

Marking Guide: Enthalpy Changes and Calorimetry

Task

Students present a labelled model or report on enthalpy changes and calorimetry. The work must define enthalpy, apply $Q = mc\Delta T$ to transfer data, use calorimetry data to determine enthalpy change, and communicate results using correct notation.

Curriculum alignment

- 30-A1.3k: define enthalpy and molar enthalpy for chemical reactions ([Outcome](#), [Outcome](#))
- 30-A1.1k: recall the application of $Q = mc\Delta T$ to transfer data, use calorimetry data to determine enthalpy change, and communicate results using correct notation ([Outcome](#))
- 30-A1.8k: use calorimetry data to determine the enthalpy changes in chemical reactions ([Outcome](#))
- 30-A1.5k: use and interpret notation, and calculate energy changes in chemical reactions ([Outcome](#))
- 30-A1.3s: analyze data and apply mathematical and conceptual models to develop and assess possible solutions ([Outcome](#))

Rubric

Criterion	Beginning	Developing	Proficient	Exemplary
Definition of enthalpy and molar enthalpy (Outcome, Outcome)	Enthalpy is mentioned but not defined, or the definition is incorrect.	Enthalpy is defined but molar enthalpy is missing or vague.	Enthalpy and molar enthalpy are both defined accurately, using correct units.	Definitions are precise, distinguish enthalpy from molar enthalpy clearly, and connect to the reaction studied.
Application of $Q = mc\Delta T$ (Outcome)	Formula is missing, misapplied, or variables are undefined.	Formula is applied with minor errors in substitution or units.	Formula is applied correctly with all variables identified and units shown.	Formula is applied correctly and the student explains the physical meaning of each term.
Use of calorimetry data to determine enthalpy change (Outcome)	Calorimetry data is presented but no enthalpy change is calculated.	Enthalpy change is calculated but contains errors in logic or arithmetic.	Enthalpy change is calculated correctly from calorimetry data, with a clear method.	Calculation is correct, method is clearly explained, and sources of experimental error are identified.
Communication of energy change (Outcome, Outcome)	Enthalpy change is not used or used incorrectly.	Enthalpy change is used but sign convention or units are inconsistent.	Enthalpy change is used correctly, with correct sign and units, to communicate the energy change.	Enthalpy change is used correctly and the report analyzes the result, such as comparing it to an accepted value or energy diagram.

Scoring

Assign each criterion a level: Beginning (1 point), Developing (2 points), Proficient (3 points), or Exemplary (4 points). Sum the four scores for a total out of 16.

- 4 to 7: Beginning overall
- 8 to 10: Developing overall
- 11 to 13: Proficient overall
- 14 to 16: Exemplary overall

A student who scores Beginning on the calorimetry calculation criterion should not receive an overall Exemplary result, regardless of total score, since correct use of calorimetry data ([Outcome](#)) is central to the task.

Notes for the teacher

- Confirm that the reported ΔH includes the correct sign for the reaction type (exothermic versus endothermic) before scoring the notation criterion.
- Students should be able to use calorimetry data to determine enthalpy changes and apply $Q = mc\Delta T$ to analyze heat transfer in chemical reactions.
- Reference [Resource](#) or [Resource](#) procedures when checking whether a student's described method matches an actual calorimetry setup.
- Where a report cites an accepted literature value for comparison, treat this as evidence toward the Exemplary level on the ΔH criterion, not as a separate requirement.