

Thermal Equilibrium

Physics

What equilibrium means, and how temperature is defined from it.

Two systems are in thermal equilibrium when no net heat flows between them in thermal contact. The zeroth law makes this transitive, which is what allows temperature to be defined at all.

ABSOLUTE ZERO

0 K = -273.15°C

REACHABLE

no

- Heat flows from higher to lower temperature, never the reverse spontaneously.
- Equilibrium means no NET flow, not no exchange.
- The zeroth law makes thermometry possible.
- Absolute zero is where entropy is minimised, not where motion stops entirely.
- Zero-point energy remains at 0 K.
- Absolute zero is unreachable in a finite number of steps.

LOOK FOR IT

A thermometer works by reaching thermal equilibrium with the thing being measured, and then reading its own state.

This is why a thermometer must be small relative to what it measures: it changes the temperature it is measuring.