

Question	Answer	Marks	AO Element	Notes	Guidance
1	number of protons plus neutrons in an atom	1			
2	Uranium / U isotope circled	1			second isotope circled
3	5	1			
4	C (1) D (1)	2			
5	B - Argon has fewer protons than potassium.	1			
6	C - the total number of neutrons and protons in the nucleus of an atom	1			
7	substance containing only one type of atom	1		<b>allow:</b> substance that cannot be split up (by chemical means)	
8	suitable use of radioactive isotope e.g. detecting leaks in pipes / checking thickness of paper / tracer / cancer treatment / investigating thyroid function	1		<b>ignore:</b> atomic bombs / explosions	

Question	Answer	Marks	AO Element	Notes	Guidance
9	giant covalent	1			
10	4 / four	1	AO2		
11	giant ionic structure	1		3rd box down	
12	C	1			
13	2 electrons in outer shell (1) inner shells 2, 8, 8 (1)	2			
14	electron in outer shell (1) electrons in first shell <b>AND</b> eight electrons in the second shell (1)	2			
15	electrons in inner shell <b>AND</b> 6 electrons in outer shell <b>AND</b> no additional shells of electrons	1			
16(a)	fluorine / F	1			
16(b)	hydrogen / H	1			
16(c)	vanadium / V	1			
16(d)	sulfur / S	1			

Question	Answer	Marks	AO Element	Notes	Guidance												
16(e)	phosphorus / P	1															
16(f)	magnesium / Mg	1															
16(g)	chlorine / Cl	1															
17(a)	18	1															
17(b)	gain of two electrons	1															
17(c)	Ca / calcium	1															
18	<p><u>atoms</u> with same number of protons <b>or</b> <u>atoms</u> of the same element <b>or</b> <u>atoms</u> with same atomic number (1)</p> <p><u>atoms</u> with different number of neutrons <b>or</b> <u>atoms</u> with different mass number <b>or</b> <u>atoms</u> with different nucleon number (1)</p>	2															
19	<table border="1"> <thead> <tr> <th>particle</th> <th>relative charge</th> <th>relative mass</th> </tr> </thead> <tbody> <tr> <td>electron</td> <td><b>M1</b> -1</td> <td></td> </tr> <tr> <td>neutron</td> <td><b>M2</b> 0</td> <td><b>M3</b> 1</td> </tr> <tr> <td>proton</td> <td></td> <td><b>M4</b> 1</td> </tr> </tbody> </table>	particle	relative charge	relative mass	electron	<b>M1</b> -1		neutron	<b>M2</b> 0	<b>M3</b> 1	proton		<b>M4</b> 1	2			
particle	relative charge	relative mass															
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20(a)	any suitable use e.g. clothing / fishing lines / ropes / nets	1			
20(b)	4	1			
21	electrons in S = 16 (1) electrons in Zn <sup>2+</sup> = 28 (1) neutrons in S = 20 <b>AND</b> neutrons in Zn <sup>2+</sup> = 37 (1) protons in S = 16 (1)	4			
22	electrons in S = 16 (1) electrons in Cu <sup>2+</sup> = 27 (1) neutrons in S = 18 <b>AND</b> neutrons in Cu <sup>2+</sup> = 34 (1) protons in S = 16 (1)	4			
23	number of protons (1) protons in the nucleus (of an atom) (1)	2			
24	<b>M1</b> electrons <b>18</b> <b>M2</b> neutrons <b>24</b> <b>M3</b> protons <b>20</b>	3			

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25	<p><b>M1</b> electron <b>AND</b> -1</p> <p><b>M2</b> proton <b>AND</b> (in the) nucleus <b>AND</b> 1</p> <p><b>M3</b> neutron <b>AND</b> 1 <b>AND</b> 0 / nil</p>	<b>3</b>			
26	<p>difference:</p> <p><b>M1</b> (number of) neutrons</p> <p>similarities:</p> <p><b>M2</b> (number of) protons</p> <p><b>M3</b> (number of) electrons</p>	<b>3</b>			
27(a)	<p><b>M1</b> protons (are the same) / 11 protons</p> <p><b>M2</b> electrons (are the same) / 11 electrons</p> <p><b>M3</b> neutrons (are different) / 11,12,13 neutrons</p>	<b>3</b>			
27(b)	same number of protons and electrons	<b>1</b>			
27(c)	<p><b>M1</b> same <b>number</b> of electrons</p> <p><b>M2</b> (same number of) electrons in outer shell</p>	<b>2</b>			
27(d)	(they all have) 1 more proton than electrons / 11 protons and 10 electrons	<b>1</b>			

Question	Answer	Marks	AO Element	Notes	Guidance
28	2 8 3 (1) 2 8 8 (1)	2			
29(a)	12p 12n 12e (1) 12p 14n 12e (1)	2			
29(b)	isotope(s)	1			
29(c)	same number of electrons (1) (same number) of electrons in the outer shell (1)	2			
30	atoms	1			
	element	1			
	neutrons	1			
31(a)	Br <sup>-</sup> /bromide	1			
31(b)	potassium bromide	1			
31(c)	11 (mg)	1			
31(d)	e <sup>-</sup>	1			
32(a)	<b>C</b>	1			

Question	Answer	Marks	AO Element	Notes	Guidance
32(b)	<b>B</b>	<b>1</b>			
32(c)	<b>E</b>	<b>1</b>			
32(d)	<b>B</b>	<b>1</b>			
32(e)	<b>D</b>	<b>1</b>			
33	4 electrons in outer shell (1) 2,8 in inner shell <b>AND</b> not more than 3 shells (1)	<b>2</b>			
34(a)	electrons: 92 (1) neutrons: 143 (1)	<b>2</b>			
34(b)	energy production	<b>1</b>			
35	(substance) made of <b>atoms</b> with the same atomic number / number of protons / proton number <b>OR</b> a substance that cannot be split up / broken down into two or more simple(r) substances by chemical means	<b>1</b>			

Question	Answer	Marks	AO Element	Notes	Guidance																				
36	<table border="1"> <thead> <tr> <th></th> <th>no. of protons</th> <th>no. of electrons</th> <th>electronic structure</th> <th>charge</th> </tr> </thead> <tbody> <tr> <td><b>A</b></td> <td>11</td> <td>10</td> <td>2,8</td> <td><b>M4</b> 1+ / +1</td> </tr> <tr> <td><b>B M1</b></td> <td><b>18</b></td> <td>18</td> <td><b>M3</b> 2,8,8</td> <td>0</td> </tr> <tr> <td><b>C M2</b></td> <td><b>9</b></td> <td>10</td> <td>2,8</td> <td>-1</td> </tr> </tbody> </table>		no. of protons	no. of electrons	electronic structure	charge	<b>A</b>	11	10	2,8	<b>M4</b> 1+ / +1	<b>B M1</b>	<b>18</b>	18	<b>M3</b> 2,8,8	0	<b>C M2</b>	<b>9</b>	10	2,8	-1	<b>4</b>			
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37(a)	hydrogencarbonate / $\text{HCO}_3^-$	<b>1</b>																							
37(b)	135 (mg)	<b>1</b>																							
37(c)	836 mg)	<b>1</b>																							
37(d)	sodium hydrogencarbonate	<b>1</b>																							
38	C	<b>1</b>																							
39	electrons in $\text{Cr}^{2+}$ : 22 (1) neutrons in N: 8 (1) protons in N and $\text{Cr}^{2+}$ : <b>7 AND 24</b> (1)	<b>3</b>																							
40(a)	<b>A</b>	<b>1</b>																							
40(b)	<b>C</b>	<b>1</b>																							



- Mark Scheme

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Question	Answer	Marks	AO Element	Notes	Guidance
40(c)	<b>B</b>	<b>1</b>			
40(d)	<b>B</b>	<b>1</b>			
40(e)	<b>B</b>	<b>1</b>			
					[Total: 102]

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