

Chemical Bonding— Experiment Summaries and Concepts



Properties of Solids—Structure and Bonding

Looking for patterns in the properties of different substances can help students understand how and why atoms join together to form compounds. What kinds of forces hold atoms together? How does the nature of the forces holding atoms together influence the properties of a material? The purpose of this experiment is to study the physical properties of common solids and to investigate the relationship between the type of bonding in a substance and its properties.

Formula of an Ionic Compound—Balancing Charges on Ions

Atoms of different elements combine with one another to form compounds. The empirical formula of an ionic compound indicates the kinds of atoms that are present in the compound and their relative ratio. The purpose of this microscale experiment is to determine the empirical formula of an unknown ionic compound. Students carry out a series of precipitation reactions by mixing two solutions in different ratios. The amount of precipitate obtained in each reaction is measured and plotted against the volume ratio of reactants to find the empirical formula of the product.



Lewis Structures and Molecular Geometry—Models of Covalent Bonding

Molecules have shape! The structure and shape of a molecule influences its physical properties and affects its chemical behavior as well. The purpose of this activity is to practice drawing Lewis structures of molecules and examine molecular models to visualize the three-dimensional structures of molecules. Words and pictures on a printed page are no substitute for models that students can hold in their hands, rotate, turn upside down, even take apart and put back together again. Students develop the spatial reasoning skills required for success in chemistry as they discover how atoms join together to make molecules.

The Color of Chemistry—Dyes, Dyeing, and Chemical Bonding

What is your favorite color? Color affects our senses, our moods, even our learning. In this experiment, students investigate the interaction of a variety of dyes with a special multifiber test fabric containing strips of wool, acrylic, polyester, nylon, cotton, and acetate. The brilliant color patterns produced by different dyes teach students about the chemical structures of dye and fabric molecules and the types of bonding interactions between them.

Concepts

- Chemical bonds
- Ionic bonding
- Covalent bonding
- Metallic bonding

- Ionic compounds
- Empirical formula
- Polyatomic ions
- Precipitation reaction

- Valence electrons
- Covalent bonding
- Lewis structures
- VSEPR theory

- Chemical bonding
- Ionic bonds
- Polar vs. nonpolar bonds
- Hydrogen bonding