

# Equilibrium— Demonstration Summaries and Concepts



## ***Equilibrium Water Games—A Classroom Activity***

Set up two water reservoirs containing different amounts of water and start bailing. What happens as students swap water from one container to another? Will the water levels keep changing? Will the water level eventually be the same in each container? This activity provides a simple and fun way to introduce key concepts relating to reversible reactions and equilibrium. Use the results of the activity to challenge student misconceptions and help them build a more accurate model of chemical equilibrium.

## ***Equilibrium in a Syringe—Solubility of CO<sub>2</sub>***

It's bubbly, it's a gas—it's equilibrium in a syringe! Use ordinary seltzer water, an acid–base indicator, and a large syringe to transform a common, gas-solubility phenomenon into an exciting, hands-on demonstration. Why is a solution of carbon dioxide gas in water acidic? How does the solubility of carbon dioxide change as the pressure or temperature is changed? Students observe the equilibrium in a syringe and measure the pH at different pressures and temperatures. The results demonstrate LeChâtelier's principle for a gas-phase reaction.

## ***Thionin—The Two-Faced Solution Chemical Demonstration***

A large beaker contains a bright purple solution. Place the beaker on an overhead projector that is half-covered with aluminum foil. Switch on the projector lamp and observe—half of the solution turns colorless, the other half remains purple. It's a two-faced solution! This demonstration provides an unusual example of a reversible reaction and the conversion of light energy to chemical energy.

## ***An Overhead Equilibrium—Chemical Demonstration***

A colorless solution turns dark red when a colorless solution or a white solid is added. The color disappears when a second white solid is added, only to reappear if the process is repeated. The familiar complex-ion equilibrium of iron(III) and thiocyanate ions is enhanced by carrying out the demonstration in a Petri dish on an overhead projector. Interesting patterns develop as the ions diffuse in solution and the reagents mix. It's like seeing the reaction in slow motion!

## ***Pink and Blue—A Colorful Chemical Balancing Act Demonstration***

Reveal the power of balance in a reversible chemical reaction! The classic equilibrium of pink and blue cobalt complex ions responds instantly and reversibly to changes in reaction conditions. Use this demonstration to illustrate the effects of concentration and temperature changes on the equilibrium for an endothermic chemical reaction. The results will help students recognize the dynamic nature of chemical equilibrium.

### **Concepts**

- Reversible reactions
- Equilibrium
- Equilibrium constant
- LeChâtelier's principle
  
- Equilibrium
- LeChâtelier's principle
- Gas solubility
- Acid–base indicator
  
- Reversible reactions
- Photochemistry
- Oxidation–reduction
  
- Complex-ion reaction
- Chemical equilibrium
- LeChâtelier's principle
  
- Reversible reactions
- Chemical equilibrium
- LeChâtelier's principle
- Equilibrium constant