

CHM 110: Chapter 5 Study Guide / Learning Objectives

Chapter 5 in OpenStax deals with thermochemistry - the study of the heat transfer in chemical reactions. The chapter provides the basic definitions of heat and energy and introduces a new way to write chemical equations that shows energy transfer. Enthalpy and Hess's Law are handy to calculate the energy transfer for a chemical reaction from literature data.

This chapter contains both terminology to learn and calculations to master. Practice the calculations before the test!

At the end of this chapter, you should be able to:

[Terminology]

- Define basic terms related to energy and energy units: **potential energy, kinetic energy, internal energy, joule, calorie.**
- Define basic terms related to heat transfer: **heat, heat/enthalpy of reaction, endothermic, exothermic, system, surroundings, enthalpy, thermochemical equation, heat/enthalpy of fusion, heat/enthalpy of vaporization.**
- Define basic terms related to the measurement of heat transfer: **heat capacity, specific heat, calorimetry, calorimeter, heat/enthalpy of formation.**

[Energy]

- Describe how energy is stored in chemicals.
- Distinguish between endothermic and exothermic reactions based on the **sign of Q**.
- Describe the changes in temperature resulting from endothermic and exothermic processes.
- Convert between different energy units given conversion factors.

[Heat/enthalpy of reaction]

- Explain why **phase labels** must be given in a thermochemical equation.
- List the conditions implied by "**standard state**".
- Calculate the heat transfer in a chemical reaction if you are given a thermochemical equation.
- Calculate the necessary amount of reagent or product produced to give a specified heat transfer.
- Find the **enthalpy of reaction** for a chemical reaction from enthalpies of formation, or find an **enthalpy of formation** based on other enthalpies of formation and the measured enthalpy of a reaction.
- Calculate the heat required to **change the temperature of an object or substance** using the **heat capacity** or **specific heat**.
- Calculate the heat/enthalpy of reaction from calorimetric data.

[Suggested review problems from the textbook]

- 3, 7, 11, 23, 25, 45, 49, 55, 69, 83