



Mark Scheme (Results)

Summer 2024

Pearson Edexcel International GCSE
In Science Single Award (4SS0) Paper 1C

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2024

Question Paper Log Number P74498A

Publications Code 4SS0_1C_2406_MS

All the material in this publication is copyright

© Pearson Education Ltd 2024

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)	<p>A (butane)</p> <p>B is not the correct answer because C_4H_{10} is not ethane</p> <p>C is not the correct answer because C_4H_{10} is not pentane</p> <p>D is not the correct answer because C_4H_{10} is not propane</p>		1
(b)	<p>D (C_nH_{2n+2})</p> <p>A is not the correct answer because the general formula for alkanes is not C_nH_{2n}</p> <p>B is not the correct answer because the general formula for alkanes is not C_nH_{2n+1}</p> <p>C is not the correct answer because the general formula for alkanes is not C_nH_{2n-2}</p>		1
(c)	44		1
(d)	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array} $		1
(e)	poly(ethene)	ACCEPT polyethene / polythene	1

Total marks for question 1 = 5

Question number	Answer	Notes	Marks
2 (a)	<p>any two from:</p> <p>M1 pure substance has fixed/definite melting point</p> <p>M2 mixture melts over range of temperatures</p> <p>M3 a mixture has a lower melting point OR a pure substance has a higher melting point</p>	<p>ALLOW sharp melting point</p> <p>IGNORE does not have fixed melting point</p> <p>IGNORE any references to boiling point</p>	2
(b)	<p>a description including any four points from M1 to M7</p> <p>M1 draw a line (on the paper)</p> <p>M2 in pencil</p> <p>M3 add the dyes/liquids/samples (to the paper)</p> <p>M4 place paper in solvent/water</p> <p>M5 in a beaker OR chromatography tank</p> <p>M6 with start line/the dyes above solvent level</p> <p>M7 let the solvent soak up the paper until it (almost) reaches the top</p> <p>and</p> <p>M8 (after chromatogram produced) X should have spots at same levels/heights as spots from yellow and red dyes OWTTE</p>	<p>ALLOW the chromatogram should have spots (in X) with the same R_f values as the yellow and red dyes</p> <p>marks could be scored from a labelled diagram</p>	5

Total marks for question 2 = 7

Question number	Answer	Notes	Marks
3 (a) (i)	<p>C (1%)</p> <p>A is not the correct answer because the approximate percentage by volume of argon in dry air is not 0.01%</p> <p>B is not the correct answer because approximate percentage by volume of argon in dry air is not 0.1%</p> <p>D is not the correct answer because approximate percentage by volume of argon in dry air is not 10%</p>		1
(ii)	<p>glowing splint relights</p>		1
(b) (i)	<p>to stop fumes/gas/phosphorus oxide/product escaping</p>	<p>REJECT references to air or oxygen escaping</p> <p>REJECT references to anything entering the tube</p>	1
(ii)	<p>exemplar calculation:</p> <p>M1 initial volume of air = 40.0</p> <p>M2 difference in measurement = 8.3</p> <p>M3 % oxygen = $(8.3 \div 40.0) \times 100$ OR 20.75</p> <p>M4 = 20.8% correct to 3 SF</p>	<p>ACCEPT alternative methods</p> <p>ALLOW ecf from M1 and M2</p> <p>20.75 with no working scores 3</p> <p>ALLOW any answer to 3 SF for M4 for a percentage calculation where the answer is less than 100%</p> <p>20.8 with no working scores 4</p> <p>21 with no working scores 0</p>	4

(c) (i)	$P_2O_5 + 3 H_2O \rightarrow 2 H_3PO_4$	ALLOW multiples or fractions	1
(ii)	<p>M1 add/test with universal indicator solution/paper</p> <p>M2 pH 0, 1, 2 or 3 strongly acidic</p> <p>M3 pH 4, 5 or 6 weakly acidic</p>	<p>ALLOW pH paper/pH indicator/pH probe/pH meter</p> <p>ALLOW UI indicator solution/pH paper/pH indicator turns red</p> <p>pH values take precedence over colour</p> <p>Colours dep on universal indicator/pH paper/pH indicator in M1</p> <p>ALLOW UI indicator solution/pH paper turns yellow/orange</p> <p>pH values take precedence over colour</p> <p>Colours dep on universal indicator/pH paper/pH indicator in M1</p>	3

Total marks for question 3 = 11

Question number	Answer	Notes	Marks
4 (a)	M1 should be 2HCl M2 should be $\text{CaCl}_2 (\text{aq})$	ALLOW 1 for balance the equation if no other mark awarded	2
(b) (i)	any one from: the marble chips are in excess the acid is not in excess/the acid is limiting all the acid is used up not enough acid is added	IGNORE references to the strength or concentration of the acid	1
(ii)	stops fizzing/volume of gas (in syringe) remains same	ALLOW no more gas produced/the gas syringe would stop moving IGNORE references to the gas syringe being full	1

<p>(iii)</p>	<p>an answer connecting three of the following points:</p> <p>At the start</p> <p>M1 gradient is steep(est)</p> <p>M2 the reaction is fast(est)/most CO₂ is produced (per unit time)/there are most acid particles (per unit volume)/most collisions (per unit time)/most frequent collisions</p> <p>Midway through</p> <p>M3 the curve becomes less steep</p> <p>M4 the reaction is slow(er)/the rate of reaction decreases/less CO₂ is produced (per unit time) there are fewer particles (per unit volume)/fewer collisions (per unit time)/fewer frequent collisions</p> <p>At the end</p> <p>M5 curve levels off/becomes flat/plateaus/becomes straight</p> <p>M6 the reaction has stopped/no more CO₂ is produced/the acid has been used up</p>	<p>ALLOW line goes up fast(est)</p> <p>ALLOW begins to straighten out/begins to level off</p> <p>ACCEPT because concentration is lower</p> <p>ALLOW the volume of gas becomes constant</p> <p>if the answer doesn't link the shape with the rate max = 2</p>	<p>3</p>
<p>(iv)</p>	<p>M1 curve below original curve</p> <p>M2 levels off at half original volume</p>	<p>tolerance +/- half a square</p>	<p>2</p>

Total marks for question 4 = 9

Question number	Answer	Notes	Marks
5 (a)	M1 sharing of electrons (between atoms) M2 sharing pair(s) of electrons	M2 subsumes M1	2
(b)	M1 simple molecular structure M2 weak intermolecular forces (of attraction) M3 so small amount of energy needed to break/overcome them	ALLOW simple covalent structure ALLOW simple structure if intermolecular is mentioned in M2 ALLOW weak intermolecular bonds REJECT weak intermolecular forces between bonds REJECT weak intermolecular forces between incorrect particles M3 dep on mention of intermolecular forces in M2 REJECT comparatives for M3 If state or imply breaking covalent bonds only M1 can be scored	3
(c)	giant (covalent)	IGNORE lattice REJECT giant ionic OR giant metallic	1

Total marks for question 5 = 6

Question number	Answer	Notes	Marks
6 (a)	M1 55 protons and 55 electrons M2 78 neutrons		2
(b) (i)	effervescence/bubbles/metal floats/moves/melts	ALLOW white trail forms/metal gets smaller or disappears/turns into a ball	1
(b) (ii)	M1 caesium is more reactive than sodium M2 reactivity increases down the group M3 caesium is below sodium in group (so more reactive than sodium)	ALLOW a description e.g. caesium reacts faster or explodes ALLOW caesium has more (electron) shells OR outer shell electron is less attracted to the nucleus ALLOW outer shell electron is more easily lost ACCEPT reverse arguments for M1, M2 and M3	3
(c) (i)	halogens		1
(c) (ii)	$2\text{Cs} + \text{Cl}_2 \rightarrow 2\text{CsCl}$	ALLOW multiples or fractions REJECT Cl^2	1

<p>(d) (i)</p>	<p>any three from:</p> <p>M1 caesium atom loses one electron</p> <p>M2 chlorine atom gains one electron</p> <p>M3 charge on caesium ion 1+</p> <p>M4 charge on chloride ion 1-</p>	<p>one electron transferred from caesium to chlorine scores M1 and M2</p> <p>ALLOW 1 mark from M1 and M2 for correct direction of transfer (unspecified number of electrons)</p> <p>ACCEPT Cs⁺ ACCEPT caesium is positive if M1 is scored with 1 electron lost</p> <p>ACCEPT Cl⁻ ACCEPT chloride is negative if M2 is scored with 1 electron gained</p> <p>All marks could be scored from diagrams</p> <p>incorrect use of chlorine or chloride max = 2</p>	<p>3</p>
<p>(ii)</p>	<p>M1 <u>electrostatic</u> attraction</p> <p>M2 between oppositely charged ions</p>	<p>ACCEPT between positive and negative ions</p> <p>any mention of molecules or sharing of electrons = 0</p> <p>marks are independent</p>	<p>2</p>
<p>(iii)</p>	<p>high melting/boiling point</p>	<p>ALLOW hard or brittle or conduct electricity when dissolved in water/molten</p> <p>IGNORE references to density or strength</p>	<p>1</p>

Total marks for question 6 = 14

Question number	Answer	Notes	Marks
7 (a)	<p>M1 the temperature increases/the solution gets warmer</p> <p>M2 (so the reaction is) exothermic</p>	<p>ALLOW heat/heat energy is given out/reading on the thermometer increases IGNORE energy alone</p> <p>any mention of endothermic or temperature decreasing scores 0</p>	2
(b)	<p>M1 use polystyrene cup/add a lid</p> <p>M2 to reduce heat loss (to surroundings)</p> <p>OR</p> <p>M1 insulate the beaker</p> <p>M2 to reduce heat loss (to surroundings)</p>	<p>ALLOW apparatus should be covered</p> <p>ALLOW which is a good insulator or which is a poor conductor REJECT no heat escapes REJECT keeps in all heat IGNORE references to temperature loss</p> <p>REJECT no heat escapes REJECT keeps in all heat IGNORE references to temperature loss</p>	2

(c)	<p>M1 temperature change (= 30.7 – 19.5) OR 11.2 (°C)</p> <p>M2 $Q = 50 \times 4.2 \times 11.2$ OR $Q = 53 \times 4.2 \times 11.2$</p> <p>M3 = 2352 (J) OR 2493 (J)</p> <p>M4 = 2.352 (kJ) OR 2.493 (kJ)</p>	<p>correct answer without working scores 4</p> <p>ALLOW ECF on M1</p> <p>ALLOW ECF on M3</p> <p>M4 is for division by 1000 somewhere</p> <p>ALLOW any number of sig figs except 1</p> <p>IGNORE - signs</p>	4

Total marks for question 7 = 8

