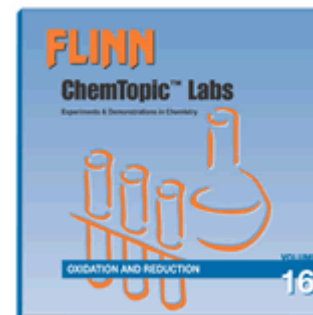


Oxidation and Reduction— Demonstration Summaries and Concepts



UV-Sensitive Paper—Blueprint for Chemical Change

Prepare special “blueprint” paper by soaking filter paper with iron(III) oxalate and potassium ferricyanide. Exposing the paper to UV light from the sun initiates a photochemical redox reaction, resulting in the formation of iron(II) ions and Prussian blue, which turns the paper dark blue. This fun activity demonstrates the role of light-activated reactions in blueprinting and photography. Images appear in just minutes and are permanent.

Fantastic Four-Color Oscillator—Redox Demonstration

Students won’t believe their eyes as they watch this amazing oscillating reaction! Ce^{4+} ions from the catalyst engage in a great see-saw battle with Fe^{2+} ions from a redox indicator, and the color of the solution changes from green to blue to purple to red over and over again for almost an hour. A perfect backdrop for your discussion of oxidation–reduction reactions and reaction pathways.

The Can Ripper—The Power of Chemistry

Show the power of chemistry by tearing apart an aluminum soda can with little effort. Just score the inside of a soda can to break the plastic lining, add some copper(II) chloride and water, and sit back—chemistry will do the rest. The single replacement reaction of aluminum metal with copper(II) ions “dissolves” the aluminum from the inside out. With only the paint on the outside of the can holding it together, the can will rip apart with just a firm twist.

The Floating Tin Sponge—A Double Redox Demonstration

Create a “floating tin sponge” by reacting zinc metal with an acidic tin(II) chloride solution. Competing single replacement reactions of the zinc metal give rise to hydrogen gas and a beautiful lattice of tin crystals on the surface of the zinc. Buoyed by the hydrogen gas bubbles, the resulting tin “sponge” bobs, rises, and finally floats to the surface.

Oxidation States of Vanadium—The Beauty of Chemistry

Vanadium, element 23, was named after Vanadis, the Norse goddess of beauty, because of its beautiful multicolored compounds. Like most transition metals, vanadium forms compounds in many different oxidation states, each one a different color. Stirring a solution of ammonium metavanadate with zinc metal initiates a sequence of bright color changes—from yellow to green to blue to purple—as the vanadium(V) is reduced in a stepwise process down to vanadium(II). Adding hydrogen peroxide reverses the sequence of color changes as the vanadium(II) is re-oxidized.

The Silver Mirror Award—Silverplating Demonstration

Reward student achievement or creativity with the “silver mirror award,” a beautiful silver-mirrored flask that you create in the lab by the reduction of silver ions with dextrose. Combine four solutions in a flask, swirl, and voilà—a thin, highly reflective silver coating plates out on the inside of the flask. The process “mirrors” the way silver mirrors are actually produced!

Concepts

- Oxidation–reduction
- Photochemistry
- Catalysts
- Oxidation–reduction
- Oscillating reaction
- Redox reaction
- Activity of metals
- Single replacement reactions
- Oxidation–reduction
- Activity of metals
- Redox reaction
- Oxidation state
- Transition metals
- Oxidation–reduction
- Reducing sugars