

Bonding and Balloons Lab

Molecular Geometry



Introduction

The shapes of covalent bonded molecular compounds can be modeled using balloons. The shapes are difficult for many learners to visualize. The balloons are better (and cheaper) than using traditional ball and stick model kits.

In this activity, the balloons represent pairs of electrons—electron clouds—not, atoms.

Concepts

- Covalent bonding
- VSEPR theory

Materials (for each demonstration)

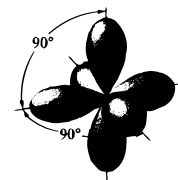
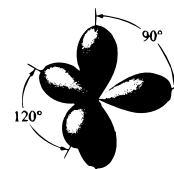
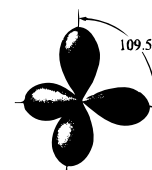
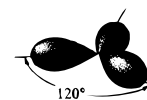
7-inch balloons, 4

Safety Precautions

The materials used in this activity are considered nonhazardous. However, some students might have a latex allergy. Check for sensitivities before beginning this activity.

Procedure

1. Predict the shapes for covalent compounds with 2, 3, and 4 atoms bonded to a central atom (AB₂, AB₃, AB₄).
2. Inflate and tie off four balloons to about equal size.
3. Using two balloons, twist together the necks of the balloons so they will temporarily remain together. Do not tie them in a knot. Draw and describe the resulting structure. Did your earlier prediction match the structure formed?
4. Add a third balloon to the previous two, by twisting its neck with the others. Draw and describe the resulting structure. Did your earlier prediction match the structure formed?
5. Add a fourth balloon to the cluster by twisting its neck into the others. Draw and describe the resulting structure. Did your earlier prediction match the structure formed?
6. Carefully flatten the four-balloon cluster into a +-shape. Collide your structure into a partner's similar structure. Describe what happens and explain why you believe it occurred.
7. Disassemble the balloons and place them in the bag.



Disposal

The balloon may be reused or disposed of in the trash.

Discussion

Molecular geometry and hybridization are important bonding concepts that require a visual understanding. The use of balloons to represent orbitals and electron pairs can greatly facilitate this learning. The use of the orbital holder makes the rearrangement of balloons much easier and quicker than tying them together manually. Once the concept of molecular geometry has been demonstrated with balloons, further study of bonding concepts with the use of traditional molecular models is successful.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Systems, order, and organization

Evidence, models, and explanation

Content Standards: Grades 5–8

Content Standard B: Physical Science, properties and changes of properties in matter

Content Standards: Grades 9–12

Content Standard B: Physical Science, structure of atoms, structure and properties of matter

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Bonding and Balloons Lab* activity, presented by Steve Long, is available in *Molecular Geometry*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Bonding and Balloons Lab* are available from Flinn Scientific, Inc.

| Catalog No. | Description |
|-------------|------------------------------------|
| AP1900 | Balloons, 129 Round, Latex, 20/Pkg |

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.