LEARNING GOALS

**Big Idea:** Any bond or intermolecular attraction that can be formed can be broken. These two processes are in dynamic competition, sensitive to initial conditions and external perturbations.

**Essential Question:** How far will the reaction go before it “stops”?

**Objectives:**
- The student will be able to...
  - recognize that chemical reactions can be reversible at the atomic or molecular level
  - construct a mathematical expression that describes the equilibrium state associated with a chemical change in terms of concentrations (i.e. equilibrium constant expression)
  - discuss dynamic equilibrium
  - calculate the equilibrium constant, $K$, when given equilibrium concentrations of all substances
  - evaluate, qualitatively, whether a system at equilibrium favors reactants or products based on the magnitude of the equilibrium constant, $K$
  - compare the equilibrium state of a system to the state of a system at any point in order to predict the direction a system will shift in order to reach equilibrium by calculating the reaction quotient
  - calculate equilibrium concentrations when given initial concentrations using the ICE method
  - use Le Châtelier’s Principle to predict how equilibrium systems respond to a perturbation in concentration, temperature, volume/pressure, catalyst, inert gas (i.e. predict the direction of the shift resulting from various possible stresses on a system at chemical equilibrium)