

Unit 11: Equilibrium

adapted from http://www.phschool.com/advanced/lesson_plans/chem_brown_2003/index.html

Objectives:

- Understand the meaning of dynamic equilibrium.
- Write the equilibrium expression for any chemical reaction.
- Understand the meaning of the magnitude of the value of K_{eq} .
- Calculate K_{eq} when given appropriate data.
- Calculate Q , the reaction quotient, to determine if a reaction is at equilibrium and if not determine its direction.
- Knowing the value of K_{eq} and initial concentrations, calculate equilibrium concentrations.
- Explain how an equilibrium is shifted by stresses (changes in temperature, pressure, or concentration)—Le Chatelier's Principle.
- Explain how temperature changes the value of K_{eq} .
- Describe the effect of a catalyst on an equilibrium.

Key Words:

chemical equilibrium

homogeneous equilibria

law of mass action

heterogeneous equilibria

equilibrium expression

reaction quotient, Q

equilibrium constant, K_{eq} ,

Le Chatelier's Principle

Tips:

- A chemical equilibrium is dynamic, only the concentrations are constant.
- Solids and liquids are always excluded from equilibrium expression.
- Although K_{eq} has units, chemists usually do not express them.
- The change line in the ICE box must always have the same ratio as the coefficients in the balanced chemical equation.
- Temperature is the only factor that changes the value of K_{eq} .
- Pressure will shift an equilibrium if there are more moles of gas on one side of a reaction than the other. Pressure never changes the value of K_{eq} .

