

2: Particles, atomic structure, ionic bonding and the Periodic Table – Topic questions**Paper 4**

The questions in this document have been compiled from a number of past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
1	2016	March	42
1	2016	June	41
2	2016	November	41

The mark scheme for each question is provided at the end of the document.

You can find the complete question papers and the complete mark schemes (with additional notes where available) on the School Support Hub at www.cambridgeinternational.org/support

- 1 (a) The table below gives information about particles.

Complete the table. The first line has been done for you.

particle	number of protons	number of electrons	electronic configuration	charge on particle
A	12	10	2,8	2+
B		18	2,8,8	1–
C	18		2,8,8	0
D	8	10		

[4]

- (b) Gallium is a Group III element.

Define the term *element*.

.....

.....

..... [1]

- (c) The following are gallium atoms.



Complete the following table.

atom	number of protons	number of neutrons	number of electrons
${}_{31}^{69}\text{Ga}$			
${}_{31}^{71}\text{Ga}$			

[3]

[Total: 8]

1 Protons, neutrons and electrons are subatomic particles.

(a) Complete the table to show the relative mass and relative charge of a proton, a neutron and an electron.

particle	relative mass	relative charge
proton		
neutron		
electron	$\frac{1}{1840}$	

[3]

(b) Bromine has two isotopes.

(i) Define the term *isotope*.

.....
..... [2]

(ii) Explain why the two isotopes of bromine have the same chemical properties.

.....
..... [2]

(c) The table shows the number of protons, neutrons and electrons in some atoms and ions.

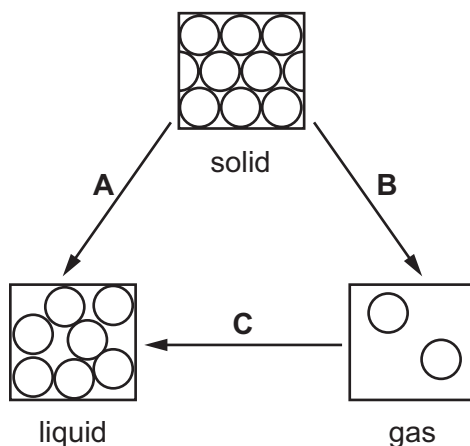
Complete the table.

particle	number of protons	number of neutrons	number of electrons
${}^7_3\text{Li}$			
${}^{34}_{16}\text{S}^{2-}$			
	19	22	18

[5]

[Total: 12]

2 Matter can exist as solid, liquid or gas. The arrows show some changes of state.



(a) Name the changes of state represented on the diagram.

(i) A [1]

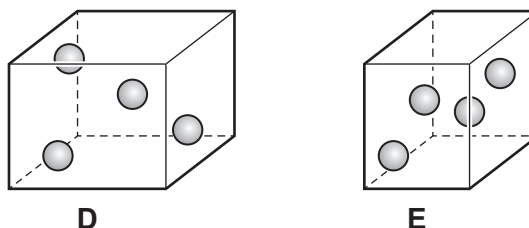
(ii) B [1]

(iii) C [1]

(b) Explain why energy has to be supplied to turn a liquid into a gas.

.....
 [1]

(c) The diagrams represent the same number of particles of a gas in two containers, **D** and **E**, which have different volumes. The two containers are at the same temperature.



In which container will the pressure be higher? Explain your answer.

.....

 [1]

[Total: 5]

Question	Answer	Marks																
1 (a)	B = 17; C = 18: D = 2,8; 2 ⁻ /2;	4																
1 (b)	substance that cannot be broken down into anything simpler / substance that cannot be broken down (by chemical means) / substance containing atoms with the same atomic number or proton number;	1																
1 (c)	<table><tr><td>number of protons</td><td>number of neutrons</td><td>number of electrons</td></tr><tr><td>31</td><td>38</td><td>31</td></tr><tr><td>31</td><td>40</td><td>31</td></tr></table> <p>M1 column one; M2 column two; M3 column three;</p>	number of protons	number of neutrons	number of electrons	31	38	31	31	40	31	3							
number of protons	number of neutrons	number of electrons																
31	38	31																
31	40	31																
Total: 8																		
1 (a)	<table><tr><td>particle</td><td>relative mass</td><td>relative charge</td></tr><tr><td>proton</td><td>1</td><td>+1</td></tr><tr><td>neutron</td><td>1</td><td>nil</td></tr><tr><td>electron</td><td>1/1840</td><td>-1</td></tr></table>	particle	relative mass	relative charge	proton	1	+1	neutron	1	nil	electron	1/1840	-1	4				
particle	relative mass	relative charge																
proton	1	+1																
neutron	1	nil																
electron	1/1840	-1																
1 (b) (i)	<p>M1 <u>atoms(s)</u> of the same element;</p> <p>M2 with different number of neutrons;</p>	2 1 1																
1 (b) (ii)	<p>M1 (both have) the same number of electrons;</p> <p>M2 in the outer shell;</p>	2 1 1																
1 (c)	<table><tr><td>particle</td><td>number of protons</td><td>number of neutrons</td><td>number of electrons</td></tr><tr><td>⁷₃Li</td><td>3</td><td>4</td><td>3</td></tr><tr><td>³⁴₁₆S²⁻</td><td>16</td><td>18</td><td>18</td></tr><tr><td>⁴¹₁₉K⁺</td><td>19</td><td>22</td><td>18</td></tr></table>	particle	number of protons	number of neutrons	number of electrons	⁷ ₃ Li	3	4	3	³⁴ ₁₆ S ²⁻	16	18	18	⁴¹ ₁₉ K ⁺	19	22	18	5
particle	number of protons	number of neutrons	number of electrons															
⁷ ₃ Li	3	4	3															
³⁴ ₁₆ S ²⁻	16	18	18															
⁴¹ ₁₉ K ⁺	19	22	18															
Total: 13																		

Question	Answer	Marks
2 (a) (i)	melt(ing)	1
2 (a) (ii)	sublimation / sublime	1
2 (a) (iii)	condensing / condensation	1
2 (b)	overcome / break the attractive forces	1
2 (c)	E AND particles hit the walls (of the container) more often	1
		Total: 5