

Kinetic Theory

Physics

What an ideal gas assumes, and what temperature actually measures.

The mean kinetic energy of a gas particle is proportional to absolute temperature.

$$\frac{1}{2}m \overline{c^2} = \left(\frac{3}{2}\right)kT \cdot pV = \left(\frac{1}{3}\right)Nm \overline{c^2}$$

Double the absolute temperature → Double the mean kinetic energy

Speed

Not proportionally.

Rises as $\sqrt{T}$

Lighter molecules

Same energy, less mass.

Move faster at the same T

THE COMMON MISTAKE

✗ **Using Celsius**

✓ **Absolute temperature only**

The proportionality is to thermodynamic temperature. At 0°C the mean kinetic energy is not zero.

Ideal gas assumptions: point particles, no intermolecular forces, elastic collisions, random motion, negligible collision time.