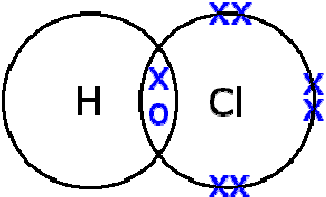


Question Number	Answer	Acceptable answers	Mark
1(a)	C : copper sulfate and sodium chloride		(1)

Question Number	Answer	Acceptable answers	Mark
1(b)	copper sulfate (1) blue-green (1) or sodium chloride (1) yellow (1) colour mark consequential on correct metal (compound)	allow blue or green or green-blue reject orange and yellow-orange	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	An explanation linking weak intermolecular forces /weak forces between molecules (1) little {heat / energy} needed to separate (molecules) (1)	bonds / attractions in place of forces intermolecular forces between {atoms / bonds} loses 1 st marking point any answer in terms of covalent or ionic bonding scores zero	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	A description linking use separating funnel (1) run off lower {layer / liquid} / OWTTE (1)	alternative description of separating funnel eg funnel with a tap at the bottom suitable labelled diagram burette allow layers / liquids to separate ignore fractional distillation	(2)

Question Number	Answer	Acceptable answers	Mark
1 (d)	 <p data-bbox="359 524 829 633">shared pair in molecule (1) rest of molecule consequent on first mark (1)</p>	<p data-bbox="885 338 1348 404">Allow a diagram without labels for 2 marks</p> <p data-bbox="885 589 1316 655">any symbols shown must be correct for the 2nd mark</p> <p data-bbox="885 698 1340 764">allow any combination of dots and crosses for electrons</p> <p data-bbox="885 808 1364 840">wrong compound = zero marks</p>	(2)

Question Number	Answer	Mark																			
2(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th colspan="2">symbol</th> <th colspan="2">number of electrons</th> </tr> <tr> <th>atom</th> <th>ion</th> <th>atom</th> <th>ion</th> </tr> </thead> <tbody> <tr> <td>chlorine</td> <td></td> <td></td> <td></td> <td>18</td> </tr> <tr> <td>sodium</td> <td></td> <td>Na⁺</td> <td>11</td> <td></td> </tr> </tbody> </table>		symbol		number of electrons		atom	ion	atom	ion	chlorine				18	sodium		Na ⁺	11		(3)
	symbol		number of electrons																		
	atom	ion	atom	ion																	
chlorine				18																	
sodium		Na ⁺	11																		

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	$\text{NaCl} + \text{AgNO}_3 \rightarrow \text{NaNO}_3 + \text{AgCl}$ <ul style="list-style-type: none"> • reactant formulae (1) • product formulae (1) 	$\text{Ag}^+ + \text{Cl}^- \rightarrow \text{AgCl}$ ignore state symbols do not give (2) if incorrectly balanced	(2)

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	to remove other ions that would also form a white precipitate		(1)

Question Number	Indicative content	Mark
QWC	<p>*2(c) An explanation linking some of the following points</p> <p>For a sample to conduct electricity</p> <ul style="list-style-type: none"> • charged particles must be present • they must be free to move <p>water does not conduct because it</p> <ul style="list-style-type: none"> • is (simple molecular) covalent • exists as molecules • contains no/(very few) charged particles <p>solid sodium chloride does not conduct because</p> <ul style="list-style-type: none"> • although it contains ions / cations / anions • which are charged particles • they are not free to move • because they are held together • by strong • electrostatic forces/ ionic bonds • in lattice <p>sodium chloride solution conducts because</p> <ul style="list-style-type: none"> • ions / cations / anions are present • which are charged particles • they are free to move • because the water has cut down the forces between the ions • ions have separated • move to electrode of opposite charge 	(6)
Level	0	No rewardable content
1	1-	<ul style="list-style-type: none"> • a limited explanation e.g. water is covalent and sodium chloride is ionic • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3-	<ul style="list-style-type: none"> • a simple explanation e.g. water is covalent and does not conduct because there are no charged particles: sodium chloride is ionic therefore solution conducts because ions move • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5-	<ul style="list-style-type: none"> • a detailed explanation e.g. in solid sodium chloride the ions are held in a lattice by strong forces but in sodium chloride solution the ions are free to move: water is covalent so contains no charged particles • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	B lead chloride		(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	<p>An explanation linking two of</p> <ul style="list-style-type: none"> • strong (electrostatic) forces of attraction • between oppositely charged ions • so requires lot of heat/energy to overcome forces/break bonds 	<p>Any reference to molecules/molecular/intermolecular/covalent scores 0 marks</p> <p>strong (ionic) bonds</p> <p>positive and negative ions reject charged atoms for this mark</p> <p>ignore hard to melt/high temperature needed</p>	(2)

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	<p>A description including</p> <ul style="list-style-type: none"> • M1 add (dilute) nitric acid • M2 add silver nitrate (solution) • M3 forms white ppt/solid 	<p>Accept correct formulae</p> <p>If use any other acid can score M2 and M3</p> <p>dependent on use of silver nitrate</p> <p>Alternative method:</p> <p>Electrolyse (1)</p> <p>Chlorine formed (1)</p> <p>Bleaches litmus/pH paper (1)</p> <p>Ignore smell</p>	(3)

Question Number	Indicative Content	Mark
QWC	3(b)	
	<p>A description including some of the following points</p> <p>ion formation</p> <ul style="list-style-type: none"> • magnesium atoms lose electrons • each magnesium atom loses two electrons • to acquire full outer shell • magnesium (configuration) becomes 2.8 • forms Mg^{2+} ion • electrons transferred to oxygen atoms • oxygen atoms gain electrons • each oxygen atom gains two electrons • oxygen (configuration) becomes 2.8 • to acquire full outer shell • forms O^{2-} ion <p>structure</p> <ul style="list-style-type: none"> • magnesium ions attract oxide ions • due to opposite charges • ions pack close together • ratio of ions 1: 1 • ions arranged in lattice • giant (ionic) (structure) <p>diagram can be credited for any points</p>	(6)
Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> • a limited description e.g. magnesium atoms lose electrons and oxygen atoms gain electrons e.g. magnesium oxide is a giant structure • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> • a simple description e.g. magnesium atoms lose two electrons to form positive ions and oxygen atoms gain two electrons to form negative ions • e.g. magnesium atoms lose electrons and oxygen atoms gain electrons and magnesium oxide is a giant structure • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> • a detailed description e.g. each magnesium atom transfers two electrons to an oxygen atom and the opposite charged ions (Mg^{2+} / O^{2-}) formed attract each other to form a giant (ionic) lattice • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	A carbonate ion CO_3^{2-}		(1)

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	A description including warm / heat / boil (1) { gas/ammonia } turns (damp red/pink) litmus blue / (damp red/pink) litmus turns blue when held above (the mixture)(1)	maximum (1) if additional reagents added ignore any ppt allow pungent smell / smell of { ammonia/wet nappies} /alkaline gas / effect of ammonia on other named indicators /dense white fumes with conc hydrochloric acid ignore litmus turns blue in ammonium ions/sodium hydroxide/mixture do not allow gas/ammonia if blue litmus turns red/pink	(2)

Question Number	Answer	Acceptable answers	Mark
4(b)	$\text{Al}^{3+} + 3\text{OH}^- \rightarrow \text{Al}(\text{OH})_3$ OH^- (1) $\text{Al}(\text{OH})_3$ (1) balancing 3, conditional on correct formulae (1)	allow multiples allow HO^- (1) allow $\text{Al}(\text{HO})_3$ (1) do not allow $\text{Al}(\text{HO})^3$ /lower case h ignore state symbols/ 3Na^+ on both sides	(3)

Question Number		Indicative Content	Mark
QWC	*4(c)	<p>An explanation including some of the following points</p> <p>test for cation</p> <ul style="list-style-type: none"> flame test if the flame is yellow/not lilac, sodium ions are present if the flame is lilac/not yellow, potassium ions are present <p>test for iodide ions</p> <ul style="list-style-type: none"> make a solution of the crystals in water add dilute nitric acid add silver nitrate solution if there is a yellow precipitate, iodide ions are present if there is no precipitate, sulfate ions are present $\text{Ag}^+ + \text{I}^- \rightarrow \text{AgI}$ <p>OR</p> <ul style="list-style-type: none"> make a solution of the crystals in water add chlorine water then cyclohexane if the cyclohexane/top layer turns purple, iodide ions were present if there is no colour change, sulfate ions are present $\text{Cl}_2 + 2\text{I}^- \rightarrow 2\text{Cl}^- + \text{I}_2$ <p>test for sulfate ions</p> <ul style="list-style-type: none"> make a solution of the crystals in water add dilute {hydrochloric/nitric} acid add barium {chloride/nitrate} solution if there is a white precipitate, sulfate ions are present if there is no precipitate, iodide ions are present $\text{Ba}^{2+} + \text{SO}_4^{2-} \rightarrow \text{BaSO}_4$ 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> a limited description of test for any 1 ion e.g. flame test, yellow flame, sodium ions are present. the answer communicates ideas using simple language and uses limited scientific terminology spelling, punctuation and grammar are used with limited accuracy 	
2	3 - 4	<ul style="list-style-type: none"> a simple description to identify a cation and an anion e.g. if the substance is sodium sulfate, it will give a yellow flame in a flame test and a white precipitate with barium chloride solution. the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately spelling, punctuation and grammar are used with some accuracy 	
3	5 - 6	<ul style="list-style-type: none"> a detailed description to identify at least 3 ions e.g. carry out a flame test, yellow flame, sodium ions present, lilac flame, potassium ions present, add silver nitrate solution to solution of substance, yellow precipitate, iodide ion. the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors 	