

9C Specific Heat

Read:

Specific heat is the amount of thermal energy needed to raise the temperature of 1 gram of a substance 1 °C.

The higher the specific heat, the more energy is required to cause a change in temperature. Substances with higher specific heats must lose more thermal energy to lower their temperature than 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 | 897 |
| silver | 235 |
| oil | 1,900 |
| concrete | 880 |
| gold | 129 |
| wood | 1,700 |

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.

Practice:

Using the table above, solve the following heat problems.

1. If 100 joules of energy were applied to all of the substances listed in the table at the same time, which would have the greatest temperature change? Explain your answer.

2. Which of the substances listed in the table would you choose as the best thermal insulator? A thermal insulator is a substance that requires a lot of heat energy to change its temperature. Explain your answer.

3. Which substance—wood or silver—is the better thermal conductor? A thermal conductor is a material that requires very little heat energy to change its temperature. Explain your answer.

4. Which has more thermal energy, 1 kg of aluminum at 20 °C or 1 kg of gold at 20 °C?

5. How much heat in joules would you need to raise the temperature of 1 kg of water by 5 °C?

6. How does the thermal energy of a large container of water compare to a small container of water at the same temperature?
