Curiosity Thread: Why Does the Path Not Change the Ledger?

Curiosity Reading | CheAI Research Inc.

Hess's law lets chemists compare energy changes by treating each balanced equation as a signed ledger entry. The actual route can be complicated, but the enthalpy difference belongs to the defined initial and final states.

1. Why does reversing a route reverse the sign of its enthalpy change?
2. What would go wrong if a Hess-law calculation silently changed water from liquid to gas?
3. Why can a catalyst matter enormously for speed while leaving the Hess-law total unchanged?
4. When a calorimetry estimate and a Hess result differ, what is a useful next question besides "Which one is wrong?"

Use only the supplied data cards. Sources and model boundaries are documented in `sources.md`.