1 **(a)** On a hot day, sweat forms on the surface of a person's body and the sweat evaporates.

Explain, in terms of the behaviour of molecules,

(i) the process of evaporation,

.....

.....

.....

(ii) how this process helps the body to cool down.

.....

.....

.....

.....

.....

.....

[3]

(b) The temperature of a person of mass 60 kg falls from 37.2 °C to 36.7 °C.

(i) Calculate the thermal energy lost from the body. The average specific heat capacity of the body is 4000 J/(kg °C).

thermal energy lost = ... [2]

(ii) The cooling of the body was entirely due to the evaporation of sweat.

Calculate the mass of sweat which evaporated. The specific latent heat of vaporisation of sweat is $2.4 \times 10^6 \text{ J/kg}$.

mass = ...[2]

[Total: 7]

2 Water molecules evaporate from a puddle and escape to the atmosphere. Water molecules also escape to the atmosphere from water boiling in a kettle.

(a) State two ways in which *evaporation* differs from *boiling*.

1. .....

.....

2. .....

.....

[2]

(b) This part of the question is about an experiment to determine the specific latent heat of vaporisation of water.

(i) Suggest apparatus that will provide thermal energy (heat) and state the readings needed to determine the amount of thermal energy provided.

apparatus .....

.....

readings .....

.....

.....

[2]

(ii) Suggest apparatus required for determining the mass of liquid vaporised and state the readings needed to determine that mass.

apparatus .....

.....

readings .....

.....

.....

[2]

[Total: 6]

3 Fig. 5.1 shows a saucepan of boiling water on an electric hotplate.

Fig. 5.1

As time passes, thermal energy (heat) is constantly supplied to the water but its temperature remains at 100 °C.

(a) State two ways in which boiling differs from evaporation.

1. .....

.....

2. .....

.....

[2]

(b) Explain, in terms of the water molecules, what happens to the thermal energy supplied to the water as it boils.

.....

.....

.....

..... [2]

(c) Describe an experiment to measure the specific latent heat of steam. You may include a diagram.

.....

.....

.....

.....

.....

..... [4]

[Total: 8]

4 **(a)** **(i)** State two ways in which the molecular structure of a gas differs from the molecular structure of a liquid.

1. .....

2. .....
[2]

(ii) Compressibility is the ease with which a substance can be compressed.

State and explain, in terms of the forces between the molecules, how the compressibility of a gas differs from that of a liquid.

.....

.....

..... [2]

(b) Fig. 6.1 shows a weather balloon being inflated by helium from a cylinder.

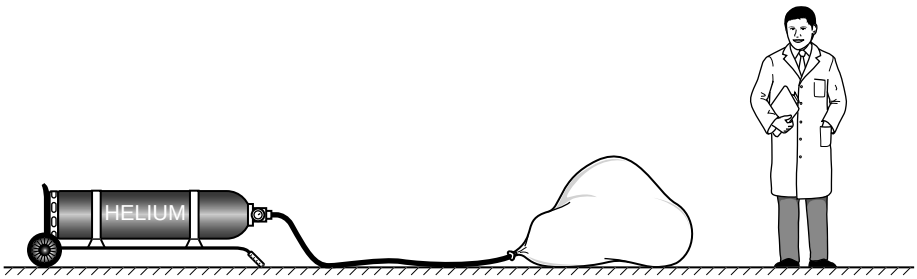

Fig. 6.1

(i) The helium that inflates the balloon had a volume of $0.035\,m^3$ at a pressure of $2.6 \times 10^6\,Pa$, inside the cylinder.

The pressure of the helium in the balloon is $1.0 \times 10^5\,Pa$ and its temperature is the same as it was when in the cylinder.

Calculate the volume occupied by the helium in the balloon.

volume = ... [3]

(ii) As the balloon rises up through the atmosphere, the temperature of the helium decreases.

State the effect of this temperature change on the helium molecules.

.....

..... [1]

[Total: 8]

5 Fig. 4.1 shows a small, closed, transparent chamber containing smoke.

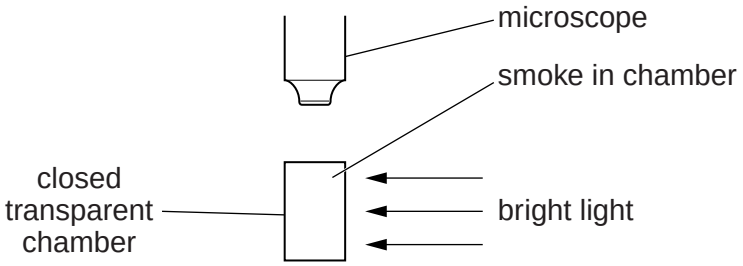

Fig. 4.1

The chamber is brightly lit and observed through a microscope. The smoke particles are seen as very small, bright dots.

(a) Describe the movement of the dots.

.....

.....

.....

..... [2]

(b) Explain, in terms of molecules, how this movement is caused.

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.....

.....

..... [2]

(c) Describe what is seen as the smoke particles move towards and away from the observer.

.....

.....

.....

..... [1]

[Total: 5]

6 **(a)** Two students hang out identical T-shirts to dry at the same time in the same neighbourhood. The only difference between the drying conditions is that one T-shirt is sheltered from any wind and the other is in a strong breeze, as shown in Fig. 6.1.

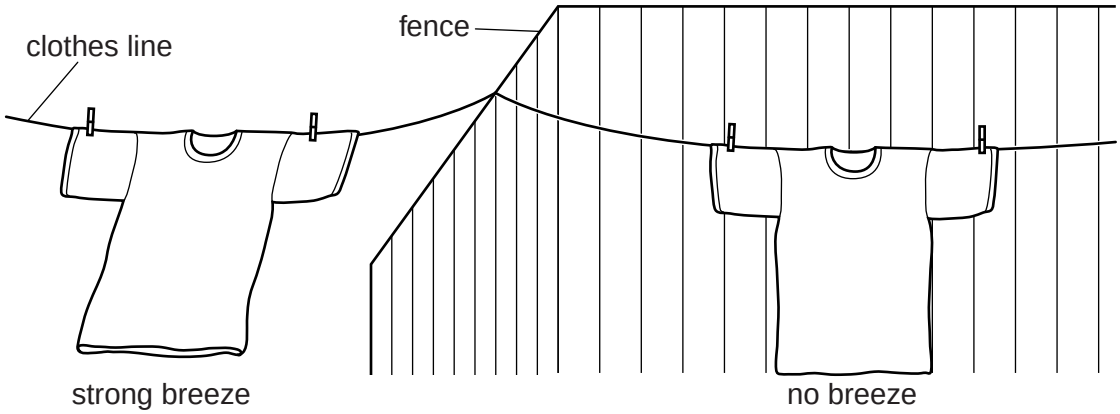

Fig. 6.1

State and explain, in terms of water molecules, the difference between the drying times of the T-shirts.

.....

.....

.....

.....

..... [2]

(b) Fig. 6.2 shows another occasion when a student hangs out two identical T-shirts to dry next to each other on a line. One T-shirt is folded double as shown in Fig. 6.2.

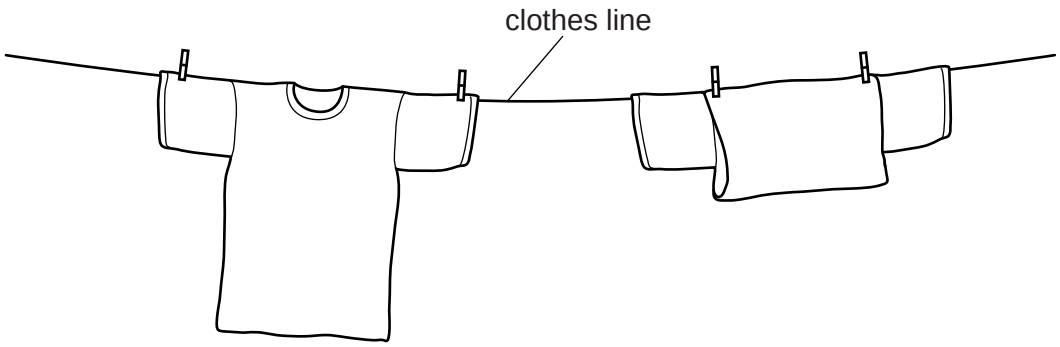

Fig. 6.2

State and explain, in terms of water molecules, the difference between the drying times of the T-shirts.

.....

.....

.....

.....

..... [2]

(c) A runner in a hot country feels cooler if she pours water over her hair to keep it wet, even when the water is at the same temperature as the air around her.

Explain, in terms of a change of state of water, why she feels cooler.

.....

.....

.....

..... [2]

[Total: 6]