

Elements, Compounds, and Mixtures—Preface

Chemistry is a material science! Since earliest times, people have sought to understand nature and the universe by observing and measuring the properties of matter. Classifying matter—knowing the elements, analyzing compounds, and separating mixtures—has long been the heart of chemistry and remains an important stepping-stone for further study of the concepts and principles of modern chemistry. The purpose of *Elements, Compounds, and Mixtures*, Volume 2 in the Flinn ChemTopic™ Labs series, is to provide high school chemistry teachers with laboratory activities that will help students understand the basic concepts that are the foundation of chemistry as a modern material science. Five experiments and three demonstrations allow students to compare the properties of metals, nonmetals, and metalloids, investigate the composition of simple compounds, and separate and identify the components in mixtures. Four “Classifying Matter Worksheet” activities have also been included to help teachers assess student understanding of these concepts. Please see *Introduction to Chemistry*, Volume 1 in the Flinn ChemTopic™ Labs series, for additional beginning-level activities—the scientific method, measurement, density, and physical versus chemical changes.

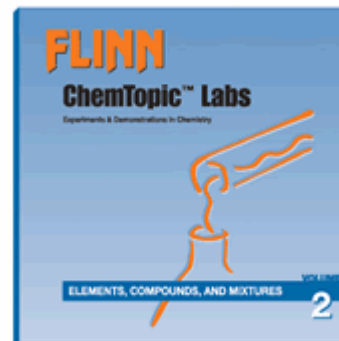
Elements and Compounds

If elements are the building blocks of matter, then the properties of the elements govern all that we hope to build! Whether it's high-strength aluminum for jumbo aircraft or ultra-pure silicon for sleek consumer electronics, all of the elements have unique physical and chemical properties that make them useful in our everyday lives. In “Properties of Elements,” students study the physical and chemical properties of eight elements, sort them into groups, and classify the elements as metals, nonmetals or metalloids. Use this microscale experiment to set the stage for independent student research projects, such as element “biographies,” on the discovery of the elements, their distribution in nature, and their uses. Together, elements and compounds make up what chemists call “pure substances.” What characteristics of a compound make it a pure substance? In “Percent Water in a Hydrate,” students investigate the law of definite proportions by analyzing the percent water in a crystalline hydrate. The hydrate is then identified by comparison with the percent water calculated for a series of possible unknowns.

Physical and Chemical Changes

Classifying matter often hinges on a key question—how is the composition of the substance affected by a physical or a chemical change? The “Polyurethane Foam” demonstration, a real crowd favorite, provides a showcase for interesting physical and chemical changes. The polymer product, a rigid

yet lightweight foam, is also an amazing modern material! In “Separating a Mixture by Filtration,” students use a combination of physical and chemical changes to separate a mixture of charcoal and salicylic acid and determine the composition of the mixture.



Mixtures versus Pure Substances

Chromatography and distillation are key methods for identifying mixtures versus pure substances and separating the components in a mixture. Chromatography is especially popular in high-school chemistry. In the “Paper Chromatography” experiment, the results are literally “written in color” when students analyze the composition of different inks. This traditional lab has been adapted to give a wonderful, inquiry-based activity in the “Chromatography Challenge.” By investigating the color patterns produced by radial chromatography of different inks and ink spots, students have to reproduce an original art chromatogram created by the teacher. Take a look at the color photos of the art of radial chromatography on the inside back cover—are your students ready for the challenge? There is also a thin-layer chromatography demonstration, “Analysis of Dye Mixtures.” The principles and practice of distillation are presented in the demonstration “Simple Distillation.”

Safety and Success

Chemistry is an experimental science! Depend on Flinn Scientific to give you the information and confidence you need to work safely with your students and help them succeed. As your safer source for science supplies, Flinn Scientific promises you the most reliable safety information for every potential lab hazard. Whether you are looking for an updated classic or a creative new approach, our labs offer you safe solutions and practical alternatives. The selection of experiments and demonstrations in *Elements, Compounds, and Mixtures* gives you the ability to design an effective lab curriculum that will work with your students and your resources in your classroom. Best of all, no matter which activities you choose, your students are assured of success. All of the activities in *Elements, Compounds, and Mixtures* have been thoroughly tested and retested. You know they will work! Use the experiment summaries and concepts on the following pages to locate the concepts you want to teach and to choose experiments and demonstrations that will help you meet your goals.

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P.O. Box 219, Batavia, IL 60510
1-800-452-1261 • Fax: (866) 452-1436
E-mail: flinn@flinnsci.com • Website: www.flinnsci.com