

Question #63399, Chemistry / General Chemistry

Each of the following is placed in an ice bath until it has lost 72.0 J of energy. Compute the final temperature in each case. Do not include units (°C) in any of your answers.

A 35.0 g block of Al originally at 65.0°C.

A 50.0 g block of Al originally at 65.0°C.

A 50.0 g block of Ag originally at 65.0°C.

A 50.0 g sample of H₂O originally at 32.5°C.

Solution:

Specific heat capacities:

Al – 0.897 J/g C

Ag – 0.233 J/g C

H₂O – 4.1813 J/g C

$$Q = c \times m \times (T_2 - T_1)$$
$$(T_2 - T_1) = \frac{Q}{c \times m}$$
$$T_2 = \frac{Q}{c \times m} + T_1$$

A 35.0 g block of Al originally at 65.0 °C:

$$T_2 = \frac{72.0 J}{0.897 \frac{J}{g^\circ C} \times 35.0 g} + 65.0^\circ C = \mathbf{67.3^\circ C}$$

A 50.0 g block of Al originally at 65.0 °C:

$$T_2 = \frac{72.0 J}{0.897 \frac{J}{g^\circ C} \times 50.0 g} + 65.0^\circ C = \mathbf{66.6^\circ C}$$

A 50.0 g block of Ag originally at 65.0 °C:

$$T_2 = \frac{72.0 J}{0.233 \frac{J}{g^\circ C} \times 50.0 g} + 65.0^\circ C = \mathbf{71.2^\circ C}$$

A 50.0 g sample of H₂O originally at 32.5 °C:

$$T_2 = \frac{72.0 J}{4.1813 \frac{J}{g^\circ C} \times 50.0 g} + 32.5^\circ C = \mathbf{32.8^\circ C}$$