

Introduction to the particulate nature of matter · supported
focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current brief acquired; full Chemistry guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Gases · 1.1

Reasoning

A sealed gas container changes pressure when heated. Celsius ratios cannot predict the pressure change because the gas model uses absolute temperature . Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Gases · 2.1

Reasoning

In a gas model, particles move randomly and pressure results from momentum transfer at walls. The ideal gas equation connects pressure, volume, amount and absolute temperature. absolute temperature: Temperature on the kelvin scale; ideal gas: A gas model with specified simplifying assumptions.

Gases · 3.1

Reasoning

At fixed amount and volume, pressure is proportional to kelvin temperature. At fixed temperature and amount, pressure is inversely proportional to volume. State which quantities are fixed before choosing a relationship. Use approved apparatus with a temperature range and pressure limit set by the teacher. Allow thermal equilibrium and record pressure against kelvin temperature. Never heat an improvised sealed vessel.

Gases · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: pressure is 100 kPa at 300 K, with fixed volume and amount. At 330 K, $p_2/p_1 = T_2/T_1$. $p_2 = p_1 T_2/T_1 = 100 \times 330/300 = 110$ kPa. A 30 °C rise is a 30 K change, but the temperature ratio must use kelvin.

Gases · 4.2

Reasoning

At fixed volume, pressure is 120 kPa at 300 K. Find pressure at 350 K. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Gases · 5.1

Reasoning

An ideal gas is a model with conditions of validity. Celsius zero is not zero molecular motion, and internal energy is not determined by pressure alone. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Gases · 5.2

Reasoning

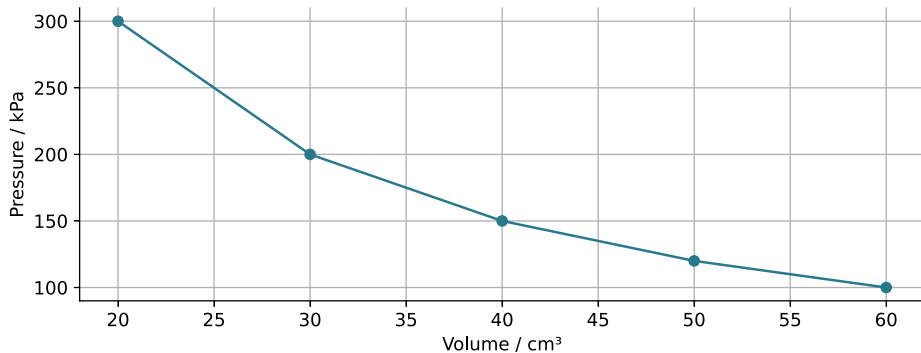
A gas pressure ratio can always use Celsius temperatures. This claim is false: An ideal gas is a model with conditions of validity. Celsius zero is not zero molecular motion, and internal energy is not determined by pressure alone.

Gases · 5.3

Reasoning

Gas models and absolute temperature: At fixed amount and volume, pressure is proportional to kelvin temperature. At fixed temperature and amount, pressure is inversely proportional to volume. State which quantities are fixed before choosing a relationship.

Gases · diagram



- Original teaching diagram: Gas models and absolute temperature
- Use the labels and the stated model together.

Gases · original transfer

Your turn

An ideal gas changes from 300 K , 100 kPa , V to 450 K and $2V$ at fixed amount. Find pressure. Explain why using only a temperature ratio would fail.

Gases · transfer reasoning

Method and interpretation

Combined relation $p_2 = p_1(T_2/T_1)(V_1/V_2) = 75 \text{ kPa}$. Volume also changes; the fixed-volume formula does not apply. Use absolute temperature.

Check yourself

- Explain absolute temperature using the stated model.
- Explain ideal gas using the stated model.
- Change one value in the original transfer; explain which assumption still matters.