

Chapter 9 Specific Heat Practice Worksheet

Specific Heat is defined as the amount of heat energy needed to raise 1 gram of a substance 1°C in temperature.

$$Q = m \cdot C_p(T_2 - T_1)$$

Q is heat energy (Joules)

m is mass of the substance (kilograms)

C_p is specific heat of the substance (J/kg·°C)

$T_2 - T_1$ is change in temperature (°C)

The higher the specific heat, the more energy is required to cause a change in temperature. Substances with higher specific heats require more loss of heat energy to experience a lowering of their temperature than do substances with a low specific heat. Some sample specific heat values are presented in the table below:

Material	Specific Heat (J/kg °C)
water (pure)	4,184
aluminum	900
steel	470
silver	235
oil	1,900
concrete	880
glass	800
gold	129
wood	2,500

Water has the highest specific heat of the listed types of matter. This means that water is slower to heat but is also slower to lose heat.

Example: How much energy is required to heat 350 g of gold from 10°C to 50°C?

$$Q = m \cdot C_p (T_f - T_i)$$

$$Q = (0.350 \text{ kg})(129 \text{ J/kg} \cdot \text{°C})(50^\circ \text{C} - 10^\circ \text{C})$$

$$\underline{Q = 1,806 \text{ J}}$$

1. A 0.5 kg piece of aluminum increases its temperature 7° C when heat energy is added. How much heat energy produced this change in temperature?

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2. A volume of water has a mass of 0.5 kg. If the temperature of this amount of water was raised by 7°C , how much heat energy is produced?

3. How much heat energy is required to raise the temperature of 1 kg of steel by 10°C ?

4. How much heat energy is needed to raise the temperature of 100 L of water from 10°C to 25°C ? Note: one liter of water has a mass of one kilogram.

5. When 1,500 Joules of energy is lost from a 0.12 kg object, the temperature decreases from 45°C to 40°C . What is the specific heat of this object? Of what material is the object made?

