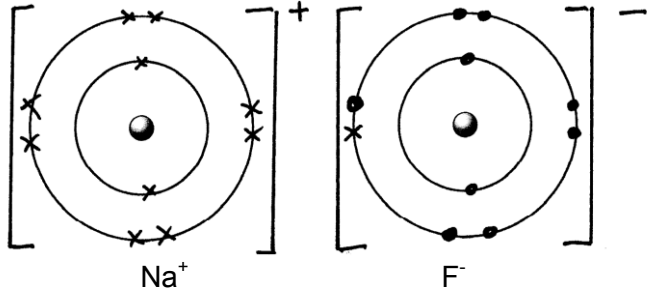
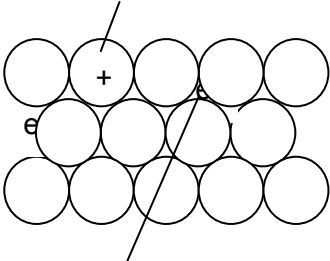


Question	Answer	Marks	Guidance
1	<p>Level 3 Candidate applies knowledge to predict the name of both products AND predicts a reaction time for rubidium AND writes a correctly balanced symbol equation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>Level 2 EITHER Candidate applies knowledge to predict the names of both products AND predicts a reaction time for rubidium OR predicts a reaction time for rubidium AND attempts a symbol equation. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>Level 1 EITHER Candidate applies knowledge to predict the names of both products OR predicts a reaction time for rubidium and the name of one product OR candidate attempts a symbol equation. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>Level 0 Insufficient or irrelevant science. Answer not worthy of credit. (0marks)</p>	6	<p>This question is targeted at grades up to A*.</p> <p>Indicative scientific points may include:</p> <p>Names of Products</p> <ul style="list-style-type: none"> hydrogen must be stated but can be in a word equation rubidium hydroxide must be stated but can be in a word equation <p>Reaction Time</p> <ul style="list-style-type: none"> any time less than 7 seconds / reaction time less than potassium <p>Equation</p> <ul style="list-style-type: none"> $2\text{Rb} + 2\text{H}_2\text{O} \rightarrow 2\text{RbOH} + \text{H}_2$ or correct multiple <p>note $\text{Rb} + \text{H}_2\text{O} \rightarrow \text{product / formula}$ is an attempt to write an equation</p> <p>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</p>
		6	

Question	Answer	Marks	Guidance
2 a	melting point of sodium – any value between 90 and 130 (1) atomic radius of rubidium – any value between 0.250 and 0.280 (1)	2	
b	$2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$ correct formulae (1) balancing – dependent on correct formulae (1)	2	allow any correct multiple including fractions e.g. $4\text{Na} + 4\text{H}_2\text{O} \rightarrow 4\text{NaOH} + 2\text{H}_2$ allow = or \rightleftharpoons for arrow not 'and' or & for + allow one mark for correct balanced equation with minor errors of case, subscript or superscript e.g. $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}^2$ (1)
c	all have one electron in their outer shell (1)	1	allow orbit or energy level rather than shell allow have same number of electrons in outer shell (1) allow all lose one electron to make an ion / all lose one electron to get a stable outer shell / all lose 1 electron to get a stable outer octet / all lose 1 electron to get a complete outer shell (1) they all lose 1 electron is not sufficient on its own all have a single electron is not sufficient ignore to make stable atom

Question	Answer	Marks	Guidance
d	 <p data-bbox="262 493 619 525">correct sodium ion / 2.8 (1)</p> <p data-bbox="262 556 619 588">correct fluoride ion / 2.8 (1)</p>	2	<p data-bbox="1108 164 1942 196">two correct electronic structures but no charges award one mark</p> <p data-bbox="1108 227 1942 290">two correct charges with incorrect electronic structure award one mark</p> <p data-bbox="1108 329 1963 392">one structure of 2,8 but unlabelled is not sufficient but allow both have a structure of 2,8 (1)</p> <p data-bbox="1108 431 1774 462">the ionic charges must not be shown in the nucleus</p> <p data-bbox="1108 501 1764 533">award 0 marks for structures with shared electrons</p> <p data-bbox="1108 572 1953 635">One electronic structure must be labelled in some way to indicate which ion is which in order to score two marks.</p> <p data-bbox="1108 674 1984 736">allow answers showing the transfer of electrons providing the same electrons are not shown twice</p> <p data-bbox="1108 776 1564 807">all electrons can be dots or crosses</p>
	Total	7	

Question	answer	Marks	Guidance
3	<p>Level 3 (5–6 marks) Candidate applies knowledge of the reaction of alkali metals to predict some observations or comments of the reaction of caesium with water including a comparison of the rate of reaction with lithium AND Constructs the balanced symbol equation for the reaction between caesium or lithium and water. Quality of written communication does not impede communication of science at this level.</p> <p>Level 2 (3–4 marks) Candidate applies knowledge of the reaction of alkali metals to predict some observations or makes comments about the reaction between caesium and water AND gives the names or formulae of products formed in the reaction between caesium and water. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Candidate applies knowledge of the reaction of alkali metals to predict some observations or makes comments about the reaction between caesium and water OR gives the names or formulae of products formed in the reaction between caesium and water. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to A</p> <p>Indicative scientific points at level 3 must include:</p> <ul style="list-style-type: none"> • $2\text{Cs} + 2\text{H}_2\text{O} \rightarrow 2\text{CsOH} + \text{H}_2$ OR $2\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2$. • faster reaction than with lithium / more reactive / more violent <p>Indicative scientific points at levels 1, 2 and 3 may include:</p> <ul style="list-style-type: none"> • caesium + water \rightarrow caesium hydroxide + hydrogen • lithium + water \rightarrow lithium hydroxide + hydrogen • hydrogen made • caesium hydroxide made • bubbles • fizzes • floats • moves on the surface • gives a flame • gets smaller • forms a colourless solution • alkaline solution formed • explodes • caesium loses electrons more easily
	Total	6	

Question		Answer	Marks	Guidance
4	(a)	K (1)	1	allow potassium
	(b)	idea of an attraction or bond(ing) between positive ions and electrons (1) (closely packed) metal ions and delocalised electrons (1)	2	do not allow intermolecular forces / covalent bonding / ionic bonding / metal molecules = 0 for the question allow positive atoms, cations, positive ions instead of metal ions and free electrons instead of delocalised electrons. allow has electrons free to move instead of delocalised or free electrons / sea of electrons instead of delocalised electrons allow mark could be found on a labelled diagram <div style="text-align: center;"> <p>(metal ion)</p>  <p>free electrons</p> </div>
Total			3	

Question			Answer	Marks	Guidance
5	(a)	(i)	68 (cm ³) (1)	1	
		(ii)	37–39 (seconds) (1)	1	
		(iii)	line needs to level off at same height and be steeper initially (1)	1	By eye the line should go through the origin Line drawn to left of original and must not go above 79 cm ³ at any point but must end at 78 cm ³
	(b)		reactant not in excess / that is all used up (at the end of the reaction) (1)	1	allow reactant that determines the volume of hydrogen given off (1) allow substance that causes the reaction to stop allow reagent that runs out (first)
			Total	4	

Question		answer	Marks	Guidance
6	(a)	zinc + copper sulfate → copper + zinc sulfate (1)	1	allow = instead of → not and or & in equation allow reactants and products in any order not copper(II) as one of the products allow mix of words and correct formulae ignore state symbols allow correct symbol equation even if not balanced $Zn + CuSO_4 \rightarrow Cu + ZnSO_4$ allow correct name with an incorrect formula but not incorrect name with correct formula
	(b)	iron or top reaction loses electrons which is oxidation (1) oxygen or bottom reaction gains electrons which is reduction (1)	2	no mark for identifying which reaction is oxidation and which is reduction allow water gains electrons which is reduction
		Total	3	

Question	Answer	Marks	Guidance
7 a	(purification processes) do not remove dissolved or soluble substances (1)	1	allow they are soluble / they are dissolved
b	large energy requirement (1) expensive (1)	2	allow heat for energy allow high cost of equipment allow issues related to scaling up / needs lots of water (1) ignore takes a long time
c	Pete is right about A but wrong about B (no mark) A contains copper (ions) because it gives a blue (ppt) with sodium hydroxide (1) A contains sulfate (ions) because it gives a white (ppt) with barium chloride (1) B contains iron(III) (ions) because it gives a brown (ppt) with sodium hydroxide (1) B does not contain sulfate (ions) as it does not give a white (ppt) with barium chloride (1)	4	allow Pete is wrong not Pete is wrong about A for marks about A not Peter is correct for B for marks about B copper sulfate goes blue with sodium hydroxide is not sufficient copper sulfate goes white with barium chloride is not sufficient iron(III) sulfate goes brown with sodium hydroxide is not sufficient B is not iron(III) sulfate because it does not go white with barium chloride is not sufficient allow B does not contain sulfate as it does not give a ppt allow A and B both cannot be sulfates since they do not both go white with barium chloride (2)
	Total	7	

Question		Answer	Marks	Guidance
8	(a)	strong acid is fully ionised (in water) (1) weak acid is only partially ionised (1)	2	allow dissociated for ionised
	(b) (i)	ethanoic acid contains a lower concentration of hydrogen ions (than hydrochloric acid) (1) so lower collision frequency (1)	2	allow ethanoic acid contains less crowded hydrogen ions / hydrogen ions in ethanoic acid are further apart / ora allow ethanoic acid has a higher pH / ora allow collisions less often / less chance of a collision / fewer collisions per second / ora if specified for hydrochloric acid
	(ii)	both contain the same number of moles of magnesium (1)	1	allow both contain the same amount of magnesium / both contain same mass of magnesium (1) ignore magnesium is the limiting reagent not same number of moles of acid
		Total	5	