



Chemical Thermodynamics

[Example]

- What is the entropy change when 50 g of $\text{CH}_4(\text{g})$ is burned at 2000 K?

[Example]

- How much heat is evolved when 50 g of $\text{CH}_4(\text{g})$ is burned at 2000 K?
- Final message – most times differences are small

[Adiabatic Flame Temp.]

- What happens if all of the heat transfer is absorbed or removed from the products of a reaction?
- Two conditions

[Example]

- What is the maximum flame temperature for an acetylene torch using pure $\text{O}_2(\text{g})$ as the oxidant. The initial temperature is 298 K.

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[Chemical Equilibrium]

- Simplest equilibrium are between phases of a pure substance.
- Phase diagram as a function of pressure and temperature.

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- Some H_2O (l) is prepared wherein a few molecules were are labeled with ^{17}O . The water is then placed in a sealed flask and allowed to come into equilibrium with its vapor at 298 K and 1 bar. Where is the ^{17}O after equilibrium has been established?
 - A - Water phase
 - B - Liquid phase
 - C - Both water and liquid phase
 - D - Neither water nor liquid phase.

[Chemical Equilibrium and ΔG]

- Gibbs free energy and chemical equilibrium are connected.
- Consider a simple liquid – gas equilibrium.
- Gibbs free energy is a function of 4 variables.

[Chemical Equilibrium and ΔG]

- Consider a simple liquid – gas equilibrium.