Energy to raise the temperature, melt, or boil a substance

Changing Temperature - Specific Heat

The specific heat capacity, c, is the energy it takes to raise the temperature of a substance.

$Q = mc\Delta T$

Q - Heat energy; m - mass; c - specific heat; ΔT - Temperature change, °K or °C

Water Numbers

Specific heats

Water: C = 4.18 J/g°C

Ice: C = 2.09 J/g°C

Vapor: C = 2.01 J/g°C

Heat of Fusion

H_f = 334 J/g

Heat of Vaporization

H_v = 2,230 J/g

Melting / Freezing - Heat of Fusion

The heat of fusion, H_f, is the energy it takes to melt a substance (that is, convert it from solid to liquid).

$Q = mH_f$

Q - Heat energy; m - mass; H_f - Heat of fusion

Kg or g? Cal or J?

The units you use for mass and energy are dictated by the units used in your specific heat table.

For example, if the specific heat table values are labelled *J/g K*, then your energy must be in Joules and mass in grams. (Temperature is always in degrees Kelvin.)

Boiling / Condensing - Heat of Vaporization

The heat of vaporization, H_v, is the energy it takes to boil a substance (that is, convert it from liquid to gas).

$Q = mH_v$

Q - Heat energy; m - mass; H_v - Heat of vaporization

Heat, Temperature, and Change of State

In the graph at right, the significant fact is that temperature does not change when a substance is changing from one state to another.

The energy being applied to the substance goes into changing the state, rather than into changing the temperature.