

# Building Molecules Laboratory: Sharon Walton

## Students' Guide

### Goals

- To build a model showing molecular geometry using balloons
- To visualize shapes of the orbitals by the VSEPR theory

### The Activity

You will build models of molecules from balloons, compare it to structures depicted by the VSEPR theory, and learn to make predictions about molecular structure.

### Materials for Each Group

- Balloons
- String and scissors
- Worksheet

### SAFETY

No special safety considerations are required.

### Instructions

Inflate a number of balloons, according to the numbers of electron pairs, as described in the table. Tie the balloons as tight as you can using piece of string.

Fill in the geometric figures for all possible structures in the table by altering the number of non-bonding electron pairs for each electron configuration.

Draw in the "configuration of bonds" column, the shape of the molecules you get from your balloons, including the central atom, the bonded atoms, and non-bonding pairs.

Give examples of molecules that fit into each category.

# of e-pairs	Config. of e- pairs	# of nonbonding e-pairs	Class of molecule	Config. of bonds	Examples of molec.	Predicted bond angle
2	Linear	0	AX <sub>2</sub>	X-A-X	BeH <sub>2</sub> , BeCl <sub>2</sub>	180°
3	Equilateral Triangular	0	—	—	—	—
—	—	1	—	—	—	—
4	Tetrahedral	0	—	—	—	—
—	—	1	—	—	—	—
—	—	2	—	—	—	—
—	—	3	—	—	—	—
5	Trigonal Bipyramid	0	—	—	—	—
6	Octahedron	0	—	—	—	—

### Summary

What can you say about the geometric properties of the different molecules?

Use the table to predict the structures of  $\text{H}_2\text{O}$ ,  $\text{H}_3\text{O}^+$ ,  $\text{PCl}_3$ ,  $\text{BCl}_3$ ,  $\text{SiH}_4$ ,  $\text{BH}_4^-$ ,  $\text{H}_2\text{S}$ ,  $\text{SCl}_2$ ,  $\text{NH}_4^+$ ,  $\text{BeH}_2$ ,  $\text{BeH}_4^{2-}$ .

(Taken from Gillespie, R.J., Humphreys, D.A., Baird, N.C., Robinson, E.A. (1986), Chemistry, Allyn & Bacon, Inc., London, p: 309.)