

Answer on Question #43600, Physics, Other

Task: A piece of metal slides on a rough floor. Its speed decreases from 10m / s to 5m / s due to friction. Assume that half of the kinetic energy lost is absorbed by it in the form of heat. Find the increase in its temperature if the specific heat capacity of the metal is 375J / kg ° C.

Solution:

$V_1=10\text{m/s}$; $V_2=5\text{m/s}$; $c=375\text{J / kg}^{\circ}\text{C}$; m – mass of piece of metal .

$$\text{change of kinetic energy : } |\Delta E_k| = \left| \frac{m}{2} (V_2^2 - V_1^2) \right| = \frac{75m}{2}$$

$$\frac{1}{2} \Delta E_k = cm\Delta t \Rightarrow \Delta t = \frac{\Delta E_k}{2cm} = \frac{75m}{4m \cdot 375} = 0.05^{\circ}\text{C}$$

Answer: the increase in its temperature $\Delta t = 0.05^{\circ}\text{C}$