Question #76677, Physics / Other

A 254g sample of metal with an initial temperature of 210oC is dropped into 100 grams of water at 46oC. If the mixture reaches a thermal equilibrium of 79oC, what is the specific heat of the metal?

Solution

The specific heat capacity of water is 4,184 J/kgK.

The amount of heat lost by water is $Q = Cm\Delta T = 4{,}184 \times 0.100 \times \left(79 - 46\right) = 13{,}807.2$J

Assuming isolated system, the same amount of heat was gained by metal.

$$Q = Cm\Delta T = C \times 0.254 \times \left(210 - 79\right) = 13{,}807.2$$

Solving for C, obtaining C = 415 J/kgK.

Answer: 415 J/kgK.