Answer on Question#37931, Physics, Other

Question:

A piece of lead [c = 128 J/(kg·C°)] is heated from 18.0 °C to 30.1 °C. The same amount of heat is added to a piece of copper [c = 387 J/(kg·C°)]. The mass and initial temperature of the copper are the same as for the lead. Determine the final temperature Tf of the copper.

Answer:

The amount of heat which is needed to add to the body to increase its temperature from $\boldsymbol{T_0}$ to $\boldsymbol{T_f}$ is

$$\boldsymbol{Q = cm(T_f - T_0)}$$

where c - is specific heat of the body, m – mass of the body.

The amount of heat is added to the piece of lead and to the piece of copper is the same, so we can write an equation

$$\boldsymbol{c_l m(T_{fl} - T_0) = c_c m(T_{fc} - T_0)}$$

So we can find the final temperature T_{fc} of the copper

$$T_{fc} = T_0 + \frac{c_l}{c_c}(T_{fl} - T_0)$$

$$T_{fc} = 18.0 + \frac{128}{387}(30.1 - 18.0) = 22.0℃$$

The answer is: $\boldsymbol{T_{fc} = 22.0℃}$