P2 Thermal Physics

P2.1 Kinetic particle model of matter

P2.1.3 Pressure changes

Gas Pressure and the Particle Model

- A gas is made up of tiny particles (atoms or molecules) that move rapidly and randomly in all directions. These particles collide with each other and with the walls of the container.
- Each collision with the walls produces a small force, and the total force per unit area of all these collisions is the pressure of the gas.

Effect of Temperature at Constant Volume

When temperature increases, the particles gain kinetic energy.

They move faster and hit the walls of the container more often and with greater force.

Since the volume is constant, the walls cannot move outward, so the pressure increases.

SUMMARY: **Higher temperature → higher particle speed → more frequent and forceful collisions → higher pressure.**

If the temperature decreases, the opposite happens: Particles move more slowly,

Collisions are less frequent and weaker, and the pressure decreases.

Effect of Volume at Constant Temperature.

When the volume decreases, the same number of particles are in a smaller space.

Particles collide with the walls more often, increasing the pressure.

SUMMARY: Smaller volume → more frequent collisions → higher pressure.

When the volume increases, the particles are further apart. Collisions occur less often, so pressure decreases.

SUMMARY: Larger volume → fewer collisions → lower pressure.