

Group 7(Halogens) – Chlorine, Bromine, Iodine

Mark Scheme 1

Level	IGCSE(9-1)
Subject	Chemistry
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1C)
Topic	Inorganic Chemistry
Sub-Topic	Group 7 (Halogens) – Chlorine, Bromine Iodine
Booklet	Mark Scheme 1

Time Allowed: 45 minutes

Score: /37

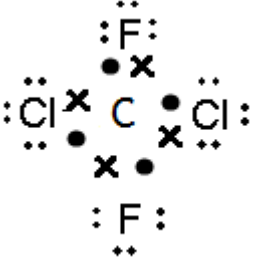
Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

Question number	Answer	Notes	Marks								
1 a	C (green)		1								
b	value in range 120 - 250	If range given, it must be wholly within 120 - 250	1								
c	(colour) dark(er) grey / black (state) solid	Do not accept grey alone Reject any other colour given with black eg blue/black Ignore just darker than iodine Accept correct state symbol	2								
d	C (outer electrons)		1								
e	<table border="1" data-bbox="310 915 1213 1214"> <thead> <tr> <th data-bbox="310 915 711 997">Incorrect word</th> <th data-bbox="711 915 1213 997">Correct word</th> </tr> </thead> <tbody> <tr> <td data-bbox="310 997 711 1078">positive</td> <td data-bbox="711 997 1213 1078">negative</td> </tr> <tr> <td data-bbox="310 1078 711 1159">potassium</td> <td data-bbox="711 1078 1213 1159">sodium</td> </tr> <tr> <td data-bbox="310 1159 711 1214">reducing</td> <td data-bbox="711 1159 1213 1214">oxidising</td> </tr> </tbody> </table>	Incorrect word	Correct word	positive	negative	potassium	sodium	reducing	oxidising	<p>one mark for each correct row</p> <p>Accept minor variations and alternatives and extra words eg for negative, accept negatively / minus eg for oxidising, accept oxidation / electron acceptor / oxidating Accept potassium bromide and sodium bromide Accept K for potassium and Na for sodium</p>	3
Incorrect word	Correct word										
positive	negative										
potassium	sodium										
reducing	oxidising										

Question number	Answer	Notes	Marks
2 a	M1 C (Bromine has a darker colour than air) M2 D (Bromine vapour diffuses upwards)		2
b i	C		1
ii	M1 ammonia (particles/molecules) travels/diffuses faster / further in same time (than hydrogen chloride) M2 (because of) lower M_r	Do not penalise ammonia atoms / ammonium (ions) / ammonia solution in place of ammonia If incorrect choice in (i), then no marks in (ii) If no answer in (i), mark on If C appears in (ii), mark can be awarded in (i) Accept smaller/lighter / ammonia less dense Reject ammonia molecules etc less dense Ignore references to kinetic energy Accept reverse argument for hydrogen chloride / hydrochloric acid for both M1 and M2	2
		Total 5 marks	

Question number	Answer	Accept	Reject	Marks
3 (a) (i)	<p>M1 – divide all the masses by respective A_r</p> <p>M2 – to give 0.02 : 0.02 : 0.04</p> <p>M3 – (mole) ratio is 1 : 1 : 2 Correct ratio or empirical formula with no working scores 0/3</p>		division by atomic number/division upside down for all marks	1
(ii)	<p>M1 – $204 \div 102 = 2$ OR $102 \times 2 = 204$</p> <p>M2 – $C_2F_2Cl_4$ Correct answer with no working scores 2 marks</p>	<p>$(2 \times 12) + (2 \times 19) + (4 \times 35.5) = 204$</p> <p>symbols in any order</p>	FI for F	1
(b)	 <p>M1 – all four bonding pairs correct</p> <p>M2 – rest of diagram correct</p> <p>M2 dep on M1</p>	<p>FI for F</p> <p>any combination of dots and crosses</p>		2

	IGNORE inner shell electrons even if incorrect Award 1 mark for similar molecules, eg CCl ₄ and CF ₄			
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(Total marks for Question 3 = 7 marks)

Question number		Answer	Notes	Marks
4	a	bromine: (red-)brown	Accept red Reject orange / yellow	1
		fluorine: gas AND astatine: solid		1
	b	i Mg ²⁺ Cl ⁻	Accept H ⁺ / H ₃ O ⁺ Ignore OH ⁻ Award 1 for both ions correct but in wrong order	1 1
		ii hydrogen / H ₂ burns with a pop / squeak OR use burning/lit splint/flame to see if pop/squeak	Ignore H Must be reference to test and result Reference to splint/match with no indication of flame is not enough Reject reference to glowing splint Ignore flame extinguished 'Squeaky pop test' alone is not sufficient No ECF from wrong gas M2 DEP on M1 correct or missing	1 1
		iii white precipitate silver chloride to prevent other precipitates forming	Accept white solid / ppt / ppte / suspension Accept AgCl Accept to react with carbonate (ions) Accept to react with hydroxide (ions) Accept carbonates/hydroxides (also) form (white) precipitates	1 1 1

Question number			Answer	Notes	Marks
	b	iv	hydrogen chloride/HCl does not dissociate / does not <u>form/produce</u> ions OR hydrochloric acid is not formed (in methylbenzene) /HCl is not an acid (in methylbenzene) / no H ⁺ ions (present/formed) OR only dissociates/forms H ⁺ ions in water	Accept hydrogen chloride covalent bonds do not break Ignore there is no water Ignore there are no ions (unspecified) Ignore all references to not reacting with methylbenzene	1

(Total for Question 4 = 10 marks)

Question number	Answer	Notes	Marks
5 (a) i	gas / (g) / g	Accept equivalents such as gaseous / vapour Ignore colours	1
ii	darker / dark grey	Accept black Ignore references to states Ignore more intense Reject reference to any other colours	1

Question number	Answer	Notes	Marks
5 (b) i	no reaction (possible) / no displacement OR halogens do not react with their own halide ions	Accept no change Ignore references to lithium chloride containing chlorine / already reacted / OWTTE	1
ii	iodine/it is less reactive than bromine / bromine more reactive than iodine	Accept correct references to positions in (re)activity series Both halogens must be mentioned, except assume it refers to iodine Reject -ide endings Accept symbols and formulae Ignore references to only one element, e.g. iodine is unreactive Reject any comparison involving sodium	1
iii	iodine	Ignore references to states Ignore I and I ₂	1
iv	cross in box D (bromine displaces iodine)		1
v	2KCl + Br ₂	Either order Penalise incorrect symbols/numbers / unconventional formulae in this part, e.g. CL, br, Br ² , ClK	1
		Total	7