



Mark Scheme (Results)

Summer 2023

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)	nucleus		1
	(ii) period number = 2 group number = 3		2
	(iii) 2		1
(b)	<p>similarity same number of / 5 protons / 5 electrons / same proton number</p> <p>difference different number of neutrons / one isotope has 5 neutrons, the other has 6 neutrons / one isotope has 1 more neutron than the other</p>	<p>similarity atomic number and difference mass number scores 1 if no other mark scored</p>	2
Total for question = 6			

Question number	Answer	Notes	Marks
2 (a)	the last (three) results are the same		1
(b)	M1 (volume of oxygen=) 51.7- 43.8 OR 7.9(cm ³) M2 (7.9÷51.7)×100 OR 15.28% M3 15.3%	ALLOW ecf from wrong volume of oxygen in M1 ALLOW an answer to 1dp as long as M2 is a percentage calculation using some data from the question and the answer is less than 100% Answer of 15.3% with or without working scores 3	3
(c)	220	IGNORE units	1
Total for question = 5			

Question number	Answer	Notes	Marks
3 (a)	kerosene from crude oil - fractional distillation water from potassium nitrate solution - simple distillation		2
(b)	M1 add (the rock salt) to water OR M1 dissolve (the salt from the rock salt) M2 filter (to obtain the sand) M3 heat/boil (to evaporate the water from the solution/filtrate to obtain the salt)	ALLOW sieve (to obtain the sand) M2 dep on M1 ALLOW evaporate OR crystallise M3 dep on M2	3
(c) (i)	A description including any three of the following M1 pour some solvent into a beaker/chromatography tank M2 (place the paper in the solvent so that the) food colourings are above the level of the solvent M3 leave the paper until the solvent reaches the level shown in the diagram/has moved to near the top of the paper M4 dry the paper OR leave the paper to dry	M1 and M2 can be scored from a labelled diagram ALLOW any named solvent ALLOW liquid ALLOW the solvent must be below the start line ALLOW leave the paper until the solvent/liquid has reached the solvent front	3
(ii)	M1 measure the distance moved by the dye OR the distance moved by the solvent	ALLOW measure the distance between the start line and the solvent front OR the distance between the start line and the spot	2
(iii)	M2 distance moved by the dye ÷ the distance moved by the solvent (the food colouring is) insoluble (in the solvent)	M2 subsumes M1 ALLOW (the food colouring is) insoluble (in water) ALLOW dye for food colouring	1

(d) (i)	<p>A (3)</p> <p>A is the correct answer as there are 3 different elements in $Al_2(SO_4)_3$</p> <p>B is not the correct answer as there are not 4 different elements in $Al_2(SO_4)_3$</p> <p>C is not the correct answer as there are not 5 different elements in $Al_2(SO_4)_3$</p> <p>D is not the correct answer as there are not 9 different elements in $Al_2(SO_4)_3$</p>		1
(ii)	<p>C (17)</p> <p>C is the correct answer as there are 17 atoms in the formula of $Al_2(SO_4)_3$</p> <p>A is not the correct answer as there are not 3 atoms in the formula of $Al_2(SO_4)_3$</p> <p>B is not the correct answer as there are not 10 atoms in the formula of $Al_2(SO_4)_3$</p> <p>D is not the correct answer as there are not 21 atoms in the formula of $Al_2(SO_4)_3$</p>		1
Total for question = 13			

Question number	Answer	Notes	Marks
4 (a) (i)	$2\text{Na(s)} + 2\text{H}_2\text{O(l)} \rightarrow 2\text{NaOH(aq)} + \text{H}_2\text{(g)}$	All four correct scores 2 2 or 3 correct scores 1	2
(ii)	any two from M1 bubbles/fizzing/effervescence M2 melts/turns into a ball/sphere M3 moves(on the surface)/floats M4 vapour trail/steam produced M5 gets smaller/(appears to) dissolve/disappears	IGNORE gas produced ALLOW bubbles etc of the wrong gas IGNORE references to a flame	2
(iii)	M1 litmus turns blue M2 because an alkali is produced OR hydroxide / OH ⁻ / hydroxide (ions) are present OR sodium hydroxide is produced	ALLOW different shades of blue REJECT purple ALLOW a base is produced	2
(b)	potassium / K		1
Total for question 4 = 7 marks			

Question number	Answer	Notes	Marks
5 (a) (i)	Any one from: to prevent hydrochloric acid/liquid/solution escaping OR so the loss in mass due to carbon dioxide/gas only		1
(ii)	the calcium carbonate is used up/runs out		1
(b) (i)	M1 lower gradient/shallower curve/less steep M2 levels off later/at a time greater than 60s	ALLOW the line/curve goes down more slowly ALLOW goes flat at 116g or at the same mass ALLOW the same mass (of CO ₂) is produced ALLOW the reaction takes longer (than 60s)	2
(ii)	lower surface area OR fewer collisions per unit time	ALLOW less frequent collisions	1
(c)	M1 1.2 (g from graph) M2 $1.2 \div 10 = 0.12$ M3 g/s	ecf value from M1 ALLOW g s ⁻¹ or grams per second 0.12 with no working scores 2 0.12g/s with no working scores 3 11.88 with no working scores 1 11.88g/s with no working scores 2	3
Total for question = 8			

Question number	Answer	Notes	Marks
6 (a) (i)	M1 temperature rise = 41.2 °C M2 $150 \times 4.2 \times 41.2$ M3 26 000 (25 956) J	ALLOW ecf from M1 ALLOW ECF from M2 as long as M2 is a $Q=mc\Delta T$ calculation ALLOW any number of significant figures except 1 IGNORE - signs REJECT incorrect rounding answer of 26 000 (or more significant figures correctly rounded) with or without working scores 3	3
(ii)	heat loss (to the surroundings)	ALLOW no lid on the beaker/poor insulation ALLOW heat absorbed by the beaker ALLOW incomplete combustion	1
(b) (i)	carbon monoxide	ALLOW CO	1
(ii)	carbon/C	ALLOW soot/particulates	1
(c)	M1 in the high temperatures of the car engine M2 nitrogen and oxygen (from the air) react OR oxides of nitrogen form M3 which dissolve/react in water OR forms nitric/nitrous acid OR M1 (petrol/octane) contains sulfur M2 sulfur dioxide (forms during combustion) M3 which dissolve/react in water OR forms sulfurous/sulfuric acid	ALLOW NO _x or any oxide of nitrogen M3 dep on M2 ALLOW sulfur reacts with oxygen M3 dep on M2	3

(d)	(i)	C_6H_{14}		1
	(ii)	$ \begin{array}{c} H & H \\ & \\ -C & -C- \\ & \\ H & H \end{array} $	IGNORE brackets and n	1
Total for question = 11				

Question number	Answer	Notes	Marks
7 (a) (i)	<p>M1 <u>pair(s)</u> of electrons</p> <p>M2 shared (between atoms)</p> <p>OR</p> <p>M1 attraction between nuclei</p> <p>M2 and shared (pairs of) electrons</p>	<p>M2 dep on mention of electrons as the only particles shared</p> <p>Both marks could be scored by a labelled dot and cross diagram</p>	2
(ii)	<p>An explanation which links any five of the following points</p> <p>M1 silicon dioxide has a giant structure</p> <p>M2 (covalent) bonds are (very) strong</p> <p>M3 (in silicon dioxide) many/all the bonds need to be broken</p> <p>M4 a large amount of/more energy is required to break the bonds (in silicon dioxide)</p> <p>M5 silicon chloride has a simple/molecular structure</p> <p>M6 the forces between the molecules/intermolecular forces (in silicon chloride) are weak OR intermolecular forces are broken/overcome</p> <p>M7 little/less energy is needed to overcome the forces in silicon chloride</p>	<p>ALLOW lattice (structure)</p> <p>REJECT any other type of bond</p> <p>No M3 or M4 if reference to overcoming/breaking intermolecular forces in silicon dioxide</p> <p>No M6 or M7 if any reference to weak covalent bonds or breaking of covalent bonds in silicon chloride</p> <p>A statement such as 'more energy is needed to break the bonds in silicon dioxide than to overcome the forces in silicon chloride' scores M4 and M7</p>	5

(b) (i)	$\text{SiCl}_4(\text{l}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow \text{SiO}_2(\text{s}) + 4\text{HCl}(\text{g})$	multiples and fractions	1
(ii)	<p>M1 add magnesium/aluminium/zinc/iron/tin</p> <p>M2 effervescence</p> <p>OR</p> <p>M1 use a pH meter</p> <p>M2 pH of 0-6</p>	<p>ALLOW any metal carbonate/metal hydrogencarbonate</p> <p>REJECT a metal that reacts quickly with water e.g. sodium/calcium</p> <p>ALLOW gas/bubbles of gas</p> <p>M2 dep on M1</p> <p>M2 dep on M1</p>	2
Total for question = 10			

