Pearson Edexcel

Mark Scheme (Results)

November 2020

Pearson Edexcel International GCSE
In Science (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)	six circles randomly arranged	**REJECT** if any circles touching **IGNORE** number of circles, as long as well spaced	1 Grad
(b)	X = sublimation Y = melting Z = boiling	**ALLOW** subliming	3 Clerical
(c) (i)	$H_2O(l) \rightarrow H_2O(s)$	Both state symbols are required for the mark. Must be in the correct order. **ALLOW** capital L/S	1 clerical
(ii)	(impure ice) melts over a range of temperatures OR (impure ice) does not have a sharp melting point.	**ALLOW** the melting point (of the impure ice) is lower **IGNORE** refs to time taken to melt	1 Grad
		Total for question 1	6

Question number	Answer	Notes	Marks
2 (a) (i)	M	**ALLOW** F	1 Clerical
(ii)	T	**ALLOW** Rb	1 Clerical
(iii)	LM_2	**ALLOW** BeF_2 **ALLOW** LM_2 / BeF_2 as the product of an equation, even if unbalanced	1 Grad
(iv)	L and Q have the same number of outer shell electrons / two outer shell electrons	**ALLOW** L and Q form ions with the same charge / +2 charge **ALLOW** both in the same Group / Group 2	1 Exp
(b) (i)	isotopes		1 Clerical
(ii)	**M1** ((24 x 79.0) + (25 x 10.0)+(26 x 11.0)) ÷100		2 Exp
	M2 24.3 COMMENT: ECF only on slips in data, not on incorrect expressions	Correct answer to 1 decimal place with or without working scores 2 marks **IGNORE** any units An answer of 24 without any working scores 0.	
		Total for question 2	7

Question number	Answer	Notes	Marks
3 (a) (i)	**M1** place (small) spots of dyes / A, B, C and U on the pencil line / baseline **M2** put the paper into (a beaker and add) water / solvent **M3** level of water/solvent must be below pencil line/baseline/ the spots **M4** wait until the water/solvent rises up the paper / until the dyes are drawn up the paper **M5** remove paper from water/solvent and (leave to) dry	**ALLOW** mark level that solvent reaches	3 Exp
(ii)	**M1** U contains (dye) B and any one from: **M2** U contains two dyes **M3** U contains an unknown dye / another dye	**ALLOW** dots / spots / inks	2 Exp
(iii)	Dye A is insoluble (in water)		1 Grad
(b)	**M1** 15 ÷ 58 **M2** 0.2586… / 0.259 / 0.26	**ALLOW** 14 – 16 / 57 - 60 **ALLOW** answer between 0.23 – 0.28 without working for 2 marks **ALLOW** two or more significant figures	2 Grad
(c) (i)	Any one from: **M1** make sure there are no naked flames near the experiment **M2** do in a well-ventilated room **M3** put a lid on the beaker	**ALLOW** no Bunsen burners **ALLOW** open the windows or do the experiment in a fume cupboard **IGNORE** references to safety glasses, gloves and lab coats	1 Exp

(ii)	Dye C is more soluble in solvent X	**ALLOW** dye C travels further up the paper (with solvent X)	1 Grad
		Total for question 3	10

Question number	Answer	Notes	Marks
4 (a)	74		1 Cler
(b) (i)	**M1** flame test	**ALLOW** any description of a flame test	2 Grad
	M2 (flame colour is) red	**ALLOW** crimson or crimson red **M2** is dependent on **M1**	
(ii)	**M1** add (dilute) hydrochloric acid	**ALLOW** any acid **IGNORE** refs to concentration **REJECT** additional reagents	3 Exp
	M2 bubble the <u>gas/CO_2</u> produced through limewater / test the <u>gas/CO_2</u> with limewater	**ALLOW** calcium hydroxide	
	M3 which turns cloudy / milky / white precipitate	**M3** is dependent on use of limewater	
4 (c)	$Li_2O + CO_2$		1 Grad
		Total for question 4	7

Question number	Answer	Notes	Marks
5 (a)	prevents liquid / acid splashing out		1 Exp
(b) (i)	**M1** (1.8 ÷ 20 =) 0.090	**IGNORE** number of significant figures **ACCEPT** -0.090	2 Exp
	M2 grams per second	**ALLOW** grams/second or g/s or gs^{-1}	
(ii)	**M1** all points plotted ± half a square **M2** curve of best fit	**Max (1)** if first point not plotted / included in curve	2 Exp
(iii)	**M1** concentration (of hydrochloric acid) decreases / smaller amount/surface area of calcium carbonate	**ALLOW** fewer particles **ALLOW** any idea that either reactant is being used up (but not run out)	2 Exp
	M2 fewer collisions per unit time / less frequent collisions	**IGNORE** less chance of a collision	
(iv)	Any one from: **M1** the calcium carbonate has run out **M2** no more carbon dioxide is given off **M3** the reaction has finished	**REJECT** hydrochloric acid has run out	1 Grad

(c)	(i)	Any two from: **M1** concentration of hydrochloric acid **M2** volume of hydrochloric acid **M3** temperature	**ALLOW** amount of hydrochloric acid	2 Grad
	(ii)	**M1** (powder has a) greater surface area **M2** therefore there are more collisions (per unit time)		2 Exp
	(iii)	Any one from: **M1** the graph would be steeper **M2** the line would get to 146 g / flatten off / finish after a shorter time	**ALLOW** higher gradient / line decreases faster **REJECT** any reference to more carbon dioxide being produced.	1 Exp
			Total for question 5	13

Question number	Answer	Notes	Marks

6 (a) (i)	**M1** (molecules / compounds containing) hydrogen and carbon (atoms)			2 grad
	M2 only		**M2** dep on **M1** or near miss	
(ii)	propane			1 Clerical
(iii)	C_2H_6			1 Grad
(iv)	**M1** add bromine water		**REJECT** bromine or bromide or bromide water	2 Exp
	M2 decolourised		**ALLOW** turns (from orange / yellow to) colourless **M2** dependent on **M1** unless **M1** is bromine, bromide or bromide water	
(b) (i)	**M1** structure is simple molecular / simple covalent			3 Exp
	M2 intermolecular forces (of attraction) are weak		**ALLOW** intermolecular bonds, if clearly not covalent bonds	
	M3 and require little energy to overcome / break		**ALLOW** low / less energy Any reference to breaking covalent bonds do not award **M2** and **M3.**	
(ii)	The intermolecular forces in R are stronger (than the intermolecular forces in S) OR reverse argument		**ALLOW** R has a higher *M*r / surface area than S / has more Cs and Hs **ALLOW** R has stronger bonds / more bonds than S if breaking bonds is mentioned in (b)(i)	clip

Question number	Answer	Notes	Marks
6 (c) (i)	Any one from:		1

	M1 heat lost to the atmosphere **M2** heat absorbed by the beaker / calorimeter / thermometer **M3** some hydrocarbon evaporates (rather than burning)		Grad
(ii)	C_6H_{14} + **5** $O_2 \rightarrow$ 3 C + **3** CO + **7** H_2O	**ALLOW** multiples or fractions	1 Grad
(iii)	**M1** (carbon monoxide is) toxic / poisonous **M2** (because it) reduces the capacity of the blood to transport oxygen	**ALLOW** correct references to haemoglobin	2 Exp
(iv)	**M1** calculates temperature increase **M2** substitution of values into $Q=mc\Delta T$ **M3** calculation of heat energy released Example calculation ΔT = 37.5(°C) Q = 100 x 4.2 x 37.5 Q = 15 750 J	ALLOW ecf from **M1** **IGNORE** sign of answer **IGNORE** units, unless answer is divided by 1000 to give 15.75 **kJ** Correct answer with or without working scores 3 marks.	3 Exp
		Total for question 6	17

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