

Curiosity Thread: Why Can a Useful Estimate Miss the Reference?

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Imagine two maps of the same city. One shows every street; the other shows only the major roads. The simpler map can still predict a sensible route, but it cannot represent every turn. Mean bond enthalpies work similarly: they give a useful structural estimate without claiming to reproduce every molecular environment.

For a reaction, first ask what has to be pulled apart. That bond breaking requires energy. Next ask what new connections appear. Forming those bonds releases energy. The difference between those two totals estimates the reaction enthalpy.

The interesting question is not merely whether an estimate matches a reference value digit-for-digit. Ask what was averaged, what physical states were specified, and whether the equation represents the same system. That is how a mismatch becomes evidence about the model rather than a reason to abandon it.