

Chemical Reactions—Preface

Chemical reactions are the lifeblood of chemistry and, increasingly, of our modern world as well. The synthesis of life-saving drugs is but one example of the remarkable power of chemical reactions—the power to transform reactants into products with new and useful properties. The purpose of *Chemical Reactions*, Volume 6 in the Flinn ChemTopic™ Labs series, is to provide high school chemistry teachers with laboratory activities that will help students recognize, identify, and classify chemical reactions. A total of eleven experiments and demonstrations allow students to observe a wide variety of different chemical reactions and to develop the “chemical literacy” skills they need to be successful in chemistry.

Observing and Classifying Reactions

Observing the properties of reactants and products is a key step in identifying chemical reactions. Some of the observations that may be associated with a chemical reaction include color changes, release of a gas, formation of a solid, and production of heat and light. All of these “signs” of a chemical reaction come together in the “Foiled Again!” demonstration, the reaction of aluminum metal with copper(II) chloride. This demonstration offers a perfect starting point for the study of chemical reactions—the observations are clues that will help students predict the products of the reaction. Observing the signs of a chemical reaction is also the starting point for “Classifying Chemical Reactions.” In this experiment, students perform eight chemical reactions, identify patterns in the conversion of reactants into products, and classify the reactions into different groups. Classifying chemical reactions helps students make sense of the great variety of chemical reactions and allows them to explain what chemical reactions will occur when different substances are mixed. The demonstration “Chemical Reactions Primer” provides an alternative or supplementary activity that can be used for the same purpose. This activity features a second set of eight chemical reactions—use them to design a collaborative classroom project on chemical reactions or to assess student understanding of how reactions are classified.

Chemical Reactions and the Principles of Chemistry

The principles and applications of chemistry reflect the principles and applications of chemical reactions! The central role of chemical reactions in the study of chemistry is examined in three experiments. In “Double Replacement Reactions and Solubility,” students carry out a series of double replacement reactions, observe which combinations produce precipitates, and analyze the results to formulate general rules of solubility

for ionic compounds. In “A Four-Reaction Copper Cycle,” students carry out a sequence of chemical reactions that starts with copper and ends with copper. The reactions demonstrate the properties of copper and its compounds and provide additional examples of how reactions are classified. Finally, in “Chemical Reactions and Qualitative Analysis,” students design and carry out a series of chemical reactions to separate and identify iron(III), silver, and zinc ions in water.



Chemical Reaction Highlights

Recognizing chemical reactions and “translating” them into chemical equations are important skills. But chemical reactions are not formulas on a piece of paper. They are dynamic and exciting events! Some of the most exciting examples of chemical reactions have been compiled in the *Demonstrations* section of this book. There’s a combination reaction that produces enough heat to fry an egg (“The Chef”), a decomposition reaction that erupts in a cascade of steaming foam (“Old Foamey”), and an oxidation reaction that gives off an eerie blue light and glows in the dark (“Cool Light”). Finally, there is an oscillating reaction that seems to defy logic and proves chemistry still has the power to surprise (“The Yellow and Blue Switcheroo”).

Safety, Flexibility, and Choice

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 complete, reliable, and practical safety information for every potential lab hazard. The selection of experiments and demonstrations in *Chemical Reactions*—combined with complete sample data and extensive teacher notes—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 *Chemical Reactions* 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.