

# Introduction to Chemistry—Preface

The study of chemistry begins in the lab! The purpose of *Introduction to Chemistry*, the first volume in the Flinn ChemTopic® Labs series, is to provide high school chemistry teachers with laboratory activities that will successfully introduce students to the study of chemistry. *Introduction to Chemistry*—a collection of six experiments and five demonstrations—will allow you to focus on key concepts and skills and to build a solid foundation for student achievement.

## Observation, measurement, and classification

The experiments and demonstrations revolve around three themes—observation, measurement, and classification—that describe how scientists do science and, more importantly, how students learn chemistry. These themes provide the framework for achieving specific learning goals and objectives that are found in the first two chapters of most high school chemistry textbooks.

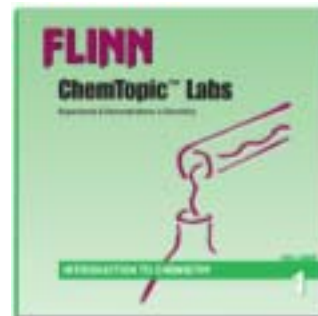
## Observe and question

The scientific method is an inquiry method. In order to be successful in learning chemistry, students must learn to ask “testable” questions. The questions that students ask about what they do in lab and read or hear in lecture will allow them to build their own conceptual framework for understanding chemistry. In the first experiment, “Observation and Experiment,” students hold an experiment in their hands, literally, as they observe and ask questions, design controlled experiments to answer their questions, collect data, and analyze and summarize the data. These critical thinking skills are the backbone of local and national standards for science education. In “A Burning Candle” demonstration students hone their observational skills as they compete to identify more than 100 observations of a “simple” burning candle.

## Measure and analyze

Three experiments develop essential student knowledge and skills in measurement. In “Introduction to Measurement,” students make measurements using the metric system, learn how significant figures arise from uncertainty in measurement, and compare the accuracy and precision of laboratory measurements. In “Discovering Density,” students collect mass and volume data for a set of metal objects, then plot the data to discover the relationship between the measurements and analyze the trend. In “Beverage Density Lab,” an applied chemistry activity, students measure the density of five reference solutions containing different amounts of sugar. They then plot density versus percent sugar concentration to

obtain a near-perfect “calibration curve” that can be used to analyze the percent sugar in juices, sodas, and sports drinks. Students begin to make vital connections between chemistry and the real world as they learn to read nutrition labels on food items. The “Reading Volumes” and “Mass vs. Density” demonstrations illustrate the concept of significant figures and probe student misconceptions of mass and density, respectively.



## Classify and organize

Without the ability to classify and organize information, students will think chemistry is a collection of thousands of unrelated facts. “Classifying Matter” is a nuts-and-bolts demonstration, literally, that lets students imagine what elements, compounds, and mixtures look like on the atomic or molecular level. “Separation of a Mixture” is a classic inquiry-based experiment. Students examine the properties of substances and design a procedure to analyze a mixture. “What Is a Chemical Reaction?” is a microscale experiment that reveals similarities, differences, and patterns in the chemical behavior of matter. All of these activities serve as an excellent introduction to classifying matter and its physical and chemical properties.

## Safety, flexibility and choice

Start with safety! “Acid in the Eye” is a safety demonstration that will leave your students with an unforgettable impression of the necessity of wearing goggles whenever chemicals, heat, or glassware are used in the lab. Each experiment and demonstration reinforces key elements of lab safety. All safety guidelines have been thoroughly researched and are explained in detail. *Introduction to Chemistry* gives you the flexibility you need to tailor a safe and effective lab program to the needs of your students. Do you have a diverse classroom with many different learning styles and backgrounds? Start with “Observation and Experiment” and “Introduction to Measurement” to lay common ground. Do your students have a solid background in the scientific method and the metric system? Start with “Discovering Density” to reinforce measurement, graphing and analytical skills. Do your students know the definitions but not how to apply them? Try the “Mass vs. Density” and “Classifying Matter” demonstrations to challenge their thinking. Use the experiment summaries and concepts to locate the concepts you want to teach and to choose experiments and demonstrations that will help you meet your goals.