Answer on Question #69597 Physics / Other

A solid $m_1 = 1.572$ kg gold container with an initial temperature of $t_1 = 20.3$ degrees C holds $m_2 = 0.674$ kg of liquid ethyl alcohol at $t_2 = 35.8$ degrees C. the specific heat of gold is

$c_1 = 129$ j/kgC and the specific heat of ethyl alcohol is $c_2 = 2.450$ j/kgC. Assume the system is isolated. Calculate the final, equilibrium temperature of the system.

Solution:

Let us denote as t the final temperature.

The energy balance equation

$$c_1 m_1 (t - t_1) = c_2 m_2 (t_2 - t)$$

Thus

$$t = \frac{c_1 m_1 t_1 + c_2 m_2 t_2}{c_1 m_1 + c_2 m_2} = \frac{129 \times 1.572 \times 20.3 + 2450 \times 0.674 \times 35.8}{129 \times 1.572 + 2450 \times 0.674} = \frac{63233.1364}{1854.088} = 34.1°\text{C}$$

Answers: $t = 34.1°$C.