

105. We demand $\sum Q = 0$ as an expression of the fact that the system is isolated. Only temperature changes (with $Q = cm\Delta T$) are involved (no phase changes). Let masses be in kilograms, heat in Joules and temperature on the Celsius scale.

$$\begin{aligned} Q_{\text{copper}} + Q_{\text{water}} &= 0 \\ (386)(3.00)(T_f - 70.0^\circ) + (4190)(4.00)(T_f - 10.0^\circ) &= 0 \end{aligned}$$

Therefore, we find

$$T_f = \frac{(386)(3.00)(70.0^\circ) + (4190)(4.00)(10.0^\circ)}{(386)(3.00) + (4190)(4.00)} = 13.9^\circ\text{C} .$$