Answer on Question 55297, Physics, Other

Question:

A $0.2kg$ rod of brass at $100℃$ is dropped into $0.5kg$ of water at $20℃$. The final temperature of the mixture is $23℃$. Calculate the specific heat capacity of brass, if the specific heat capacity of water is $4200\,J/kg\cdot℃$.

Solution:

The water will heated, while the rod of brass will cooled. We can write the heat balance equation:

$$m_{water}c_{water}(T-t_{water})=m_{brass}c_{brass}(t_{brass}-T),$$

here, m_{water} is the mass of water, c_{water} is the specific heat capacity of water, t_{water} is the temperature of water, m_{brass} is the mass of rod of brass, c_{brass} is the specific heat capacity of brass, t_{brass} is the temperature of rod of brass and T is the final temperature of the mixture.

From this equation we can find the specific heat capacity of brass:

$$c_{brass}=\frac{m_{water}c_{water}(T-t_{water})}{m_{brass}(t_{brass}-T)}=\frac{0.5kg\cdot 4200\frac{J}{kg\cdot℃}\cdot(23℃-20℃)}{0.2kg\cdot(100℃-23℃)}=409\,\frac{J}{kg\cdot℃}.$$

Answer:

$c_{brass}=409\,\frac{J}{kg\cdot℃}$.