Question #78025, Chemistry / General Chemistry

A 0.500 kg mass of unknown metal at 100.0 oC is placed in 120.0 g H2O at 25.0 oC. The final temperature of the water and metal is 30.0 oC. Ignoring the container, what is the specific heat of the metal? (c-water = 4.184 J/goC)

A. 0.0071 J/goC

B. 0.0142 J/goC

C. 0.071 J/goC

D. 0.142 J/goC

E. None of the Above

Solution:

$$q = m \times c \times \Delta T \text{ -heat capacity formula;}$$

1. Find heat capacity for water:

$$q(water) = m \times c \times \Delta T = 120.0g * 4.184J/goC * (30.0oC - 25.0oC) = 2486.4 \text{ J}$$

2. q(water)=q(unknown metal)

$$q(metal) = m \times c \times \Delta T$$

$$c = \frac{q}{m * \Delta T} = \frac{2486.4J}{500g * (100.0oC - 30.0oC)} \approx 0.071 \text{ J/goC}$$

Answer: C