PHY1014

# Heat

**Heat transfer and temperature change**

,

is heat, is specific heat (depends on the material and phase), is mass, is change in temperature.

SI units of is J (joule), SI units of is K (kelvin), SI units if is kg, SI units of is J/kg \*C.

Specific heat value can be found in a table with values for specific heat for various materials.

**NOTE**: in this case we will use temperature in degrees C.

**Phase change and latent heat**

**Melting/freezing**

,

is heat, is mass, is latent heat of fusion.

**Vaporization/condensation**

,

is heat, is mass, is latent heat of vaporization.

NOTE: latent heat of fusion and latent heat of vaporization can be found in a table with values for various materials.

**Heat transfer methods:**

* Conduction
* Convection
* Radiation

**Rate of conductive heat transfer**

,

is heat, is time, is the thermal conductivity, is surface area, is thickness, is temperature.

This formula will be used in case we need to find the rate of conductive heat transfer through a slab of material.

Thermal conductivity can be found in a table with values for various materials.

The SI unit of the rate of heat conduction is W (watt).

**Rate of heat transfer by emitted radiation**

**The Stefan-Boltzmann law of radiation**

,

is heat, is time, σ = 5.67 x 10-8 J/s m2 K4 is the Stefan-Boltzmann constant, is the surface area of the object, is emissivity, is absolute temperature in K.

**Emissivity** is a measure how well an object radiates.

**Net rate of heat transfer by emitted radiation**

,

is heat, is time, σ = 5.67 x 10-8 J/s m2 K4 is the Stefan-Boltzmann constant, is the surface area of the object, is emissivity, is absolute temperature in K;

is the temperature of an object, is the temperature of the environment.