Pearson Edexcel

Mark Scheme (Results)

Summer 2022

Pearson Edexcel International GCSE

In Single Science Award (4SS0) Paper 1C

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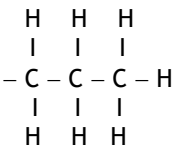
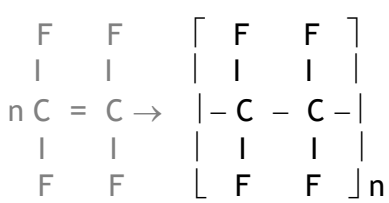
General Marking Guidance

- 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)	(i)	sulfur	**ALLOW** S	1
		(ii)	boron	**ALLOW** B	1
		(iii)	bromine	**ALLOW** Br/Br_2 **ALLOW** mercury/Hg	1
	(b)	(i)	20 /twenty		1
		(ii)	S^{2-}	**ALLOW** S^{-2}	1
		(iii)	MgF_2	**ACCEPT** $Mg^{2+}(F^-)_2$	1
					Total 6

Question number	Answer	Notes	Marks
2 (a) (i)	V is insoluble (in the solvent)/ does not dissolve (in the solvent)		1
(ii)	**M1** X and Z **M2** because the top spots are/dye is closest to the solvent front **OR** the dye/the top spots moved the furthest distance (from the start line) OWTTE	M2 dep on M1	2
(b)	**M1** distance from start line to spot to nearest mm 17 to 20 mm **M2** distance from start line to solvent front to nearest mm 56 mm **M3** answer to **M1** ÷ answer to **M2** = R_f value between 0.30 and 0.36	**ACCEPT** answers in cm **ALLOW** 55 – 57mm **ACCEPT** any number of sig figs except 1 **ALLOW** ECF on incorrect measurements for **M1** and/or **M2**	3
			Total 6

Question number	Answer	Notes	Marks
3 (a)	alkali metals		1
(b) (i)	**D** potassium sinks A is incorrect as a colourless solution forms B is incorrect as a lilac flame is seen C is incorrect as effervescence occurs		1
(ii)	may explode /break the trough/ cause a fire	**ALLOW** (too) dangerous	1
(iii)	OH^-	**ALLOW** HO^- /OH^{1-} /OH^{-1}	1
(iv)	$2K + 2H_2O \rightarrow 2KOH + H_2$ **M1** correct formulae **M2** balancing of correct formulae	**ALLOW** multiples and fractions **IGNORE** state symbols even if incorrect **M2** dep on **M1**	2
(c)	An explanation that links the following four points **M1** giant structure/lattice **M2** strong electrostatic attraction **M3** between (oppositely charged) ions **M4** large amount of energy needed to overcome the forces of attraction/break the bonds	 **ALLOW** strong (ionic) bonds No **M2** or **M3** if mention of covalent or metallic bonds /intermolecular forces	4
			Total 10

Question number	Answer	Notes	Marks
4 (a) (i)	propane	spelling must be correct	1
(ii)			1
(iii)	C_nH_{2n+2}	**ALLOW** upper case N or different letter e.g. x	1
(b) (i)	shared pair of electrons (between two atoms)	**REJECT** if between molecules	1
(ii)	An explanation that links the following three points		3
	M1 C_4H_{10} has larger molecules/longer chain ORA	**ALLOW** C_4H_{10} has more carbon (and hydrogen) atoms	
	M2 C_4H_{10} has stronger intermolecular forces ORA	**ACCEPT** forces between molecules **ALLOW** intermolecular bonds	
	M3 more energy needed to separate the molecules /overcome the forces in C_4H_{10} ORA	No **M2** or **M3** if implied that covalent bonds break	
(c) (i)		**REJECT** double bond between carbons for both marks	2
	M1 correct repeat unit		
	M2 extension bonds brackets and n	n must be on RHS of bracket and extension bonds do not have to go through brackets	
(ii)	Any one from		1
	M1 food will not bind to/ bond with the coating	**ALLOW** coating will not react with the food/ non-toxic/ not poisonous	
	M2 hard/tough /long lasting coating		
	M3 resistant to heat/ will not melt	**ALLOW** high melting point	
	M4 inert/ unreactive		
			Total 10

Question number	Answer	Notes	Marks
5 (a) (i)	Any one of the following **M1** bright/white light **OR** bright/white flame **M2** white solid/powder/ash	 **ALLOW** grey solid/powder /ash **ALLOW** white smoke	1
(ii)	$2Mg + O_2 \rightarrow 2MgO$	**REJECT** charges on Mg and/or O_2 **ACCEPT** $2Mg^{2+}O^{2-}$ **ALLOW** multiples and fractions **IGNORE** state symbols even if incorrect	1
(b)	**M1** (volume of oxygen =) 100 − 28 **OR** 72 (cm^3) **M2** (volume of air at start =) 275 + 100 **OR** 375 (cm^3) **M3** 72 ÷ 375 x 100 **OR** 19.2 (%) **M4** 19 (%)	Correct answer without working scores 4 **ALLOW** ECF throughout Use of 275 gives an answer of 26 scores 3 Alternative method **M1** (volume of air left=) 275 + 28 **OR** 303 (cm^3) **M2** 303 ÷ 375 x 100 **OR** 80.8 (%) **M3** 100 − 80.8 **OR** 19.2 **M4** 19 (%)	4
(c) (i)	**M1** bubble/pass/add carbon dioxide/gas into limewater **M2** (limewater) turns cloudy/milky	 **ALLOW** white precipitate **M2** dependent on mention of limewater **REJECT** addition of extra reagent for both marks	2

(ii)	An explanation that links two of the following three points **M1** carbon dioxide is a greenhouse gas **M2** (that causes) climate change/ global warming **M3** oceans becoming more acidic	 **ACCEPT** description of greenhouse effect **REJECT** reference to the ozone layer for **M1** **ACCEPT** a result of climate change (e.g. melting of polar icecaps/flooding /wildfires) **IGNORE** reference to acid rain	2
			Total 10

Question number		Answer	Notes	Marks
6 (a)	(i)	$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$		1
	(ii)	carbon dioxide/CO_2/gas escapes/is given off OWTTE	**IGNORE** carbon dioxide is a gas alone	1
	(iii)	to stop acid/liquid/solution leaving flask/spitting out OWTTE	**REJECT** to stop carbon dioxide/gas escaping	1
(b)	(i)	An explanation that links four of the following points **M1** the curve is steep(est) at the start **M2** because the reaction is fast(est) at the start **M3** the curve becomes less steep because the reaction slows down **M4** the curve levels off/stops going up when the acid has all been used up **OR** **M1** the curve is steep(est) at the start **M2** because the (acid) concentration is high(est) **M3** the curve becomes less steep as the solution/ acid is becoming more dilute **M4** the curve levels off/ stops going up when the acid has all been used up	**ALLOW** there are the most (acid) particles in solution/per unit volume OWTTE **ALLOW** the curve becomes less steep as there are fewer acid particles/particles in solution /per unit volume **IGNORE** references to energy	4
	(ii)	**M1** curve starting at the origin and steeper than the original curve **M2** curve levelling off before and at the same level as the original curve		2
				Total 9

Question number	Answer	Notes	Marks
7 (a)	heat (energy) is given out OWTTE	**ACCEPT** thermal energy is given out **ACCEPT** thermal energy store of mixture decreases	1
(b) (i)	**C** displacement A is incorrect as it is not a combustion reaction B is incorrect as it is not a decomposition reaction D is incorrect as it is not a neutralisation reaction		1
(ii)	**M1** the (blue) colour fades/ solution turns (from blue) to colourless **M2** pink-brown/pink coating (on zinc)	 **ALLOW** any combination of pink, orange, brown	2
(iii)	silver is less reactive/ lower in the reactivity series than copper ORA	**ALLOW** silver cannot displace copper	1
(c)	**M1** temperature change = 37.0 − 20.5 **OR** 16.5 (°C) **M2** $Q = 50.0 \times 4.2 \times 16.5$ **M3** 3465 (J) **M4** 3.465 (kJ)	correct answer without working scores 4 **ALLOW** ECF on **M1** **ALLOW** ECF on **M3** **ALLOW** any number of sig figs except 1	4
			Total 9

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