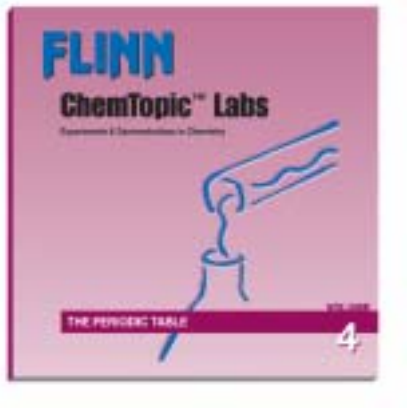
The Periodic Table—Preface



Everything you ever wanted to know about chemistry is in the periodic table! From its discovery more than 125 years ago, the periodic table has served as both the most recognized symbol of chemistry across the world and the most important tool for understanding the chemistry of the elements. The purpose of The Periodic Table, Volume 4 in the Flinn ChemTopic® Labs series, is to provide high school teachers with laboratory activities that will allow students to discover for themselves key principles of the periodic law for the classification of elements. The Periodic Table is a collection of four experiments and five demonstrations/activities that take students on a guided tour of the periodic table—its discovery, predictions, and applications. Students learn about the discovery of the periodic table, the existence of trends or relationships among the elements that can be used to predict the properties of related or unknown elements, and the organization of elements into groups and periods based on similarities, differences, and trends in their properties.

Analyze and discover

Dmitri Mendeleev's discovery of the periodic table provides an interesting parallel to the struggles students experience as they confront the rapidly expanding body of knowledge in modern chemistry. More than 60 elements were known to Mendeleev, along with a great many facts about their properties. What was missing was a way to organize these facts, a way to understand how individual facts related to each other. "It's in the Cards" is an inquiry-based lab activity that allows students to reenact Mendeleev's discovery of the periodic law. Students analyze known facts about the elements using a special set of element cards that summarize the properties of elements, but not their names or identities. As students arrange and rearrange the element cards based on logical and repeating trends in some of the properties, they discover the nature and importance of the periodic law. "Plotting Trends" is a cooperative activity that allows students to analyze quantities that are too small to be seen or measured directly. Students use miscroscale reaction plates and straws to build three-dimensional models and discover periodic trends.

Classify and predict

Dmitri Mendeleev was not the first scientist to recognize relationships among the elements and classify them into groups. He was, however, the first to predict the existence and properties of missing elements when the elements were arranged in order of increasing atomic mass. In "Density Is a Periodic Property," students re-create the excitement that followed the prediction and discovery of Mendeleev's missing elements. Students measure mass and volume data for three elements, calculate their densities, then graph and analyze the results to predict the density of germanium, Mendeleev's missing element in the Group IV family of elements. "The Ultimate Element Crossword" is a paper activity that tests student knowledge of the elements, their classification, and their uses in modern society.

Recognize and explain

Similarities and differences among the elements give rise to so-called periodic trends, both across rows and within columns of the periodic table. Recognizing periodic trends in the physical and chemical properties of the elements is key to understanding the full value of the periodic table. "Periodic Trends and the Properties of Elements" is a microscale experiment in which students compare the reactions of the alkaline earth metals and identify the trend in metal activity both within a group and across a series. Two complementary demonstrations—"Periodic Activity of Metals" and "Safe Swimming with Sodium"—illustrate the spectacular reactions of the more active alkali metals. In "All in the Family," students investigate the periodic trend in the activity of nonmetals within the halogen group. The "Solubility Patterns" chemical demonstration explores the solubility pattern of alkaline earth metal compounds.

Safety, flexibility and choice

Depend on Flinn Scientific to give you the information and confidence you need to work safely with all chemicals, including reactive metals and halogens. *The Periodic Table* offers true flexibility and choice to meet the needs of a diverse student body in diverse settings. Do you have a group of students who think chemistry means memorizing lots of isolated facts? "It's in the Cards" will challenge these students—there are no right or wrong answers! Two experiments explore similarities and differences within families of elements. "Periodic Trends and the Properties of Elements" is more straightforward; the reactions are easy to see and understand. "All in the Family" is more challenging, because students have to think about what they are seeing and what the observations mean. Students who are visual learners will benefit from the opportunity to build three-dimensional models of periodic trends in "Plotting Trends." Using "The Ultimate Element Crossword Puzzle" means you don't have to leave behind the students who love the language arts. 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.