Metals - Specific Heats

Specific heat of commonly used metals like aluminum, iron, mercury and many more - imperial and SI units.

The specific heat of **metals and metalloids (semimetals)** are given in the table below.

- Specific heat online unit converter

See also tabulated values for gases, food and foodstuff, common liquids and fluids, common solids and other common substances as well as values of *molar specific heat* for common organic substances and inorganic substances.

Metal	Specific Heat - c_p - (kJ/(kg K)) (Btu/lb °F) (cal/gram C°)
Aluminum	0.91
Antimony	0.21
Barium	0.20
Beryllium	1.83
Bismuth	0.13
Cadmium	0.23
Calsium	0.63
Carbon Steel	0.49
Cast Iron	0.46
Cesium	0.24
Chromium	0.46
Cobalt	0.42
Copper	0.39
Gallium	0.37
Germanium	0.32
Gold	0.13
Hafnium	0.14
Indium	0.24
Iridium	0.13
Iron	0.45
Lanthanum	0.195

Metal	Specific Heat - c_p - (kJ/(kg K)) (Btu/lb °F) (cal/gram C°)
Lead	0.13
Lithium	3.57
Lutetium	0.15
Magnesium	1.05
Manganese	0.48
Mercury	0.14
Molybdenum	0.25
Nickel	0.44
Niobium (Columbium)	0.27
Osmium	0.13
Palladium	0.24
Platinum	0.13
Plutonium	0.13
Potassium	0.75
Rhenium	0.14
Rhodium	0.24
Rubidium	0.36
Ruthenium	0.24
Scandium	0.57
Selenium	0.32
Silicon	0.71
Silver	0.23
Sodium	1.21
Strontium	0.30
Tantalum	0.14
Thallium	0.13
Thorium	0.13
Tin	0.21
Titanium	0.54
Tungsten	0.13
Uranium	0.12
Vanadium	0.39
Yttrium	0.30
Zinc	0.39
Zirconium	0.27
Wrought Iron	0.50

Metalloids - also known as semimetals - are elements containing properties similar and midway between metals and nonmetals.

- *1 J/(kg K) = 2.389x10^{-4} kcal/(kg ^{o}C) = 2.389x10^{-4} Btu/(lb$_m$ ^{o}F)*
- *1 kJ/(kg K) = 0.2389 kcal/(kg ^{o}C) = 0.2389 Btu/(lb$_m$ ^{o}F) = 10^3 J/(kg ^{o}C) = 1 J/(g ^{o}C)*
- *1 Btu/(lb$_m$ ^{o}F) = 4186.8 J/ (kg K) = 1 kcal/(kg ^{o}C)*
- *1 kcal/(kg ^{o}C) = 4186.8 J/ (kg K) = 1 Btu/(lb$_m$ ^{o}F)*

For conversion of units, use the Specific heat online unit converter.

See also tabulated values for Gases , Food and foodstuff , Common liquids and fluids , Common solids and other Common substances as well as values of *molar specific heat* for common organic substances and inorganic substances.

Heating Energy

The energy required to heat a product can be calculated as

$$q = c_p\, m\, dt \qquad (1)$$

where

q = heat required (kJ)

c_p *= specific heat (kJ/kg K, kJ/kg C°)*

dt = temperature difference (K, C°)

Example - Heating Carbon Steel

2 kg of carbon steel is heated from *20 °C* to *100 °C*. The specific heat of carbon steel is *0.49 kJ/kgC°* and the heat required can be calculated as

q = (0.49 kJ/kg °C) (2 kg) ((100 °C) - (20 °C))

= 78.4 (kJ)

Related Topics

- **Material Properties** - Material properties of gases, fluids and solids - densities, specific heats, viscosities and more.
- **Thermodynamics** - Work, heat and energy systems.

Related Documents

- **Aluminum - Radiation Heat Emissivity** - Radiation heat emissivity of unoxidized, oxidized and polished aluminum.
- **Aluminum Alloys - Mechanical Properties** - Mechanical properties of aluminum alloys - tensile strength, yield strength and more.
- **Galvanic Corrosion vs. Electrode Potential** - Introduction to electro chemical series and corrosion of metals.
- **Heat Capacity** - The amount of heat required to change the temperature of a substance by one degree.
- **Heat, Work and Energy** - Heat vs. work vs. energy.
- **Inorganic Compounds in Water - Melting and Boiling Temperature, Density and Solubility** - Physical constants for more than 280 common inorganic compounds. Density is given for the actual state at 25°C and for liquid phase at melting point temperature.
- **Lead Binary Eutectic Alloys - Melting Points** - Pb - Lead (Plumbum) - binary eutectic alloys and melting points.
- **Magnesium Binary Eutectic Alloys - Melting Points** - Mg - Magnesium - binary eutectic alloys and melting points.
- **Metals - Boiling Temperatures** - Metals and their boiling temperatures.
- **Metals - Corrosion Resistance to Aggresive Fluids** - Common metals and their corrosion resistance to aggressive fluids like acids, bases and more.
- **Metals - Latent Heat of Fusion** - Metals and their latent heat of fusion.
- **Metals - Machinability** - The machinability of some common metals.
- **Metals and Alloys - Densities** - Densities of some common metals, metallic elements and alloys - aluminum, bronze, copper, iron and more.
- **Metals and Alloys - Melting Temperatures** - The melting temperatures for some common metals and alloys.

- **Metals, Metallic Elements and Alloys - Thermal Conductivities** - Thermal conductivities of common metals, metallic elements aand alloys.
- **Mixing Fluids** - Final mass and temperature when mixing fluids.
- **Poisson's Ratios Metals** - Some metals and their Poisson's Ratios.
- **Polymers - Specific Heats** - Specific heat of polymers like epoxy, PET, polycarbonate and more.
- **Solids - Specific Heats** - Common solids - like brick, cement, glass and many more - and their specific heats - in Imperial and SI units.
- **Solids and Metals - Specific Gravities** - Specific gravity for common solids and metals like aluminum, asbestos, brass, calcium and many others.
- **Specific Heat - Online Unit Converter** - Online specific heat converter with the most commonly used units.
- **Specific Heat of common Substances** - Specific heat of products like wet mud, granite, sandy clay, quartz sand and more.
- **Standard enthalpy of formation, Gibbs energy of formation, entropy and molar heat capacity of organic substances** - The standard enthalpy of formation, Gibbs energy of formation, entropy and molar heat capacity are tabulated for more than hundred organic substances.
- **Standard State and Enthalpy of Formation, Gibbs Free Energy of Formation, Entropy and Heat Capacity** - Definition and explanation of the terms standard state and standard enthalpy of formation, with listing of values for standard enthalpy and Gibbs free energy of formation, as well as standard entropy and molar heat capacity, of 370 inorganic compounds.

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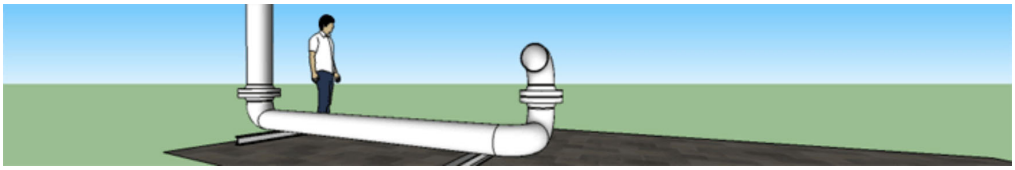

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- **Air Psychrometrics**
- **Basics**
- **Combustion**

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