

CHERRY HILL TUITION AQA CHEMISTRY AS PAPER 1 MARK SCHEME

1	d	i	Coordinate/ dative (covalent) (Lone) pair of electrons/ both electrons (on F) Donated from F ⁻ / fluoride or donated to the BF ₃	1 1 1	If wrong CE = 0/3 but if 'covalent' or left top line blank, mark on. CE if lone pair is from B Must have the - sign on the F ie F ⁻ Ignore F ⁺ M3 dependent on M2
1	d	ii	109° to 109.5°	1	
1	e		$\frac{238 \times 100}{438}$ = 54.3%	1 1	For 1 mark allow 238 as numerator and 438 as denominator or correct strings 2 marks if correct answer to 3 sig figs. 54% or greater than 3 sig figs = 1 mark

Question	Part	Sub Part	Marking Guidance	Mark	Comments
2	(a)	(i)	$M_r = 132.1$ 0.0238	1 1	132 Allow 0.024 Allow 0.0237 Penalise less than 2 sig fig once in (a)
2	(a)	(ii)	0.0476	1	0.0474-0.0476 Allow (a) (i) x 2
2	(a)	(iii)	1.21	1	Allow consequential from (a) (ii) ie allow (a) (ii) x 1000 / 39.30 Ignore units even if wrong
2	(b)		$\frac{34 \times 100}{212.1}$ = 16.0(3)%	1 1	Allow mass or Mr of desired product times one hundred divided by total mass or Mr of reactants/products If 34/212.1 seen correctly award M1 Allow 16% 16 scores 2 marks
2	(c)		100(%)	1	Ignore all working
2	(d)		$PV = nRT$ or $n = \frac{PV}{RT}$ $n = \frac{100000 \times 1.53 \times 10^{-2}}{8.31 \times 310}$ = 0.59(4)	1 1 1	If rearranged incorrectly lose M1 and M3 M2 for mark for converting P and T into correct units in any expression Allow 0.593 M3 consequential on transcription error only not on incorrect P and T
2	(e)		(Na ₂ SO ₄) (44.1%) 44.1/142.1 0.310 =1 x = 10	1 1 1	M1 is for 55.9 Alternative method gives 180 for water part =2 marks X = 10 = 3 marks 10.02 = 2 marks

Qu	Part	Sub Part	Marking Guidance	Mark	Comments
3	a	i	$M_r \text{ MgO} = 40.3$ $0.741/40.3 = 0.0184$	1 1	If used 40 then penalise this mark but allow consequential M2 (0.0185) 0.018 with no M_r shown = 0 Penalise if not 3 sig figs in this clip only
3	a	ii	$0.0184 \times \frac{5}{2} = 0.0460$	1	Allow 0.0459 to 0.0463 Allow their 3(a)(i) x 5/2 ie allow process mark of x 5/2 but insist on a correct answer being written down Ignore sig figs
3	b		$pV = nRT$ ($V = \frac{0.402 \times 8.31 \times 333}{100000}$) 0.0111 11.1 (dm ³)	1 1 1	If rearranged incorrectly then lose M1 If this expression correct then candidate has scored first mark Ignore units 3 marks for 11.1 (dm ³) However if 11.1 m ³ or cm ³ allow 2 (ie penalise wrong units in final answer) Ignore sig figs- but must be 2 sig figs or greater
3	c	i	$0.0152 \times 2 = 0.0304$	1	Allow 0.03
3	c	ii	0.938 mol dm ⁻³	1	Allow range 0.92 – 0.94 Minimum 2 sig figs Allow consequential marking from 3(c)(i) Ignore units even if wrong

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4	a		O = 74.1%	1	If atomic numbers or molecular masses are used lose M2 This ratio alone will not score the final mark. (It would get 2) Allow 3 marks for N ₂ O ₅
			$\frac{25.9}{14} \frac{74.1}{16}$	1	
			1.85 4.63		
			1 2.5	1	
4	b		Toxic/ poisonous/ <u>forms</u> an acidic gas / forms NO ₂ which is acidic/ respiratory irritant/ forms HNO ₃ when NO reacts with <u>water and oxygen</u> / triggers asthma attacks/ greenhouse gas/ photochemical smog/ contributes to global warming /formation of acid rain	1	ignore NO is an acidic gas or NO is acidic in water Not references to ozone layer
4	c		2NO + O ₂ → 2NO ₂	1	Accept multiples or fractions of equation Ignore wrong state symbols
4	d		Nitrogen / N ₂ and oxygen / O ₂ combine/react spark / high temperature / 2500-4000 °C	1 1	QWC (not N and O combine) Not nitrogen in fuel Allow N ₂ + O ₂ → 2NO for M1 only
4	e		2NO + 2CO → N ₂ + 2CO ₂ OR 2NO → N ₂ + O ₂	1	Accept multiples or fractions of equation Ignore wrong state symbols Allow C ₃ H ₁₈ + 25NO → 8CO ₂ + 12.5 N ₂ + 9H ₂ O

5) N/A

6) N/A

Qu	Part	Sub Part	Marking Guidance	Mark	Comments
7	a		Iodine – <u>molecular</u>	1	Not covalent lattice
			Graphite- macromolecular/giant covalent/giant atomic	1	
7	b		<u>Layers</u> of (C atoms)	1	If any other element mentioned other than C, CE = 0 Ignore the no of covalent bonds around the C if mentioned The first 3 marks could be scored with a <u>labelled</u> diagram. Need to label or state covalent bonds within the layers. Covalent or ionic or metallic bonds between molecules CE = 0
			Connected by <u>covalent bonds</u> within each layer	1	
			<u>Van der Waals forces/ IMF</u> between layers/ weak forces between layers	1	
			<u>Many/strong covalent bonds need to be broken</u>	1	
7	c		Van der Waals forces are weak or easily broken Van der Waals <u>between molecules</u> (or implied)	1 1	Not vdw between atoms Allow weak IMF = 2
7	d		Does not have <u>delocalised/free electrons</u>	1	Only allow answer with respect to iodine Not all electrons used in bonding Ignore free ions

Qu	Part	Sub Part	Marking Guidance	Mark	Comments
8	a		Mass number = number of protons + neutrons (in the nucleus/atom)	1	Not in a substance or compound or element
			7 protons <u>and</u> 7 electrons	1	
			8 neutrons	1	
8	b		<u>Average/mean mass of (1) atom(s) (of an element)</u> 1/12 mass of one atom of ¹² C	1	Accept answer in words Can have top line x 12 instead of bottom line ÷12 Allow 95.12 + 4.88 instead of 100 If not to 2 d.p. then lose last mark Not 14.04
			OR		
			<u>(Average) mass of one mole of atoms</u> 1/12 mass of one mole of ¹² C		
			OR		
			<u>(Weighted) average mass of all the isotopes</u> 1/12 mass of one atom of ¹² C		
			OR		
Average mass of an atom/isotope compared to C-12 on a scale in which an atom of C-12 has a mass of 12					
$\frac{(95.12 \times 14) + (4.88 \times 15)}{100}$ = 14.05	1				
1					
8	c		¹⁵ N is heavier / ¹⁵ N has a bigger m/z / different m/z values Electromagnet/ electric field/ magnet /accelerating potential or voltage / electric current	1 1	Not different no's of neutrons Not ionisation potential
8	d		No difference Same no of electrons (in outer orbital/shell/sub shell)/ same electron configuration	1 1	M2 dependent on M1 Not just electrons determine chemical properties Ignore protons