

## CHAPTER 14 LEARNING OBJECTIVES

To satisfy the minimum requirements for this course, you should master the following learning objectives.

Describe the properties of chemical equilibrium and be able to

- write the equilibrium expression ( $K_c$ , or  $K_p$  for gaseous reactions) for a balanced chemical equation.
- classify any equilibrium as heterogeneous or homogeneous.
- given a chemical reaction and its equilibrium constant, determine the new equilibrium constant when the reaction has been reversed or multiplied by a constant.
- numerically evaluate  $K_c$  and  $K_p$  from knowledge of the equilibrium concentrations (or pressures) of reactants or products, or from the initial concentration and the equilibrium concentration of at least one substance.
- interpret the magnitude of  $K_c$  and  $K_p$  and what this tells you about the composition of the equilibrium mixture.
- use  $K_p$  and  $K_c$  to calculate equilibrium concentrations (i.e., apply *ICE* tables).

Understand the relationship between kinetics and equilibrium.

Understand the concept of reaction quotient,  $Q$ , and by comparison with the value of  $K$

- determine whether a reaction is at equilibrium.
- predict in which direction a reaction will shift to reach equilibrium.

Explain how the relative equilibrium quantities of reactants and products are shifted by changes in temperature, pressure, volume, or the concentrations of substances in the equilibrium reaction (Le Chatelier's Principle).

Explain what effect the presence of a catalyst has on the position of equilibrium in a chemical system.

Understand the meaning of the Key Words on page 647.