



Mark Scheme (Results)

Summer 2024

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

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

Total marks for question 1 = 5

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

Total marks for question 2 = 7

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

(c) (i)	$\text{P}_2\text{O}_5 + 3 \text{H}_2\text{O} \rightarrow 2 \text{H}_3\text{PO}_4$	ALLOW multiples or fractions	1
(ii)	M1 add/test with universal indicator solution/paper	ALLOW pH paper/pH indicator/pH probe/pH meter	3
	M2 pH 0, 1, 2 or 3 strongly acidic M3 pH 4, 5 or 6 weakly acidic	ALLOW UI indicator solution/pH paper/pH indicator turns red pH values take precedence over colour Colours dep on universal indicator/pH paper/pH indicator in M1 ALLOW UI indicator solution/pH paper turns yellow/orange pH values take precedence over colour Colours dep on universal indicator/pH paper/pH indicator in M1	

Total marks for question 3 = 11

Question number	Answer	Notes	Marks
4 (a)	M1 should be 2HCl M2 should be CaCl ₂ (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

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

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
(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
(ii)	$2\text{Cs} + \text{Cl}_2 \rightarrow 2\text{CsCl}$	ALLOW multiples or fractions REJECT Cl^2	1

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

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

Total marks for question 7 = 8