

OCR B Physics A Level

5.2.1 - Gas Laws

Flashcards

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How is the motion of gas molecules described?



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Gas molecules move with Brownian motion, which is the random motion of molecules caused by collisions with larger particles.



How does a gas exert a force on its container?



How does a gas exert a force on its container?

- The molecules collide with the walls of their container.
- Collisions cause a change in momentum.
- A change in momentum produces a force equal to the rate of change of momentum.



What does Boyle's Law state?



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When a gas is at a constant temperature, pressure and volume are inversely proportional to each other.



Explain Boyle's Law.



Explain Boyle's Law.

- When the volume of a gas increases, the space between molecules increases and so the time between collisions is larger.
- This causes the rate of collisions and so the rate of change of momentum to decrease.
- This means the force exerted is lower, causing a decrease in pressure.



What does Charles' Law state?



What does Charles' Law state?

When a gas is at a constant pressure, the volume is directly proportional to the absolute temperature.



Explain Charles' Law.



Explain Charles' Law.

- As temperature increases, the average kinetic energy of the molecules increases.
- Pressure is constant so the force and so also the rate of change of momentum, must remain constant.
- To achieve this, the volume increases so the faster speed of the molecules is compensated by there being larger gaps between them.



What does the Pressure Law state?



What does the Pressure Law state?

When a gas has a fixed volume, pressure is directly proportional to the absolute temperature.



Explain the Pressure Law.



Explain the Pressure Law.

- As temperature increases, the average kinetic energy, and so the speed of the molecules also increases.
- This increases the rate of collisions, and so produces a larger rate of change of momentum.
- This leads to a greater force exerted and so an increase in pressure.



In kinetic theory, what is assumed about the gases involved?



In kinetic theory, what is assumed about the gases involved?

- The gas contains a large number of molecules.
 - The molecules are identical to each other.
- All collisions between molecules and the walls of their container are perfectly elastic.
- The time taken for collisions is negligible compared to the time between collisions.
 - There are no intermolecular forces between molecules.
 - Molecules are in constant random motion.
 - The gas particles obey Newton's Laws of motion.



What follows all the assumptions made
in kinetic theory?



What follows all the assumptions made in kinetic theory?

Ideal gases.

