SC151 - CHAPTER 9 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should be able to:

Discuss the nature of energy by:

- giving examples of different forms of energy and examples of energy converting from one form to another.
- explaining the differences between energy (E) and work (w), between thermal energy and temperature (T), and between thermal energy and heat (q).

Apply the concepts of thermochemistry by:

- explaining the relationships among the following: system, surroundings, and universe; exothermic process and endothermic process; internal energy (E) and enthalpy (H); ΔE, ΔH, and q_p.
- explaining how an energy diagram such as those shown in Figures 9.2 and 9.3 of the text relate to the energy changes of chemical processes.
- associating the sign of ΔH with whether the process is exothermic or endothermic.
- using a thermochemical equation to calculate the quantity of heat involved in a reaction given the quantity of reactants and the enthalpy change for the reaction on a mole basis, or to calculate the amount of reactant needed to generate a given amount of heat.

Demonstrate an understanding of thermodynamics by:

- recognizing that energy (E), pressure (P), volume (V), temperature (T), and enthalpy (H) are state functions and that heat (q) and work (w) are not state functions.
- calculating the amount of work done when a gas changes volume at constant pressure using the equation $w = -P\Delta V$.
- stating the first law of thermodynamics in words and performing calculations using the mathematical equivalent of the first law ($\Delta E = q + w$).
- explaining the sign conventions for heat and work.

Apply the definition of a standard state, and calculate the standard enthalpy of reaction (ΔH^o_{rxn}) using:

- standard enthalpies of formation (ΔH^o_f) of reactants and products.
- Hess's law.
- calorimetry
    - explain the difference between heat capacity, specific heat and molar heat capacity, and converting among these quantities.
    - perform calorimetric calculations to determine heat capacities, temperature changes, or the amount of heat absorbed or released by thermal transfer or a chemical reaction.
    - use constant pressure data to calculate the enthalpy change of reaction (ΔH_{rxn}).