

Question number	Answer				Accept	Reject	Marks
1 (a)	<b>Element</b>	<b>Arrangement of electrons in atom</b>	<b>Arrangement of electrons in ion</b>	<b>Charge on ion</b>	$K^{(1)+} / K^{+1}$ $S^{2-} / S^{-2}$  positive for potassium and negative for sulfide for 1 mark		3
			2.8.8	(1)+/+1			
			2.8.8	2-/-2			
<b>M1</b> – <u>both</u> arrangements correct <b>M2</b> – charge on potassium ion <b>M3</b> – charge on sulfide ion							
(b) (i)	<u>ions</u> move/travel (to the electrodes)				<u>ions</u> are free to move / <u>ions</u> are mobile	electrons free to move	1
(ii)	<b>M1</b> (electrostatic) forces (of attraction) between (oppositely charged) <u>ions</u>  <b>M2</b> are (relatively) strong  <b>M3</b> large amount of energy required to overcome the forces / separate the ions from the lattice  <b>M2</b> dep on mention of forces (of attraction) or bonds  Mention of covalent bonds or intermolecular forces no <b>M1</b>				<u>ionic</u> bonding / <u>ionic</u> bonds   break the bonds		3

**Total 7 marks**

Question number		Answer	Notes	Marks	
2	a	cross in box C (neutrons and protons)		1	
	b	i	6	1	
		ii	14	1	
	c	cross in box B (the numbers of electrons and protons are equal)		1	
	d	M1	same number of protons / (they both have) 6 protons	Ignore references to electrons	1
		M2	different numbers of neutrons / more neutrons	If number of extra neutrons specified, it must be 2 Reject different numbers of electrons	1
				Ignore references to atomic number and mass number	
	e	cross in box B (2.4)		1	
<b>TOTAL</b>				<b>7</b>	

Question number	Expected Answer	Accept	Reject	Marks												
3 (a)	<table border="1"> <thead> <tr> <th></th> <th>Proton</th> <th>Neutron</th> <th>Electron</th> </tr> </thead> <tbody> <tr> <td>relative mass</td> <td>1</td> <td></td> <td></td> </tr> <tr> <td>relative charge</td> <td></td> <td>0</td> <td>-</td> </tr> </tbody> </table> <p>1 mark for each correct answer</p>		Proton	Neutron	Electron	relative mass	1			relative charge		0	-	+1	- 1 / one  Zero minus one /negative	4
	Proton	Neutron	Electron													
relative mass	1															
relative charge		0	-													
(b) (i)	Protons <u>AND</u> electrons = 1 neutrons = 2	one two		1 1												
(ii)	<u>atoms</u> of the same element  with different masses Ignore references to electrons	atoms with same atomic number / number of protons / proton number  with different mass numbers / different numbers of neutrons / different neutron numbers	molecules / compounds for first mark only  different relative atomic masses for second mark only	1  1												

Question number	Expected Answer	Accept	Reject	Marks
3(c)	$((79 \times 50.7) + (81 \times 49.3))/100$ <p><b>OR</b></p> $(79 \times 0.50.7) + (81 \times 0.493)$ $= 79.99$ <p>Allow 1 mark for a single transcription error (e.g. 43.9 instead of 49.3) Ignore units such as grams</p>	Correct answer on its own scores 2		1  1
			<b>Total</b>	<b>10</b>

Question number	Answer	Notes	Marks
4 a	A (the crystal dissolves)		1
b	A (it is all blue)		1
c i	4		1
ii	21		1

Question number	Answer	Notes	Marks									
5 a	<table border="1"> <thead> <tr> <th>Halogen</th> <th>Colour</th> <th>Physical state</th> </tr> </thead> <tbody> <tr> <td>bromine</td> <td></td> <td>liquid</td> </tr> <tr> <td>iodine</td> <td>black</td> <td></td> </tr> </tbody> </table>	Halogen	Colour	Physical state	bromine		liquid	iodine	black		M1 (bromine) liquid / (l) M2 (iodine) black allow (dark) grey	2
Halogen	Colour	Physical state										
bromine		liquid										
iodine	black											
b	<pre>       ••   xx   ••      : Br x P x Br :      ••   x•   ••            : Br :            •• </pre>	M1 three bonding pairs of electrons correct M2 rest of electrons correct Accept any combination of dots and crosses Ignore circles	2									
c	$\text{PBr}_3 + 3\text{H}_2\text{O} \rightarrow 3\text{HBr} + \text{H}_3\text{PO}_3$	M1 all formulae correct M2 balanced M2 DEP on M1	2									

**Total 6 marks**