Quiz 1 – PH241 **Name**_____ ☐ **Pledged**

Suppose that we have .50 kg of an unknown material. It is heated to 365 K and then placed into .75 kg of room temperature water (21° C). The water is in a copper cup of mass .14 kg surrounded by very light insulating material, and the final equilibrium temperature of the water-cup-unknown material mixture is 302 K. Compute the specific heat of the unknown material.

$Q = mc\Delta T$ $T_K = T_C + 273$ $c_{copper} = 390\frac{J}{kg\,K}$ $c_{water} = 4186\frac{J}{kg\,K}$

$Q_{gained} + Q_{lost} = 0$

21 °C ✓

$-Q_{lost} = Q_{gained}$

$(294 \to 302)\,K \to \Delta T = 8K$

$-(.5\,kg)\,c\,(-63K) = (.75\,kg)\left(\frac{4186\,J}{kg\,K}\right)(8K)$

$+(.14\,kg)\left(\frac{390\,J}{kg\,K}\right)(8K)$

$c = \frac{811\,J}{kg\,K}$