

AP Chemistry
Thou Shalt Not Forget
Credit: Dan Reid

Thermochemistry

1. Exothermic reactions: $(-)\Delta H$; feels hot; heat is a product; temperature goes up...(endothermic is the opposite.)
 2. $\Delta H_{\text{rxn}} = \text{Bonds broken} - \text{Bonds formed}$...(reactant bonds are broken; product bonds are formed)
 3. Breaking bonds is endothermic. Forming bonds is exothermic.
 4. $\Delta H_{\text{rxn}} = \Delta H_{\text{products}} - \Delta H_{\text{reactants}}$...Don't forget to multiply by the coefficients!!
 5. If a reaction is exothermic, then the bonds formed in the products are stronger/more stable than the reactant bonds.
 6. Doubling a reaction? ΔH will double. Reversing a reaction? The sign for ΔH changes. Adding reactions? Add the ΔH 's.
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Thermodynamics: ΔG and ΔS

1. Thermodynamically favorable (spontaneous) reactions have a $(-)\Delta G$.
2. Reactions with $(-)\Delta H$ and $(+)\Delta S$ are ALWAYS thermodynamically favorable...“enthalpy driven & entropy driven”
3. Reactions that increase the # of moles of gas have a $(+)\Delta S$.
4. If ΔG is $(-)$, then $K_{\text{eq}} > 1$.
5. ΔH and ΔS are usually NOT given in the same units!! When using $\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$, make sure they match units.
6. $\Delta G = 0$ at equilibrium.
7. When using $\Delta G^\circ = -RT \ln K$, the value for R is 8.314 J/mol K so the answer for ΔG will be in the units of Joules.
8. Sometimes a reaction with a $(-)\Delta G$ does not proceed at a measurable rate. They are said to be under “kinetic control.” High activation energy is a common reason for a process to be under kinetic control.