<table>
<tr><th>Question number</th><th>Answer</th><th>Accept</th><th>Reject</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><th>Element</th><th>Arrangement of electrons in atom</th><th>Arrangement of electrons in ion</th><th>Charge on ion</th></tr>
<tr><td></td><td></td><td>2.8.8</td><td>(1)+/+1</td></tr>
<tr><td></td><td></td><td>2.8.8</td><td>2−/−2</td></tr>
</table>
M1 – <u>both</u> arrangements correct

M2 – charge on potassium ion

M3 – charge on sulfide ion</td><td>$K^{(1)+}$ / K^{+1}

S^{2-} / S^{-2}

positive for potassium and negative for sulfide for 1 mark</td><td></td><td>3</td></tr>
<tr><td>(b) (i)</td><td><u>ions</u> move/travel (to the electrodes)</td><td><u>ions</u> are free to move / <u>ions</u> are mobile</td><td>electrons free to move</td><td>1</td></tr>
<tr><td>(ii)</td><td>M1 (electrostatic) forces (of attraction) between (oppositely charged) <u>ions</u>

M2 are (relatively) strong

M3 large amount of energy required to overcome the forces / separate the ions from the lattice

M2 dep on mention of forces (of attraction) or bonds

Mention of covalent bonds or intermolecular forces no M1</td><td><u>ionic</u> bonding / <u>ionic</u> bonds

break the bonds</td><td></td><td>3</td></tr>
</table>

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
TOTAL						**7**

<table>
<tr><th>Question number</th><th>Expected Answer</th><th>Accept</th><th>Reject</th><th>Marks</th></tr>
<tr><td>3 (a)</td><td>
<table>
<tr><th></th><th>Proton</th><th>Neutron</th><th>Electron</th></tr>
<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>
</table>
1 mark for each correct answer</td><td>+1</td><td>– 1 / one

Zero
minus one /negative</td><td>4</td></tr>
<tr><td>(b) (i)</td><td>Protons <u>AND</u> electrons = 1
neutrons = 2</td><td>one
two</td><td></td><td>1
1</td></tr>
<tr><td>(ii)</td><td><u>atoms</u> of the same element

with different masses
Ignore references to electrons</td><td>atoms with same atomic number / number of protons / proton number

with different mass numbers / different numbers of neutrons / different neutron numbers</td><td>molecules / compounds for first mark only

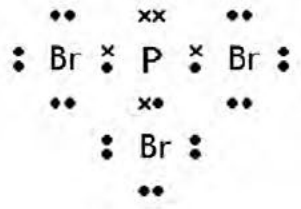
different relative atomic masses for second mark only</td><td>1

1</td></tr>
</table>

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

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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>5 a</td><td>
<table>
<tr><th>Halogen</th><th>Colour</th><th>Physical state</th></tr>
<tr><td>bromine</td><td></td><td>liquid</td></tr>
<tr><td>iodine</td><td>black</td><td></td></tr>
</table>
</td><td>M1 (bromine) liquid / (l)

M2 (iodine) black
allow (dark) grey</td><td>2</td></tr>
<tr><td>b</td><td></td><td>M1 three bonding pairs of electrons correct

M2 rest of electrons correct

Accept any combination of dots and crosses
Ignore circles</td><td>2</td></tr>
<tr><td>c</td><td>$PBr_3 + \mathbf{3}H_2O \rightarrow \mathbf{3}HBr + H_3PO_3$</td><td>M1 all formulae correct

M2 balanced
M2 DEP on M1</td><td>2

Total 6 marks</td></tr>
</table>