NOTES: The heat required to raise the temperature of a mass \( m \) of a substance can be calculated from:

Heat = mass in grams \( \times \) specific heat in Calories per gram degree C \( \times \) temperature change \((\Delta T)\) in C,

\[
Q = m \cdot c \cdot \Delta T
\]

where \( Q \) is the heat in calories, \( m \) is the mass in grams and \( \Delta T = T_{\text{final}} - T_{\text{initial}} \) (Note: always consider \( \Delta T \) as a positive number, even if the temperature goes down, only the temperature change is important.)

The specific heat of water is 1 Calorie/g C

The formulas can also be used to find the amount of heat that must be removed from a substance to cool it.

Remember that the mass must be in grams!

Ex. 1.— How much heat is required to raise the temperature of 2 kg of water from 45 to 55 degrees C?

Ex. 2.— How much heat must be removed from 5 kg of water to cool it from 10 to 2 degrees C?

Solutions:

(1) Heat = mass x specific heat x temperature change

\[
= 2000 \text{ g} \times 1 \text{ Cal/g C} \times 10 \text{ C} = 20,000 \text{ Cal.}
\]

(2) Heat = mass x specific heat x temperature change

\[
= 5000 \text{ g} \times 1 \text{ Cal/g C} \times 8 \text{ C} = 40,000 \text{ Cal.}
\]