Your notes

GCSE Physics: revision notes

Particle motion and gas pressure

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Particle motion in gases

- The molecules of a gas are in constant **random motion**.
- The temperature of a gas is related to the average **kinetic energy** of its molecules: the hotter the gas, the faster they move.
- When the molecules collide with the walls of a container, they exert a force. **Pressure** is the force per unit area.

Temperature and pressure

- If a gas is heated at **constant volume**, its molecules move faster.
- They collide with the walls more often and with more force, so the **pressure** increases.

Pressure and volume (separate sciences)

- A gas exerts a net force at right angles to the walls of its container, or any surface.
- Increasing the volume of a fixed mass of gas at constant temperature decreases its **pressure**, because the molecules hit the walls less often.
- For a fixed mass of gas at constant temperature: p V = constant, so $p_1V_1 = p_2V_2$.

Doing work on a gas (Higher, separate sciences)

- Work is done when a gas is compressed, for example in a bicycle pump.
- The work done increases the internal energy of the gas, so its temperature increases. This is why a bicycle pump gets warm.

Key terms

Pressure	The force per unit area, caused by gas molecules colliding with surfaces.

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Random motion	Movement in all directions at different speeds.
Kinetic energy	The energy of moving particles; its average is linked to temperature.
Constant volume	When a gas is kept in a container that cannot expand.
Pascal	The unit of pressure (Pa); 1 Pa = 1 N/m^2.
Compression	Squeezing a gas into a smaller volume.

Your notes

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. How do gas molecules move?
2. What causes gas pressure?
3. What happens to the pressure of a gas heated at constant volume?
4. What is temperature linked to in a gas?
5. What happens to the pressure if the volume of a gas is increased at constant temperature? (Separate sciences)
6. A gas at 100 kPa is squeezed from 2 m^3 to 1 m^3 at constant temperature. What is the new pressure? (Separate sciences)
7. In which direction does gas pressure act on a surface? (Separate sciences)
8. Why does a bicycle pump get warm? (Higher)

Answers

1. In constant random motion
2. Molecules colliding with the walls of the container
3. It increases
4. The average kinetic energy of the molecules
5. It decreases
6. 200 kPa
7. At right angles to the surface
8. Work done compressing the air increases its internal energy

What to do next

Practise 10 questions on this topic

Try 7 exam questions, with mark schemes

Read the lesson, one step at a time

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