The Particle Model and Gas Pressure

Energy and matter · 4 questions · step-by-step answers at the end

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USEFUL EQUATIONS

$p_1V_1 = p_2V_2$ $\quad p_1 / T_1 = p_2 / T_2$ $\quad T\,(\mathrm{K}) = \theta\,(^\circ\mathrm{C}) + 273$

Questions

Show your working in the space under each question.

1. A sealed can at 27 °C and 100 kPa is heated to 327 °C. Find the new pressure.

2. A gas at 100 kPa has a volume of 0.60 m³. It is compressed to 0.20 m³ at constant temperature. Find the new pressure.

3. Convert 25 °C and −273 °C to kelvin.

4. A bicycle pump gets warm when used. Why?

Step-by-step answers

The Particle Model and Gas Pressure

1. T_1 = 300 K, T_2 = 600 K: the kelvin temperature doubles, so p = **200 kPa**.

2. 1. $p_1V_1 = p_2V_2 \rightarrow 100 \times 0.60 = p_2 \times 0.20$.
   2. p_2 = 60/0.20 = **300 kPa**.
   3. A third of the volume gives three times the pressure.

   Answer: 300 kPa

3. **298 K** and **0 K** (absolute zero).

4. **Work is done on the gas** when it is compressed, which increases its internal energy and so its temperature.