The Gas Laws

There are 3 laws related to three physical quantities of a gas – pressure (P), volume (V) and temperature (T)

Boyles Law

$P_1V_1=P_2V_2$ (when T is a constant)

Charles' Law

$V_1/T_1 = V_2/T_2$ (when P is a constant)

Pressure Law

$P_1/T_1 = P_2/T_2$ (when V is a constant)

Choosing the correct equation

Questions will always give you 3 things and ask you to calculate the forth.

e.g. A gas with a volume $2m^3$ and at room temperature (293K) is heated by 100°C. What is its new volume? You have $V_1=2m^3$, $T_1=293K$, $T_2=393K$. You need to find V_2. This is a Charles' Law problem (where pressure is a constant).

Solution: $2/293 = V_2/393$. Therefore $V_2 = 2x393/293$

Note: temperature is always in kelvin (not degrees Celsius)

To convert add 273 to the Celsius temperature.

Questions

1) The volume of gas at the start is recorded as 30 $cm^3$with a temperature of 30°C. The cylinder is heated further till the thermometer records 60°C. What is the volume of gas?
2) The pressure of gas is recorded as 1.0×10^5 Pa at a temperature of 0°C. The cylinder is heated further till the thermometer records 150°C. What is the pressure of the gas in pascals (Pa)?
3) The volume of gas at the start is 50 cm^3 with a pressure of 1.2×10^5 pascals. The piston is pushed slowly into the syringe until the pressure on the gauge reads 2.0×10^5 pascals. What is the volume of gas?