Calorimetry and Energy Conservation

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Use $q = mc\Delta T$ with ΔT = final minus initial temperature. In the insulated models, heat lost by the warmer sample equals heat gained by the cooler sample.

1 A warm object cools while transferring heat to water. What is the sign of q for the object?

(1) Positive

(2) Negative

(3) Zero

(4) Always equal to the mass

2 Calculate the heat gained by 50.0 g of water as it warms by 4.0 °C. Use $c = 4.18$ J/(g·°C). [1]

Answer and work

3 In an insulated two-sample model, water gains 500 J. What is q for the object that transfers heat to the water?

(1) −500 J

(2) 0 J

(3) +250 J

(4) +500 J

4 Explain why a calorimetry calculation may be inaccurate if a substantial amount of heat escapes to the room. [1]

Answer and work

Two Metal Samples in Water

Use the information below to answer the questions.

In each insulated trial, a 30.0 g metal sample starts at 80.0 °C. The bath holds 50.0 g water at 20.0 °C. The container stores negligible heat. Use 4.18 J/(g·°C) for water.

Trial	Final common temperature (°C)
P	24.0
Q	26.0

5 Which bath gains more heat?

(1) P

(2) Q

(3) Both gain equal heat.

(4) Neither gains heat.

6 Calculate q for the metal in P. Show how the water result gives the metal result. [1]

Answer and work

7 What is ΔT for the metal in trial P?

(1) −56.0 °C

(2) −4.0 °C

(3) +4.0 °C

(4) +56.0 °C

8 Use P’s data to estimate the metal’s specific heat. Show the heat balance and the substitution into q = mcΔT. [1]

Answer and work