

Measuring enthalpy change · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2025; current brief acquired; full Chemistry guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Energy · 1.1

Reasoning

A cup warms when two solutions react. The temperature rise measures energy transferred to the surroundings; it does not directly equal the enthalpy change . Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Energy · 2.1

Reasoning

Exothermic reactions transfer energy to surroundings. Endothermic reactions take energy from surroundings. Bond breaking requires energy; bond formation releases energy. exothermic: Transferring energy to the surroundings; enthalpy change: Heat change at constant pressure for a stated process.

Energy · 3.1

Reasoning

Use energy transferred = mass $\times$ specific heat capacity $\times$ temperature change. Convert joules to kilojoules before dividing by reaction amount. An exothermic molar enthalpy change has a negative sign. Use insulation and a lid, measure starting temperatures consistently, stir, and record a temperature-time series. Estimate the reaction temperature from an appropriate extrapolation rather than ignoring cooling during measurement.

Energy · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: 100 g solution rises by 5.0 °C; specific heat capacity is 4.18 J per gram per degree. $q = mc\Delta T$. $q = 100 \times 4.18 \times 5.0 = 2,090 \text{ J} = 2.09 \text{ kJ}$. If 0.050 mol reacts, $\Delta H = -q/n = -2.09/0.050 = -41.8 \text{ kJ per mole}$.

Energy · 4.2

Reasoning

50 g water rises 4 °C. Use $c = 4.2$ J per gram per degree to find q . Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Energy · 5.1

Reasoning

Heat loss usually lowers the observed temperature rise. The solution gaining heat and the reaction losing heat have opposite signs. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Energy · 5.2

Reasoning

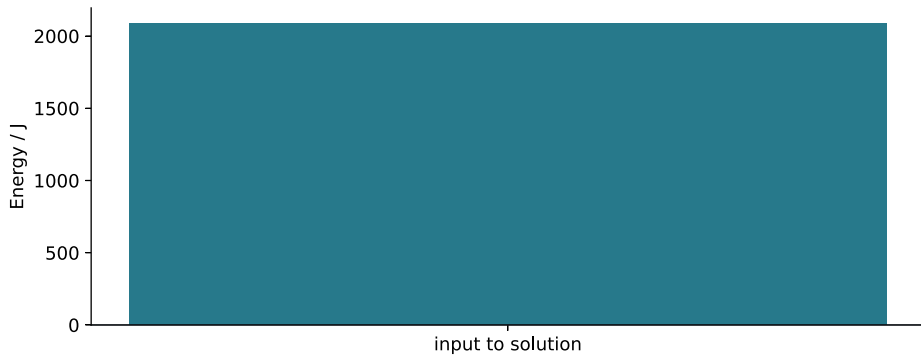
Bond breaking releases energy. This claim is false: Heat loss usually lowers the observed temperature rise. The solution gaining heat and the reaction losing heat have opposite signs.

Energy · 5.3

Reasoning

Calorimetry and chemical energy: Use energy transferred = mass $\times$ specific heat capacity $\times$ temperature change. Convert joules to kilojoules before dividing by reaction amount. An exothermic molar enthalpy change has a negative sign.

Energy · diagram



- Original teaching diagram: Calorimetry and chemical energy
- Use the labels and the stated model together.

Energy · original transfer

Your turn

Fictional solution gains 1.5 kJ when 0.030 mol reacts. Find molar reaction enthalpy using the stated heat-transfer model, and explain the sign and effect of uncorrected heat loss.

Energy · transfer reasoning

Method and interpretation

$\Delta H = -q/n = -1.5/0.030 = -50 \text{ kJ/mol}$. Solution gains heat, reaction loses it.
Uncorrected loss usually underestimates magnitude. Include container heat if relevant.

Check yourself

- Explain enthalpy change using the stated model.
- Explain exothermic using the stated model.
- Change one value in the original transfer; explain which assumption still matters.