

Covalent Molecules

Formulas and Molecular Models

Learning Target

Describe how the VESPR theory helps predict the shapes of molecules.
Identify the information a molecular formula provides.

Introduction

The molecular model kit you will use in this activity uses different colored spheres to represent different kinds of atoms, as well as sticks and springs, used to connect the spheres, which represent covalent bonds (shared pairs of electrons). This lab will help you visualize the shapes that molecules have, as well as allow you to practice determining their structures.

Procedure

1. Complete the first four columns in Chart 1 below.
2. Each of the colored spheres has a specific number of holes. Each hole represents one covalent bond that must be formed in order to achieve stability. Use this information to complete column 5 in Chart 1.
3. Select a sphere with the required number of holes for each of the atoms listed in the chart and record the color. You will need a lot of hydrogens for this lab, so select an appropriate color which has a large number of spheres. For chlorine, select a color which has at least three spheres.
4. For each molecule in Chart 2, draw the electron dot structure.
5. Select the spheres from the model kit needed to make each molecule. Make the molecule and do your best to draw a 3D picture of the molecule in the chart. Have EACH MOLECULE checked by your teacher.

Chart 1

Atom	# of Valence Electrons	Electron Dot Symbol	# of additional e- Needed to Become Stable	# of Covalent Bonds Formed	# of Holes Needed in Sphere	Color of Sphere
Hydrogen						
Chlorine						
Oxygen						
Nitrogen						
Carbon						

Chart 2

Molecule Name	Molecular Formula	Electron Dot (or Line) Structure	3D Shape	Shape Name
Hydrogen	H_2			
Chlorine	Cl_2			
Hydrogen Chloride	HCl			
Water	H_2O			
Methane	CH_4			
Chloroform	$CHCl_3$			

Molecule Name	Molecular Formula	Electron Dot (or Line) Structure	3D Shape	Shape Name
Methyl Alcohol	CH ₃ OH			
Ammonia	NH ₃			
Nitrogen trichloride	NCI ₃			
Ethane	C ₂ H ₆			
Hydrazine	N ₂ H ₄			
Hydrogen Peroxide	H ₂ O ₂			

Name: _____

Molecule Name	Molecular Formula	Electron Dot (or Line) Structure	3D Shape	Shape Name
Methylamine	CH_3NH_2			
Oxygen	O_2			
Carbon dioxide	CO_2			
Ethylene	C_2H_4			
Nitrogen	N_2			