Calibrating a Cup for Heat Measurements

Scoring guide · one credit per question · review written work against each rubric

Calibrating a Cup for Heat Measurements

Question 1

Choice (2)

The warm water cools and loses thermal energy. The cool water and the cup warm, so both gain energy.

Question 2

The cool water gains (100.0 g)(4.18 J/(g·°C))(29.0 − 20.0 °C) = 3762 J, or about 3.76 kJ.

Question 3

The warm water loses (50.0 g)(4.18 J/(g·°C))(50.0 − 29.0 °C) = 4389 J. Of this, the cool water gains 3762 J. The cup gains the difference, 627 J. Accept rounding consistent with the measurements.

Question 4

The cup warmed by 9.0 °C in the calibration. A rise of 4.5 °C is half as large, so the cup gains about 627 J/2 = 314 J, or 0.314 kJ. The total released is about 2.50 kJ + 0.314 kJ = 2.81 kJ. Accept equivalent rounding and a consistent calculation based on the earlier cup result.