Answer on Question#60803 – Physics – Molecular Physics – Thermodynamics

The temperature of a 46.4 g sample of a metal is raised from 21.3 degrees celsius to 55.9 degrees celcius when 400.6 cal of heat are added. The specific heat capacity of the sample is what in cal/g*oC.

Solution. The specific heat is the amount of heat per unit mass required to raise the temperature by one degree Celsius. The relationship between heat and temperature change is usually expressed in the form shown below where c is the specific heat. The relationship does not apply if a phase change is encountered, because the heat added or removed during a phase change does not change the temperature.

$$Q = Cm\Delta T$$

Q – added heat;
C – specific heat capacity;
m – mass substance;
ΔT – change in temperature.

According to the statement of the problem $m = 46.4g$, $\Delta T = 55.9 - 21.3 = 34.6^0C$, $Q = 400.6 cal$. Hence specific heat capacity equal $C = \frac{Q}{m\Delta T} = \frac{400.6}{46.4 \cdot 34.6} \frac{cal}{g \cdot {}^0C} \approx 0.25 \frac{cal}{g \cdot {}^0C}$.

Answer: $C = 0.25 \frac{cal}{g \cdot {}^0C}$.