That's why temperature is typically used to measure or define the average microscopic kinetic energy of the particles in some material.

In ideal gases, the Ideal Gas Law describes the relationship between the pressure and temperature of a gas.

Boltzmann constant

The Boltzmann constant, kR, is a physical constant that relates the average kinetic energy of particles in a gas with the temperature of the gas. The constant is commonly used in the Ideal Gas Law.

If the temperature is measured in Kelvin and the energy in Joules the constant gets the following value in SI units:

$k_R = 1.38 \times 10^{-23}$ J/K.

The value of the constant has to be adjusted to the temperature scale selected.

Thermometers

A very precise way to measure the temperature of an object would be by summing the kinetic energy of its constituent particles. Unfortunately, this method is not feasible in the real world as even tiny objects contain billions of particles. Therefore, to obtain a quantitative measurement of temperature we always measure temperature through some other proxy.

This can, for example, be the expansion of the length of a column of mercury in a glass capillary, the bending of a bimetallic strip or a change in the electrical resistivity of a material or some other physical change. An instrument that measures the temperature of a material by measuring some other physical change is called a thermometer and since the measurement is dependent on some physical change, each type of thermometer is limited to functioning over a limited temperature range.

Temperature scale

Thermometers measure temperature according to well-defined scales of measurement. The three most common temperature scales are Fahrenheit, Celsius, and Kelvin. Temperature scales are created by identifying at least two reproducible temperatures. The freezing and boiling temperatures of water at standard atmospheric pressure are commonly used as reference points to these scales.

The table below shows the most common temperature reference points at all three scales: