

After this chapter, you should be able to...

- Give a simple definition of energy
  - State some of the common forms of energy
- Explain what is meant by the "system" and the "surroundings" in a thermochemical experiment
  - Explain the difference between the three types of systems: Open, Closed, and Isolated
- Explain what is meant by an endothermic or an exothermic reaction
  - Explain how it is possible to determine whether a reaction is endothermic or exothermic, based on how it affects the temperature of the surroundings
- State and explain the first law of thermodynamics
- Explain *when* and *how*  $\Delta H_{\text{rxn}}$  is related to the heat produced or absorbed in a chemical reaction
- Interpret a thermochemical equation in terms of a change in enthalpy per mole of the reaction as written
  - Write conversion factors relating the number of moles of a specified reactant/product and the heat produced/absorbed during a chemical reaction
  - Explain why physical states of reactants/products need to be specified in a thermochemical equation
  - Calculate the change in  $\Delta H_{\text{rxn}}$  when a thermochemical reaction is multiplied by a factor, or reversed
  - Calculate the heat released (under constant pressure) when a given quantity of a reactant/product is consumed/produced in a chemical reaction
- Explain what a calorimeter is
  - Calculate how the heat absorbed/released by a substance is related to its temperature change, given its heat capacity, or its mass and its specific heat
  - Calculate the heat produced by a chemical reaction if it is performed inside a calorimeter
    - Calculate  $\Delta H_{\text{rxn}}$  from the temperature change of a calorimeter, and the amounts of reactant mixed
- Write the thermochemical reaction corresponding to the standard enthalpy of formation of a specified chemical substance

- Calculate  $\Delta H^\circ_{\text{rxn}}$  from standard enthalpies of formation
- Apply Hess' law to calculate  $\Delta H_{\text{rxn}}$  for a reaction, given  $\Delta H_{\text{rxn}}$  for several related reactions

Make sure you can solve all the assigned end-of-chapter homework problems!