

Name:

Date:

P3 - Test 6
PARTICLE MODEL OF MATTER
Advanced

GCSE

PHYSICS

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

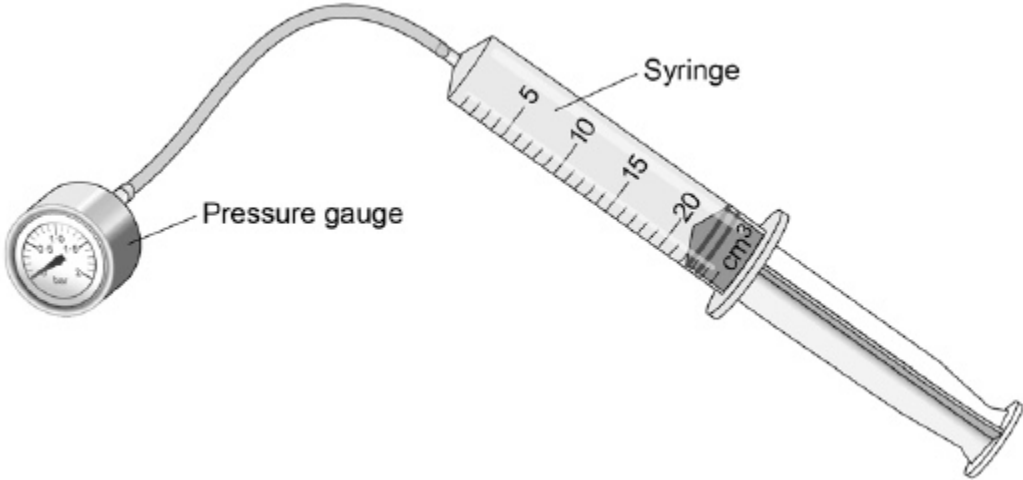
1.

A student investigated how the pressure of a gas varied with the volume of the gas.

The mass and temperature of the gas were constant.

Figure 1 shows the equipment the student used.

Figure 1



(a) What is the resolution of the syringe?

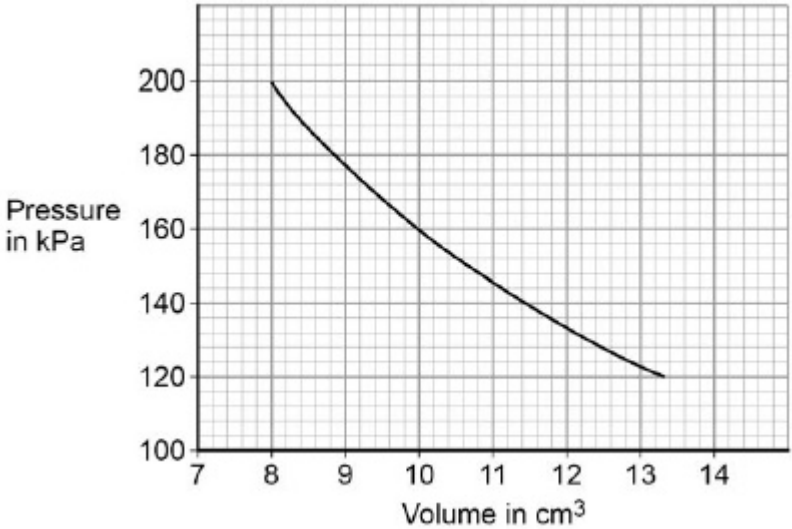
_____ cm³

(1)

The student compressed the gas in the syringe and read the pressure from the pressure gauge.

Figure 2 shows the student's results.

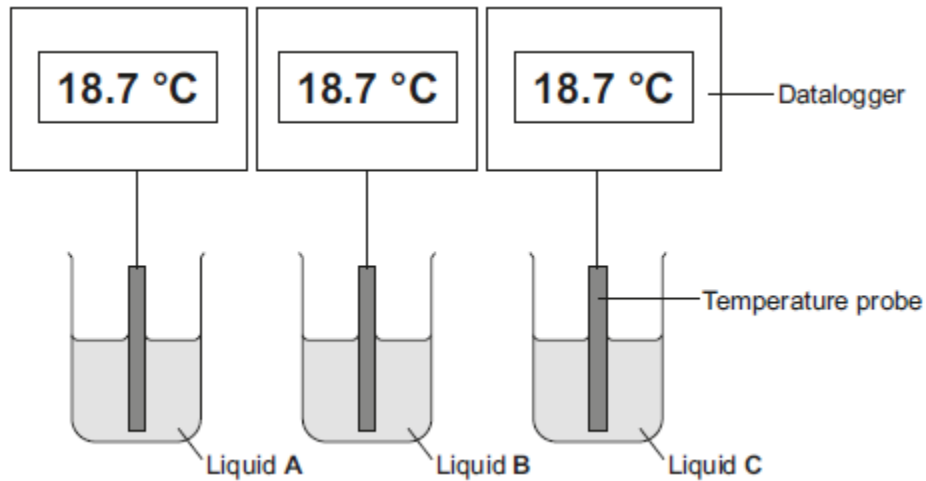
Figure 2



2.

A student investigated the cooling effect of evaporation. She used the equipment in **Figure 1** to measure how the temperature of three different liquids changed as the liquids evaporated.

Figure 1



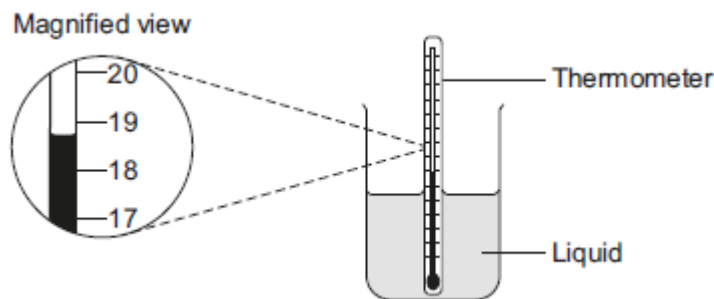
(a) The temperature and volume of each liquid was the same at the start of the investigation.

State **one** further control variable in this investigation.

(1)

(b) Give **two** advantages of using dataloggers and temperature probes compared to using the thermometer shown in **Figure 2**.

Figure 2



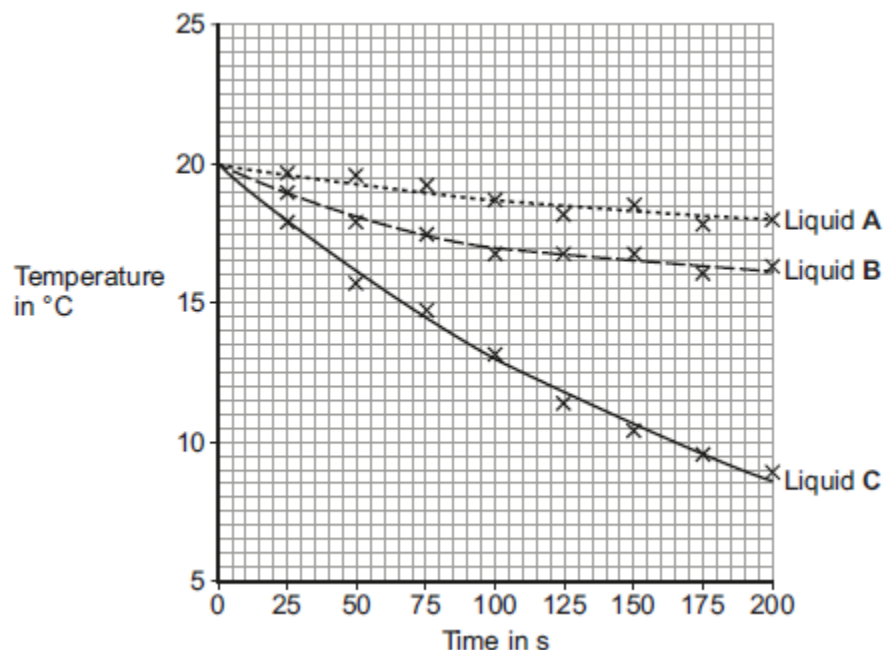
1. _____

2. _____

(2)

(c) The student's results are shown in **Figure 3**.

Figure 3



(i) Calculate the average rate of temperature decrease of liquid **C** between 0 and 100 seconds.

Average rate of temperature decrease = _____ °C / s

(2)

(ii) Give **one** conclusion that can be made about the rate of temperature decrease of **all three** liquids from the results in **Figure 3**.

(1)

(iii) Which liquid had the lowest rate of evaporation? Give a reason for your answer.

Liquid _____

Reason _____

(1)

- (iv) A second student did the same investigation but using a smaller volume of liquid than the first student.

All other variables were kept the same.

What effect would this have on the results of the second student's investigation?

(1)

- (d) Explain how the evaporation of a liquid causes the temperature of the remaining liquid to decrease.

(3)

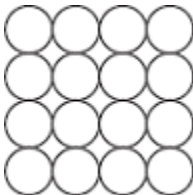
(Total 11 marks)

3.

According to kinetic theory, all matter is made up of small particles. The particles are constantly moving.

Diagram 1 shows how the particles may be arranged in a solid.

Diagram 1



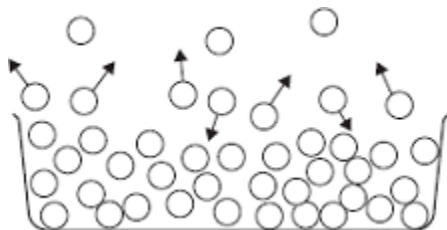
(a) One kilogram of a gas has a much larger volume than one kilogram of a solid.

Use kinetic theory to explain why.

(4)

(b) **Diagram 2** shows the particles in a liquid. The liquid is evaporating.

Diagram 2



(i) How can you tell from **Diagram 2** that the liquid is evaporating?

(1)

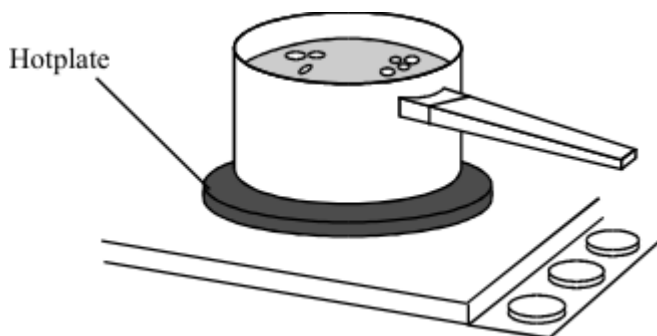
(ii) The temperature of the liquid in the container decreases as the liquid evaporates. Use kinetic theory to explain why.

(3)

(Total 8 marks)

4.

The drawing shows water being heated in a metal saucepan.



- (a) Explain, in terms of the particles in the metal, how heat energy is transferred through the base of the saucepan.

(2)

- (b) Energy is transferred through the water by convection currents. Explain what happens to cause a convection current in the water. The answer has been started for you.

As heat energy is transferred through the saucepan, the water particles at the bottom

(3)

- (c) Some energy is transferred from the hotplate to the air by *thermal radiation*. What is meant by *thermal radiation*?

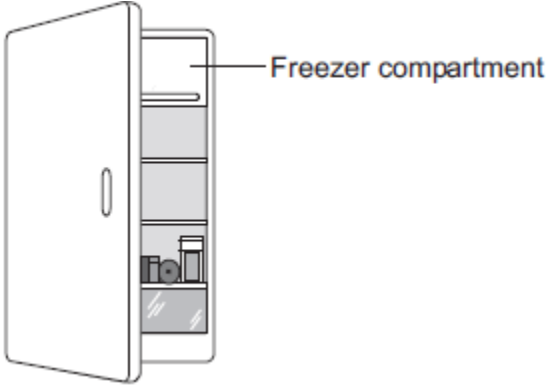
(1)

(Total 6 marks)

5.

(a) The figure below shows a fridge with a freezer compartment.

The temperature of the air inside the freezer compartment is $-5\text{ }^{\circ}\text{C}$.



The air inside the fridge forms a convection current when the fridge door is closed.

Explain why.

(4)

(b) The table below shows information about four fridges.

Fridge	Volume in litres	Energy used in one year in kWh
A	250	300
B	375	480
C	500	630
D	750	750

A householder concludes that the energy used in one year is directly proportional to the volume of the fridge.

Explain why her conclusion is **not** correct.

Use data from the table in your answer.

(2)

(c) New fridges are more efficient than fridges made twenty years ago.

Give **one** advantage and **one** disadvantage of replacing an old fridge with a new fridge.

Ignore the cost of buying a new fridge.

Advantage _____

Disadvantage _____

(2)

(Total 8 marks)

Mark schemes

- 1.** (a) 1 (cm³) 1
- (b) pressure is inversely proportional to volume 1
- data to prove inversely proportional relationship
eg $8 \times 200 = 1600$
and $10 \times 160 = 1600$
if no other marks score allow for 1 mark: as volume decreases
pressure increases 2
- (c) (as the gas is compressed) the volume of gas decreases 1
- (so there are) more frequent collisions of gas particles with
container walls 1
- (and) each particle collision with the wall causes a force 1
- (so there is a) greater force on walls 1
- [8]**
- 2.** (a) surface area
or
duration of experiment
accept shape of beaker
size of beaker is insufficient 1
- (b) any **two** from:
- takes readings automatically
*ignore easier **or** takes readings for you*
 - takes readings more frequently
 - reduces / no instrument reading error
ignore human error
 - higher resolution
allow better resolution
 - don't need to remove probe to take reading
 - more accurate
- 2