

GCSE Physics B (Twenty First Century Science)
J259/02 Depth in physics (Foundation Tier)

Question Set 7

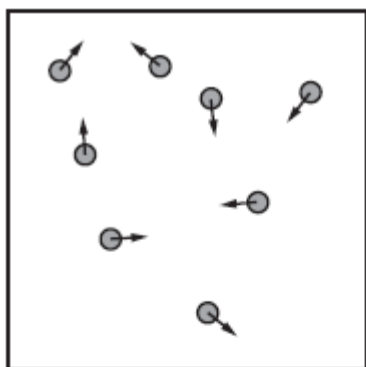
1

This question is about the particles in a gas and the pressure they exert on a container.

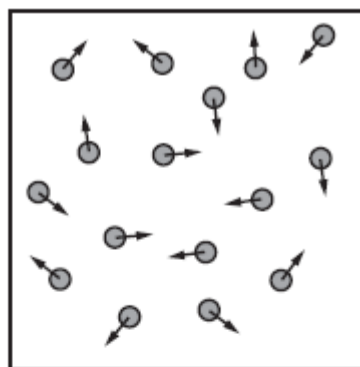
(a) The diagram below shows four samples of the same gas in containers of the same size.

Each particle is shown as a circle.

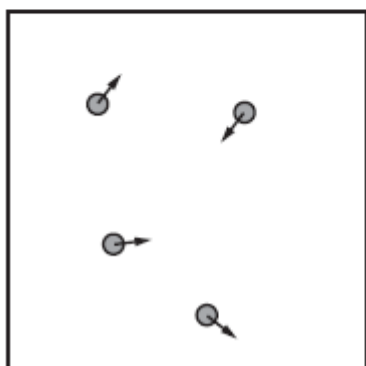
The arrow on each particle shows its velocity.



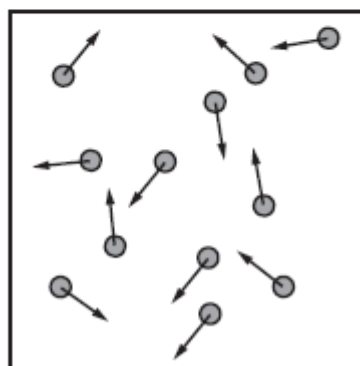
A



B



C



D

(i) Which sample has the **fastest** particles? **D** [1]

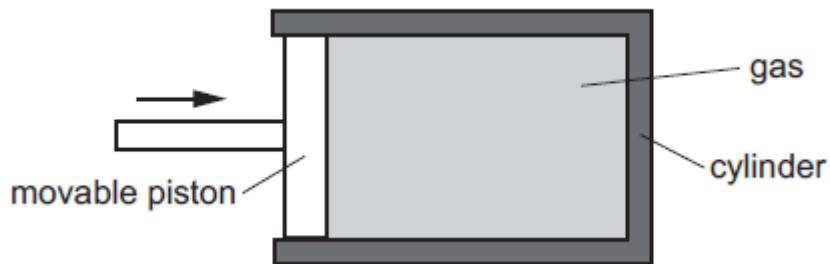
(ii) Which sample has the **greatest** density? **B** [1]

(iii) Which sample is at the **highest** temperature? **D** [1]

(iv) Which sample has the **smallest** pressure? **C** [1]

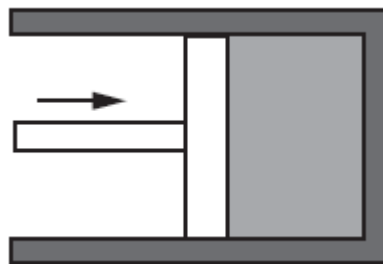
A tight-fitting moveable piston traps gas in a cylinder as shown in the diagram.

The gas has volume 300 cm^3 and pressure of 100 kilopascals (kPa).



The piston is now pushed in and changes the volume of the gas to 150 cm^3 .

The temperature of the gas has not changed.



Calculate the new pressure of the gas.

Use the equation: old pressure \times old volume = new pressure \times new volume

$$300 \times 100 = P \times 150$$
$$\frac{300 \times 100}{150} = P = 200 \text{ kPa}$$

New pressure = 200 kPa [2]

(c) The piston is moved to a new position.

The force with which the gas pushes out on the piston is now 300 N.

The area of the piston is 0.002 m^2 .

Calculate the pressure of the gas in pascals (Pa).

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{300}{0.002} = 150,000 \text{ Pa}$$

Pressure = 150,000 Pa [3]

Total Marks for Question Set 7: 9

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