

Competition Corner: Energy Claims Under a Boundary

g10_u02_w05 | audit the model

Safe challenge: Analyze supplied temperature and energy-diagram cards only. No heating, mixing, or chemical handling is requested. Use $c_{\text{water}} = 4.184 \text{ J g}^{-1} \text{ }^{\circ}\text{C}^{-1}$.

1. Card A: 80.0 g water warms by 3.00°C during a stated 0.0400 mol reaction. Card B: 120.0 g water warms by 2.20°C during a stated 0.0400 mol reaction. Calculate each modeled ΔH . Give two reasons the cards could differ without either arithmetic calculation being wrong.

2. An energy diagram has reactants at 15 kJ/mol, products at -45 kJ/mol , and a peak at 95 kJ/mol. Calculate ΔH , both activation energies, and explain why an exothermic process can still require an energy input to begin.

3. A bond-energy calculation gives -120 kJ/mol , while a calorimetry card gives -105 kJ/mol . Give a bounded interpretation that distinguishes an average-bond estimate from a measurement model. List one data check for each method.

4. A student says, “The water got colder, so energy disappeared.” Correct the statement by naming the reaction system, the water surroundings, the signs of both q values, and a possible experimental limitation.
