

Topic 11 Temperature

Summary

- Two regions that are at the same temperature are said to be in thermal equilibrium.
- Empirical centigrade scale of temperature: $\theta = 100(P_\theta - P_i)/(P_s - P_i)$, where θ is the centigrade temperature on the scale of a thermometer based on a property P . P_s , P_i and P_θ are the values of the property at the steam-point, ice-point and at temperature θ respectively.
- The kelvin (K), unit of thermodynamic temperature, is the fraction $1/273.16$ of the thermodynamic temperature of the triple point of water.
- Thermodynamic scale of temperature: for a constant-volume gas thermometer, $T = 273.16(p/p_{tr})$, where T is the thermodynamic temperature, p is the pressure reading at temperature T and p_{tr} is the reading at the triple point of water.
- Celsius scale: $\theta = T - 273.15$, where θ is the Celsius temperature (in $^{\circ}\text{C}$) and T is the thermodynamic temperature (in K).
- The thermometric properties of common thermometers include the length of a column of liquid (in liquid-in-glass thermometers), the pressure of a gas (in constant-volume gas thermometers), the resistance of a coil of wire or of a sample of semiconductor (in thermistors), and the thermoelectric e.m.f. (in thermocouples).

Definitions and formulae

- Thermal energy is transferred from higher temperature to lower temperature.
- Thermal equilibrium exists between regions of equal temperature.
- $T/\text{K} = t/^{\circ}\text{C} + 273.15$