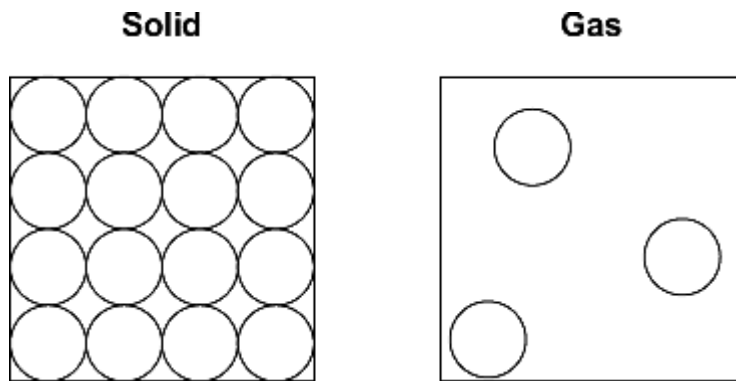
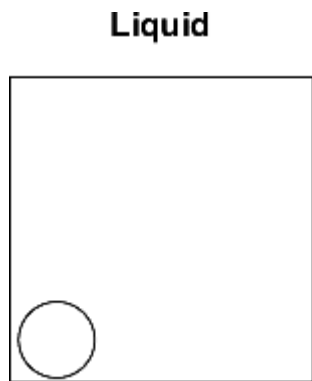


Q1. (a) The diagrams show the arrangement of the particles in a solid and in a gas.

Each circle represents one particle.



(i) Complete the diagram below to show the arrangement of the particles in a liquid.



(2)

(ii) Explain, in terms of the particles, why gases are easy to compress.

.....

.....

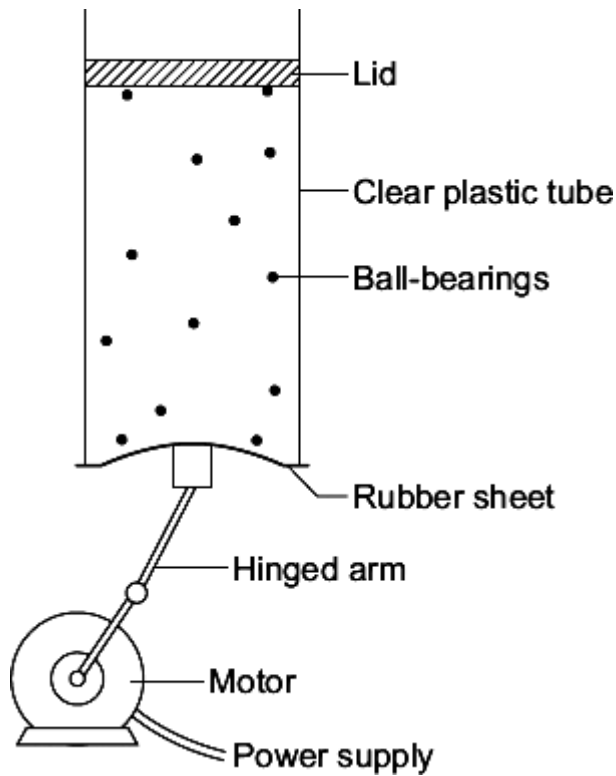
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(2)

(b) The diagram below shows the model that a science teacher used to show her students that there is a link between the temperature of a gas and the speed of the gas particles.

The ball-bearings represent the gas particles. Switching the motor on makes the ball-bearings move around in all directions.



(i) How is the motion of the ball-bearings similar to the motion of the gas particles?

.....
.....

(1)

(ii) The faster the motor runs, the faster the ball-bearings move. Increasing the speed of the motor is like increasing the temperature of a gas.

Use the model to predict what happens to the speed of the gas particles when the temperature of a gas is increased.

.....
.....

(1)
(Total 6 marks)

Q2.In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The information in the box is about the properties of solids and gases.

<p>Solids:</p> <ul style="list-style-type: none">• have a fixed shape• are difficult to compress (to squash). <p>Gases:</p> <ul style="list-style-type: none">• will spread and fill the entire container• are easy to compress (to squash).
--

Use your knowledge of kinetic theory to explain the information given in the box.

You should consider:

- the spacing between the particles
- the movement of individual particles
- the forces between the particles.

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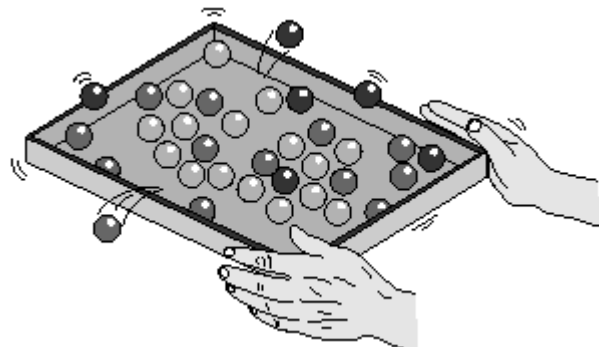
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(Total 6 marks)

Q3.
(a) The diagram shows a tray of marbles being shaken from side to side. As this happens some of the marbles jump out of the tray.



Explain how the tray of marbles is acting as a model for the evaporation of a liquid.

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

(2)

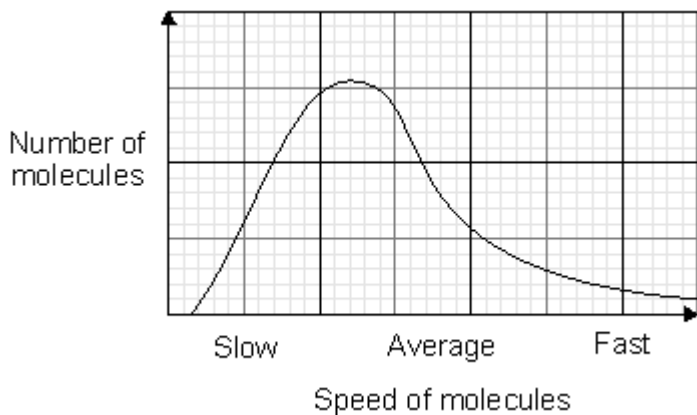
- (b) Before giving an injection, a nurse dabs some alcohol onto the patient's arm. This makes the patient's skin feel cold.

Explain what happens to make the patient's skin feel cold.

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

(2)

- (c) The graph shows that the molecules in a liquid do not all have the same speed.



Use the information in the graph to explain why a liquid cools down when it evaporates.

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

(5)
(Total 9 marks)

M1. (a) (i) random distribution of circles in the box with at least 50 % of circles touching **1**

random distribution of circles occupies more than 50 % of the space
judged by eye

1

(ii) (large) gaps between particles
accept particles do not touch
accept particles are spread out

1

(so) easy to push particles closer (together)
or
forces between particles are negligible / none
an answer in terms of number of particles is insufficient

1

(b) (i) (both are) random
accept a correct description of random eg unpredictable or move
around freely or in all directions
they take up all the space is insufficient
they are spread out is insufficient
they move in straight lines is insufficient

1

(ii) (speed also) increases

1

[6]

M2. Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1–2 marks)

Considers either solid or gas and describes at least one aspect of the particles.

or

Considers both solids and gases and describes an aspect of each.

Level 2 (3–4 marks)

Considers both solids and gases and describes aspects of the particles.

or

Considers one state and describes aspects of the particles and explains at least one of the properties.

or

Considers both states and describes an aspect of the particles for both and explains a property for solids or gases.

Level 3 (5–6 marks)

Considers both states of matter and describes the spacing and movement / forces between the particles. Explains a property of both solids and gases.

examples of the points made in the response***extra information*****Solids**

- (particles) close together
 - (so) no room for particles to move closer (so hard to compress)
 - vibrate about fixed point
 - strong forces of attraction (at a distance)
 - the forces become repulsive if the particles get closer
 - particles strongly held together / not free to move around (shape is fixed)
- any explanation of a property must match with the given aspect(s) of the particles.*

Gases

- (particles) far apart
- space between particles (so easy to compress)
- move randomly
- negligible / no forces of attraction
- spread out in all directions (to fill the container)

[6]

- M3.** (a) the marbles model / act as molecules
accept atoms / particles for molecules

- or**
marbles leaving tray = evaporation 1
- (b) to evaporate the alcohol requires energy 1
- this energy is taken from the skin and the skin feels cold
accept heat for energy 1
- (c) there are attractive forces between molecules 1
- only the fastest molecules have enough energy to break
away from other molecules 1
- these molecules escape from the surface of the liquid 1
- therefore the average speed / energy of the remaining
molecules goes down 1
- the lower the average speed / energy of molecules the
lower the temperature of the liquid 1

[9]