Module 4: Bonding, Formula Writing, and Nomenclature
Topic 6 Application: VSEPR Scientific Investigation

Before you begin the scientific investigation below, make sure to download the VSEPR Scientific Investigation Report. As you complete this scientific investigation, fill in any needed information on the report template. If you need more information about each section of the report, please visit the Developmental Module.

Introduction

The VSEPR theory explains that bonding and non-bonding pairs of atoms will always try to be as far apart as possible. This is because of their like charges, which repel one another. In this activity, you will investigate the VSEPR theory using balloons to represent atoms.

Objectives

In this scientific investigation, you will:

- construct molecules with two, three, and four bonds; and
- relate the arrangement of each group of balloons to a VSEPR shape.

Hypothesis

Using the Procedure and Data Collection section below, read through the procedural information for this scientific investigation. Based on your understanding of the procedure, develop your own hypotheses which describe your expected results. Specifically, how do you think the arrangement of each group of balloons will relate to a VSEPR shape? Record these hypotheses in the Hypothesis section of your VSEPR Scientific Investigation Report.

Equipment and Materials

- Nine Round Balloons

Procedure and Data Collection

1. Blow each balloon to approximately the same size and tie each balloon closed with a knot.
2. Take two of the balloons and tie them together. Make sure their “knots” are touching.
3. Take three of the balloons and tie them together. Make sure their “knots” are touching.
4. Take the remaining four balloons and tie them together. Make sure their “knots” are touching.
5. Make sure that the balloons are as far apart from each other as possible, just like electron pairs around a central atom in a compound.
6. In the Data section of your VSEPR Scientific Investigation Report, take a digital photo of each of the balloon groups and paste them into the area provided, or create a perspective drawing of each of the balloon groups.

Data Analysis

In the Data Analysis section of your VSEPR Scientific Investigation Report, provide responses to the following questions:

1. Explain VSEPR theory and how it is used to predict the shapes of molecules.
2. Relate the arrangement of each group of balloons to a VSEPR shape.

3. For the grouping of three balloons, discuss the following shapes:
    a. All balloons are bonding pairs
    b. One balloon is unshared
4. For the grouping of four balloons discuss the following three shapes:
    a. All balloons are bonding pairs
    b. One balloon is unshared
    c. Two balloons are unshared

Conclusion

Using the Conclusion section of your VSEPR Scientific Investigation Report, compose three to four sentences describing an overall conclusion based on your data. Were your hypotheses true or false, and how do you know? Use the data and notes that you collected from your investigation to form your conclusion. Make sure that you include information that you gained from data analysis to support your conclusion.

Experimental Sources of Error

On your VSEPR Scientific Investigation Report, provide responses to the following questions: Are there any sources of error? If so, what are they, and what could be done to minimize error?

Once you have completed your VSEPR Scientific Investigation Report, please submit your work to the dropbox.