

**QUESTION:**

In determining the specific heat of a new metal alloy 150 gm of substance is heated to 400 degree C and then placed in a 200 gm calorimeter cup containing 400 gm of water at 10 degree C. IF the final temperature of mixture is 30.5 degree C, What is the specific heat of alloy?

**SOLUTION:**

We assume that alloy wasn't melted, water wasn't boiled and no heat was transferred to calorimeter.

According to the energy conservation law:

$$c_{\text{alloy}} m_{\text{alloy}} (T_{\text{alloy,initial}} - T_{\text{final}}) = c_{\text{water}} m_{\text{water}} (T_{\text{final}} - T_{\text{water,initial}})$$

$$c_{\text{alloy}} = \frac{c_{\text{water}} m_{\text{water}} (T_{\text{final}} - T_{\text{water,initial}})}{m_{\text{alloy}} (T_{\text{alloy,initial}} - T_{\text{final}})} = 621.38 \frac{\text{J}}{\text{kg} \cdot \text{K}}$$

**ANSWER:**

$$c_{\text{alloy}} = 621.38 \frac{\text{J}}{\text{kg} \cdot \text{K}}$$