**Q1.** John ground some coffee beans into little pieces. He put them into a coffee filter and poured 800 cm3 of boiling water over them to make a jug of coffee.

(a)     Complete the sentences below. For each sentence, choose **one** of the following words.

**insoluble**      **soluble**          **solution**          **solvent**

(i)      The liquid in the jug is brown because parts of the coffee beans

         are .............................. in water. 1 mark

(ii)     Some bits of coffee beans are left on the filter because they

         are .............................. in water. 1 mark

(iii)     The brown liquid which drips through the filter is a ............................

         of coffee. 1 mark

(b)     How could John get dry, solid coffee from the brown liquid in the jug of coffee?

......................................................................................................................

...................................................................................................................... 1 mark

(c)     John tried making coffee in the same way using cold water. He used 800 cm3 of cold water and the same amount of ground up coffee beans.

(i)      The liquid in the jug was a lighter colour. Why was this?

.............................................................................................................

............................................................................................................. 1 mark

(ii)     How much solid coffee could John get back from this liquid?

         Tick the correct box.

more than before          

the same as before      

less than before            

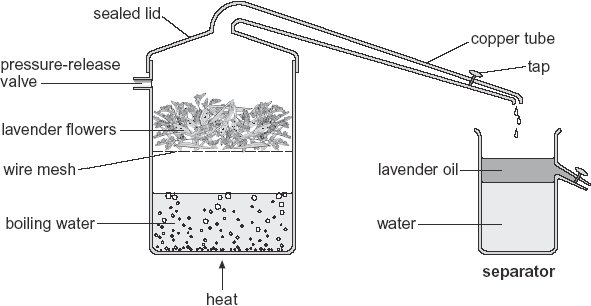
none                              

1 mark

Maximum 6 marks

**Q2.**

Lavender oil is a perfume obtained from lavender flowers.  
Steam at 100°C is passed through the flowers in the apparatus below.



*not to scale*

          Water vapour and lavender oil vapour pass down a copper tube towards a separator.

(a)     (i)      The lavender flowers are heated in a container with a sealed lid.

         Why must the lid be sealed?

...............................................................................................................

...............................................................................................................

1 mark

(ii)     What would happen if the container did **not** have a pressure-release valve?

...............................................................................................................

...............................................................................................................

1 mark

(b)     Lavender oil vapour and water vapour cool as they pass down the copper tube.  
A mixture of lavender oil and water collects in the separator.

(i)      What is the change in the physical state of both lavender oil vapour   
and water vapour as they cool?

from .................................. to ..................................

1 mark

(ii)     Look at the separator.

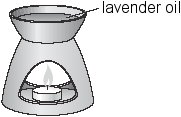
         How does this show that the water is denser than lavender oil?

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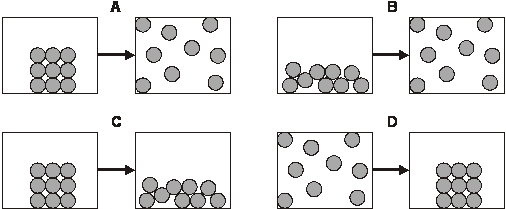
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1 mark

(c)     Rosie poured some lavender oil into an oil burner.  
She heated it with a candle.



          The oil changed state.



          Which diagram represents this change of state?  
Write the letter.

..............

1 mark

maximum 5 marks

**Q3.**

This question is about four chemical elements.

(a)     The melting points and boiling points of the four elements are shown in the table. Complete the table to give the physical state, **solid**, **liquid** or **gas**, of each element at room temperature, 21°C.

|  |  |  |  |
| --- | --- | --- | --- |
| **element** | **melting point in °C** | **boiling point in °C** | **physical state at room temperature, 21°C** |
| bromine | –7 | 59 |  |
| chlorine | –101 | –34 |  |
| fluorine | –220 | –188 |  |
| iodine | 114 | 184 |  |

4 marks

(b)     Bromine can be a solid, a liquid or a gas depending on the temperature.  
In which physical state will 10 g of bromine store the most thermal energy?

....................................................................................................................

1 mark

(c)     Is bromine a **solid**, a **liquid** or a **gas** when the arrangement of particles is:

(i)      far apart and random? .......................................................................

1 mark

(ii)     close together but random? ...............................................................

1 mark

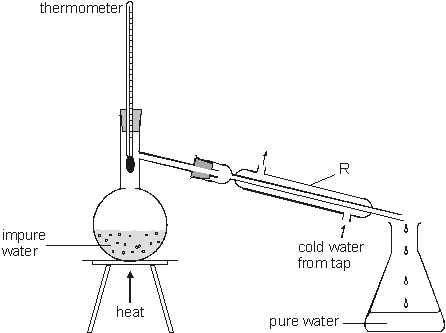
(iii)     close together in a regular pattern? ...................................................

1 mark

Maximum 8 marks

**Q4.**

(a)     The apparatus in the diagram below is used to obtain pure water from impure water.



(i)      What temperature would the thermometer show?

................................°C

1 mark

(ii)     What is the function of the piece of apparatus labelled R?

.............................................................................................................

.............................................................................................................

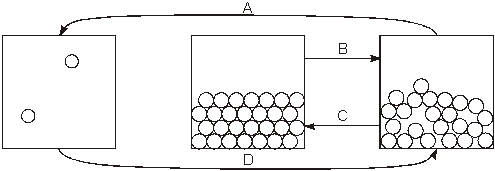
1 mark

(iii)     Give the name of the process which purifies water in this way.

................................

1 mark

(b)     The diagram below shows particles in a gas, a solid and a liquid.  
Each arrow, A, B, C and D, represents a change of state.



(i)      Choose from the following words to complete the sentences below.

**boiling**                 **condensing**            **distilling**           **evaporating**

**filtering**               **freezing**                  **melting**

Change of state A is called  .................................................................. .

Change of state B is called  .................................................................. .

Change of state C is called  .................................................................. .

Change of state D is called  .................................................................. .

4 marks

(ii)     Look back to the apparatus in part (a).  
Give the letter, A, B, C or D, from the diagram above, for the change of state which occurs:

in the round-bottomed flask ...............................................................................

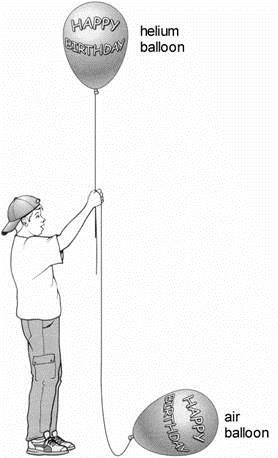
in the piece of apparatus labelled R. ..................................................................

2 marks

Maximum 9 marks

**Q5.**

Chris has two rubber party balloons. One is filled with air and the other is filled with helium.  
Both balloons contain the same volume of gas.



(a)     (i)      Explain why the helium balloon rises.

.............................................................................................................

.............................................................................................................

1 mark

(ii)     Explain why the air balloon drops to the ground.

.............................................................................................................

.............................................................................................................

1 mark

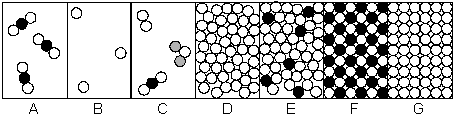
(b)     The chemical symbol for helium is He.  
Explain why air does **not** have a chemical symbol or formula.

.....................................................................................................................

.....................................................................................................................

1 mark

(c)     The diagram below shows seven arrangements of particles.



          The two party balloons are coated with a thin layer of aluminium.  
Give the letter of the diagram which best represents the particles in:

(i)      the helium gas; .......................

1 mark

(ii)     the air; .........................

1 mark

(iii)     the thin layer of aluminium. .........................

1 mark

(d)     Over several days, the balloons shrink because the particles of gas diffuse through the balloon and escape. The helium balloon shrinks more quickly than the air-filled balloon.  
Answer the following questions in terms of particles.

(i)      Why does helium escape more quickly than air from a balloon?

.............................................................................................................

.............................................................................................................

1 mark

(ii)     A rubber balloon coated with aluminium takes longer to shrink than a rubber balloon **without** an aluminium coating.  
Suggest a reason why gas particles diffuse more slowly through aluminium than through rubber.

.............................................................................................................

.............................................................................................................

1 mark

Maximum 8 marks