

**CHM2045**  
**Spring 2017**  
**Week 8**

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Reading: Zumdahl – Chapter 6 (all)

The first rule of thermodynamics is that you can't win, you can only break even. That means in every exchange between two bodies, there is never a net gain in energy. At best, the total remains constant. There are other rules, but we will focus on the first one. Also, don't talk about Thermodynamics (5<sup>th</sup> rule).

We will consider constant volume and constant pressure situations and see how heat and work contribute to the total internal energy of a system, as well as its effects on the surroundings. This will introduce us to the constant pressure energy, also referred to as Enthalpy. Later this will be applied as the amount of heat that is available to do work.

There is an enthalpy for everything, and we will look at how this concept is used to tell us about the energetics of various reactions. Instead of being concerned with how much of a substance emerges, we become interested in the amount of energy produced or consumed. Calorimetry is the technique that is commonly used to keep track of this.

Finally, we will look at Hess's Law as a sort of energy accounting for various reactions. Certain bonds, unsurprisingly, have more energy stored in them than others. That makes them hard or easy to break, depending on the stored energy. This will tell us a lot about the energetics of reactions.

**Learning Outcomes:**

By the end of this week, a student should be able to:

1. Calculate the internal energy of a system, given heat and work.
2. Determine the amount of heat generated through a temperature change.
3. Describe processes as exothermic or endothermic.
4. Use Hess's Law to determine the total change in energy for various reactions.

**Recommended Problems:**

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6.37, 6.41, 6.45, 6.47, 6.51, 6.53, 6.55, 6.69, 6.73, 6.75, 6.77, 6.81