

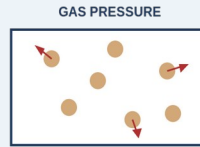
# 5.3 Ideal Gas Molecules

Mr Curran · practical-science.com

## 1. KEY VOCABULARY

TERM	MEANING
Gas pressure	The total force of molecular collisions per unit area of the walls.
Kelvin (K)	The absolute temperature scale: $K = ^\circ C + 273$ .
Absolute zero	0 K ( $-273\text{ }^\circ C$ ) — the coldest possible temperature.
Kinetic theory	The model of a gas as fast-moving, colliding molecules.

## 2. GAS PRESSURE & THE GAS LAWS



Gas molecules move fast in all directions. They collide with the walls — each collision exerts a tiny force.  
Pressure = the total force of these collisions per unit area.

### THE GAS LAWS

**Heat a gas** — molecules move faster — hit the walls harder and more often — pressure (or volume) increases.

**Squeeze a gas (smaller volume)** — molecules hit the walls more often — pressure rises.

**$P_1 \times V_1 = P_2 \times V_2$  (at constant temperature)**  
Pressure and volume are inversely proportional.

Temperature must be in kelvin (K) for gas calculations:  
 $K = ^\circ C + 273$ . Absolute zero = 0 K =  $-273\text{ }^\circ C$ .

## 3. WHERE GAS PRESSURE COMES FROM

Gas molecules move quickly in random directions. They constantly collide with the container walls; each collision exerts a tiny force.

**Pressure = the total force of those collisions per unit area.**

## 4. TEMPERATURE & PRESSURE

**Heat a gas at fixed volume:** molecules move faster, hit the walls harder and more often — pressure rises.

**Temperature must be in kelvin** for gas calculations.  $K = ^\circ C + 273$ .

## 5. PRESSURE & VOLUME

**Squeeze a gas into a smaller volume** at constant temperature: the molecules hit the walls more often, so pressure rises.

**$P_1 \times V_1 = P_2 \times V_2$**  — pressure and volume are inversely proportional.

## 6. THE WHY

**Why heating a sealed gas raises its pressure:** the molecules gain kinetic energy, so they collide with the walls harder and more frequently.

**Why temperatures must be in kelvin:** pressure and temperature are only proportional from absolute zero — the kelvin scale starts there.

## 7. COMMON EXAM MISTAKES

- ✗ Using  $^\circ C$  in a gas-law calculation.
- ✓ Always convert to kelvin first:  $K = ^\circ C + 273$ .
- ✗ "Pressure comes from molecules pushing each other."
- ✓ It comes from molecules colliding with the WALLS.
- ✗ "Squeezing a gas makes its molecules bigger."
- ✓ The molecules are unchanged — they just collide more often.

## 8. SELF-CHECK · cover & quiz

Can you...

1. Explain what causes gas pressure?
2. Explain why heating a gas raises its pressure?
3. Explain why reducing the volume raises the pressure?
4. Convert between  $^\circ C$  and kelvin?
5. Use  $P_1V_1 = P_2V_2$ ?
6. State what absolute zero is?