

Question number	Answer	Marks	Guidance															
1 (a)	C	B1																
1 (b)	B	B1																
1 (c)	D	B1																
2 (a)	38	B1																
2 (b)	32	B1																
2 (c)	5	B1																
3 (a) (i)	23	B1																
3 (a) (ii)	$^{54}_{26}\text{Fe}$	B2																
3 (b)	$^{24}_{11}\text{Na}$	B2																
3 (c)	$^{88}_{38}\text{Sr}$	B2																
4 (a)	Isotopes are atoms of the same element with different numbers of neutrons and different masses.	B1																
4 (b)	Relative isotopic mass is the mass of an isotope relative to one-twelfth of the mass of an atom of carbon-12.	B2																
4 (c)	71	B1																
4 (d)	<table border="1"> <thead> <tr> <th></th> <th>protons</th> <th>neutrons</th> <th>electrons</th> <th>charge</th> </tr> </thead> <tbody> <tr> <td>^{17}O</td> <td>8</td> <td>9</td> <td>10</td> <td>2-</td> </tr> <tr> <td>^{27}Al</td> <td>13</td> <td>14</td> <td>10</td> <td>3+</td> </tr> </tbody> </table>		protons	neutrons	electrons	charge	^{17}O	8	9	10	2-	^{27}Al	13	14	10	3+	B2	
	protons	neutrons	electrons	charge														
^{17}O	8	9	10	2-														
^{27}Al	13	14	10	3+														
5 (a)	Relative atomic mass is the weighted mean mass of an atom of an element relative to one-twelfth of the mass of an atom of carbon-12.	B3																
5 (b)	$A_r = 32.09$	B2																
5 (c)	<table border="1"> <thead> <tr> <th></th> <th>protons</th> <th>neutrons</th> <th>electrons</th> </tr> </thead> <tbody> <tr> <td>^{34}S</td> <td>16</td> <td>18</td> <td>16</td> </tr> <tr> <td>$^{32}\text{S}^{2-}$</td> <td>16</td> <td>16</td> <td>18</td> </tr> </tbody> </table>		protons	neutrons	electrons	^{34}S	16	18	16	$^{32}\text{S}^{2-}$	16	16	18	B1				
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^{34}S	16	18	16															
$^{32}\text{S}^{2-}$	16	16	18															
6 (a)	$3\text{Mg(s)} + \text{N}_2\text{(g)} \rightarrow \text{Mg}_3\text{N}_2\text{(s)}$ 1 mark for correct species and state symbols 1 mark for balance	B1 × 2																
6 (b)	$\text{Ca(s)} + 2\text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{H}_2\text{(g)}$ 1 mark for correct species and state symbols 1 mark for balance	B1 × 2																
6 (c)	$6\text{NaOH(aq)} + \text{Fe}_2\text{(SO}_4)_3\text{(aq)} \rightarrow 2\text{Fe(OH)}_3\text{(s)} + 3\text{Na}_2\text{SO}_4\text{(aq)}$ 1 mark for correct species and state symbols 1 mark for balance	B1 × 2																