Unit Plan Guide Sketch

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Part I: Information about the Unit

Topic: Energy

Type of Class: Chemistry

- **Grade level(s):** 10 11 High school basic elective/high track
- **Type of school:** Suburban
- **Tracking level:** College bound

Abstract

Prior to this lesson students will need to know how to balance chemical equations, know what ΔT stands for and how to calculate it, and knowing the difference between the prefixes exo- and endo-, especially when it refers to heat. The main thing from this unit is energy, especially chemical potential energy, which deals with chemical reactions. Energy in the form of heat can either be released or absorbed by the chemical reaction. In this unit we will describe the different ways to measure the heat absorbed and released and also the spontaneity of the reaction.

Big Ideas

- Energy
  - Potential, Chemical Potential, Kinetic
  - Law of Conservation of Energy
  - Work
  - Heat, Temperature
  - Exothermic & Endothermic Reactions
- Thermodynamics
  - First Law of Thermodynamics
  - Negative heat, energy decreases
  - Specific Heat, Heat Capacity
- Thermochemsitry
  - Enthalpy → endothermic vs. exothermic reation
  - Hess's Law
  - Enthalpy Diagrams
  - Entropy
  - Gibbs Free Energy

Objectives for Student Learning

Michigan Objectives	Type
C2.1a Explain the changes in potential energy (due to electrostatic interactions) as a chemical bond forms and use this to explain why bond breaking always requires energy. **C2.1b** Describe energy changes associated with chemical reactions in terms of bonds broken and formed (including intermolecular forces).	Content
C3.1a Calculate the ΔH for a given reaction using Hess's Law. **C3.1b** Draw enthalpy diagrams for exothermic and endothermic reactions. **C3.1c** Calculate the ΔH for a chemical reaction using simple coffee cup calorimetry. **C3.1d** Calculate the amount of heat produced for a given mass of reactant from a balanced chemical equation.	
C3.4A Use the terms endothermic and exothermic correctly to describe chemical reactions in the laboratory. **C3.4B** Explain why chemical reactions will either release or absorb energy.	
C3.4c Write chemical equations including the heat term as a part of equation or using Δ**H** notation. **C3.4d** Draw enthalpy diagrams for reactants and products in endothermic and exothermic reactions. **C3.4e** Predict if a chemical reaction is spontaneous given the enthalpy (Δ**H**) and entropy (Δ**S**) changes for the reaction using Gibb's Free Energy, Δ**G** = Δ**H** - TΔ**S** (Note: mathematical computation of Δ**G** is not required.) **C3.4f** Explain why some endothermic reactions are spontaneous at room temperature. **C3.4g** Explain why gases are less soluble in warm water than cold water.	

Assessment and Activities

- What is energy? Get prior knowledge and misconceptions out
- Exothermic and Endothermic Demonstrations
- Book Problems
- Calorimeter Lab
- Review
- Chapter Test