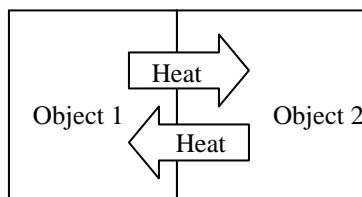


CHAPTER 4: HEAT

4.1 Thermal Equilibrium



Thermal equilibrium is reached between two objects in contact when:

- The net transfer of heat is zero (rate of exchange of heat are equal)
- The two objects have the same temperature

4.1.1 Calibration of a thermometer

To calibrate a thermometer, two extreme points must be chosen to mark its scale. These points must be able to be reproduced accurately.

In the Celsius scale, the two fixed points of temperature are:

- ice point (0°C)** – temperature of pure ice melting under standard atmospheric pressure
- steam point (100°C)** – temperature of pure water boiling under standard atmospheric pressure

To calculate the scale of a thermometer, given the two fixed points:

$$\theta_x - \theta_0 = \frac{l_x - l_0}{l_{100} - l_0} \times (\theta_{100} - \theta_0)$$

where l_1 = length on scale based on lower fixed point (typically 0°C)
 l_2 = length on scale based on higher fixed point (typically 100°C)
 l_x = length on scale based on temperature of object to be measured
 θ_1 = temperature of lower fixed point (typically 0°C)
 θ_2 = temperature of higher fixed point (typically 100°C)
 θ_x = temperature to be calculated