrect as S is not used for crystallisation B is incorrect as S is not used for filtration D is incorrect as S is not used for simple distillation		1
(iii)	evaporating basin/dish	ALLOW evaporating bowl	1
			Total 4

Question number	Answer	Notes	Marks
2 (a)	(i) 3/three		1
	(ii) nucleus	ALLOW nuclei	1
	(iii) 1/one	ALLOW alkali metals	1
	(iv) 2/two		
	(v) lithium	IGNORE Li	1
	(vi) +1/1+	ALLOW +/plus/positive	1
(b)	(i) M1 atoms (of the same element) with same atomic number / same number of protons M2 but different mass numbers/different number of neutrons	REJECT molecules/ compound once only	2
	(ii) M1 $(6 \times 7.8) + (7 \times 92.2)$ OR 692.2 M2 $692.2 \div 100 = 6.9$ OR answer to M1 $\div 100$	ACCEPT 6.92/6.922 An answer of 7 with working scores 1 An answer of 7 without any working scores 0.	2
			Total 10

Question number	Answer	Notes	Marks
3 (a) (i)	halogens		1
(ii)	B bromine A is incorrect as astatine is a solid at room temperature C is incorrect as fluorine is a gas at room temperature D is incorrect as iodine is a solid at room temperature		1
(iii)	C green A is incorrect as chlorine is not brown B is incorrect as chlorine is not colourless C is incorrect as chlorine is not red		1
(iv)	M1 (damp) litmus paper M2 bleached	ALLOW universal indicator paper/ pH paper ALLOW turns white	2
(b) (i)	M1 use of 56 and 35.5 in calculation M2 162.5	ACCEPT (damp) blue litmus paper turns red and then bleached for both marks. 91.5 without working scores 1 correct answer without working scores 2	2
(ii)	$2 \text{ Fe} + 3 \text{ Cl}_2 \rightarrow 2 \text{ FeCl}_3$	ALLOW multiples and fractions	1
			Total 8

Question number	Answer	Notes	Marks
4 (a) (i)	C_nH_{2n}	ALLOW upper case N or different letter e.g. x	1
(ii)	An explanation that links the following three points M1 (a compound) with a (C=C) double bond M2 (which contains) hydrogen and carbon (atoms) M3 only	ACCEPT molecule or substance for compound REJECT element for compound and/or molecules for atoms once only M3 dep on mention of just C and H in M2	3
(b) (i)	$\begin{array}{cc} H & H \\ & \\ C & = & C \\ & \\ H & Cl \end{array}$		1
(ii)	An explanation that links one of the following pairs M1 inert M2 (so) do not biodegrade OWTTE OR M1 burning polymers releases gases/fumes M2 (which) are toxic/poisonous	ALLOW do not react /unreactive ALLOW other relevant alternatives eg landfill sites fill up ALLOW (which) contribute to global warming /greenhouse effect	2
			Total 7

Question number	Answer	Notes	Marks						
5 (a) (i)	OH ⁻	ALLOW HO ⁻ / OH ⁻¹ / OH ¹⁻ ALLOW lower case letters	1						
(ii)	Any value between 0 and 3 inclusive		1						
(b)	An explanation that links the following two points M1 polystyrene is an insulator M2 less heat (energy) will be lost	ALLOW no heat (energy) will be lost	2						
(c)	<table border="1"> <tr> <td>temperature in °C at end</td> <td>22.0</td> </tr> <tr> <td>temperature in °C at start</td> <td>17.7</td> </tr> <tr> <td>temperature change in °C</td> <td>4.3</td> </tr> </table> 1 mark each	temperature in °C at end	22.0	temperature in °C at start	17.7	temperature change in °C	4.3	ALLOW 22 If initial and final temperatures are reversed deduct 1 mark ALLOW ECF on temperature change	3
temperature in °C at end	22.0								
temperature in °C at start	17.7								
temperature change in °C	4.3								
(d)	<ul style="list-style-type: none"> • give the expression for Q • substitute correct numbers into $Q = mc\Delta T$ • evaluation in J • conversion to kJ Example calculation M1 $Q = mc\Delta T$ M2 $50 \times 4.2 \times 5.2$ M3 1092 (J) M4 1.1 (kJ)	M2 subsumes M1 ALLOW ECF for M3 and M4 on incorrect values in M2 ACCEPT answers correctly rounded to 2 or more sig figs 1.1, 1.09, 1.092 without working scores 4 1100, 1090, 1092 without working scores 3 0.546, 0.55 without working scores 3 546, 550 without working scores 2 ALLOW use of 4.18 giving an answer of 1.0868	4						
			Total 11						

Question number	Answer	Notes	Marks
6 (a)	(i) C_7H_{16}	Penalise incorrect use of case and subscripts	1
	(ii) (surfacing) roads/roofs	ALLOW other correct uses	1
	(iii) A description that makes reference to the following three points M1 gasoline has a lighter colour /ORA M2 gasoline has a lower boiling point /ORA M3 gasoline has a lower viscosity /ORA	ACCEPT reference to specific colours e.g. gasoline is colourless/ bitumen is black statements must be comparisons	3
(b)	(i) An explanation that links the following four points M1 water vapour/steam condenses M2 (because) the ice (and water) is below 100°C / the boiling point of water M3 carbon dioxide is still a gas/ does not condense (in the U-tube) M4 (because) the ice (and water) is above -78°C / the sublimation point of carbon dioxide	ALLOW turns to liquid ALLOW (because) the ice (and water) are cold /at a low temperature/ at 0°C	4
	(ii) A description including the following two points M1 anhydrous copper(II) sulfate is white M2 (when water is present) it turns blue		2
			Total 11

Question number	Answer	Notes	Marks
7 (a)	shared pair(s) of electrons (between two atoms)	REJECT if between molecules	1
(b) (i)	$N_2 + 2O_2 \rightarrow 2NO_2$	ALLOW multiples and fractions	1
(ii)	acid rain	ACCEPT breathing problems/ asthma ALLOW an effect of acid rain e.g. kills fish	1
(c)	An explanation that links the following six points M1 nitrogen dioxide has a simple molecular structure M2 silicon dioxide has a giant (covalent) structure M3 many/strong (covalent) bonds in silicon dioxide (need to be broken) M4 intermolecular forces in nitrogen dioxide M5 are weak M6 more energy needed to break the bonds in silicon dioxide than to overcome the (intermolecular) forces in nitrogen dioxide	REJECT ionic or metallic structure/ bonds for M2 and M3 REJECT mention of intermolecular forces for M3 REJECT covalent bonds are weak for M4 and M5 REJECT reference to breaking of covalent bonds in nitrogen dioxide	6
			Total 9

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