

If the specific heat capacity of water initially is 4.2×10^3 per kg per K and $g=10\text{m/s}^2$, the difference in temperature of water between the top and bottom of a 210 m high water fall is -----

The energy conservation law:

$$\Delta W + \Delta Q = 0$$

where ΔW – changing of mechanical energy, Q – changing of heat;

changing of mechanical energy:

$$\Delta W = mg\Delta h$$

h – high of body;

changing of heat:

$$Q = cm\Delta t$$

c - specific heat capacity, t – temperature;

Therefore:

$$mg(h - 0) = cm\Delta t$$

$$\Delta t = \frac{gh}{c} = \frac{210 \text{ m} * 10 \frac{\text{m}}{\text{s}^2}}{4200 \frac{\text{J}}{\text{kg K}}} = \frac{1}{2} = 0.5 \text{ degrees}$$

Answer: 0.5 degrees