Chapter 6

Thermochemistry

These notes will provide additional information on an area of chemistry called thermochemistry (or thermodynamics). This is covered in Chapter 6 of Chemistry & Chemical Reactivity, 4th edition. It is assumed that you have read this material. These notes will provide a guide for studying the chapter and will help you follow along in the lecture.

Homework Questions
Chapter 6 in The Chemical World, pages 237-290
Chapter 6: 14, 16, 22, 23, 27, 29, 30, 34, 36, 39, 40, 41, 44, 47, 50, 52, 61, 68, 69, 70, 74
Thermodynamics is another topic that needs a lot of practice for you to understand it reasonably well.

Saunders Interactive General Chemistry CD-ROM
See Chapter 6 on the CD-ROM. Pay particular attention to specific heat capacity (Screen 6.7), heat associated with phase changes (Screen 6.11), enthalpy changes for chemical reactions (Screen 6.15), Hess’s law (Screen 6.16), and standard enthalpy of formation (Screen 6.17).

Chemistry Web Site
Available on this web site are the following materials that may help you better learn the concepts in this course:
• These lecture notes
• A bank of multiple choice questions
• The PowerPoint slides used in the lecture

For useful internet material on thermochemistry in introductory chemistry, see for example
• Saunders web site — recall that the username is “student” and the password is “curie.”
• http://proton.csudh.edu/lecture_help/startthermoequns.html (Cal State)
• http://www.public.asu.edu/~jpbirk/chpt05/sld001.htm (Arizona State)
• http://chemed.chem.purdue.edu/~genchem/topicreview/bp/ch5/workframe.html (Purdue University)
Thermochemistry

Thermochemistry is the study of energy transfer in chemical and physical processes.

Foods can oxidize readily in oxygen or in another strong oxidizing agent in a PRODUCT-FAVORED REACTION.

A PRODUCT-FAVORED REACTION is one

Other forms of energy are

1. 

2. 

Anions and cations can attract one another to form an ionic bond.

Atoms can attract one another to form a bond.
Atoms and molecules have kinetic energy owing to their motions —
Types of motions are
1.
2.
3.

Internal energy of a chemical system depends on
1.
2.
3.

We measure the change in internal energy of a system by measuring the

How is heat energy associated with molecular motion?

All of thermodynamics depends on the principle of

Why does the temperature increase in the surroundings of the hydrogen explosion?
The unit of energy used in science is called the joule: \[ 1 \text{ J} = \text{kg m}^2 \text{s}^{-2} \]

How does the HEAT CAPACITY of an object differ from the SPECIFIC HEAT CAPACITY?

Specific heat capacity =

What is special about the specific heat capacity of water?

How does the specific heat capacity of liquids in general differ from solids?

**PROBLEM:** If 25.0 g of Al cool from 310 °C to 37 °C, how much energy (J) is lost by the aluminum?
When there is a change of state, for example, the conversion of ice to water, does the process require energy or is energy given off?

Why do you put water on a fire?

When the system undergoes a phase change, does the temperature also change or does it remain constant?

Why?

Data required to do this calculation:

1.
2.
3.

Calculation