

Building Atomic Structure: Covalent Molecule

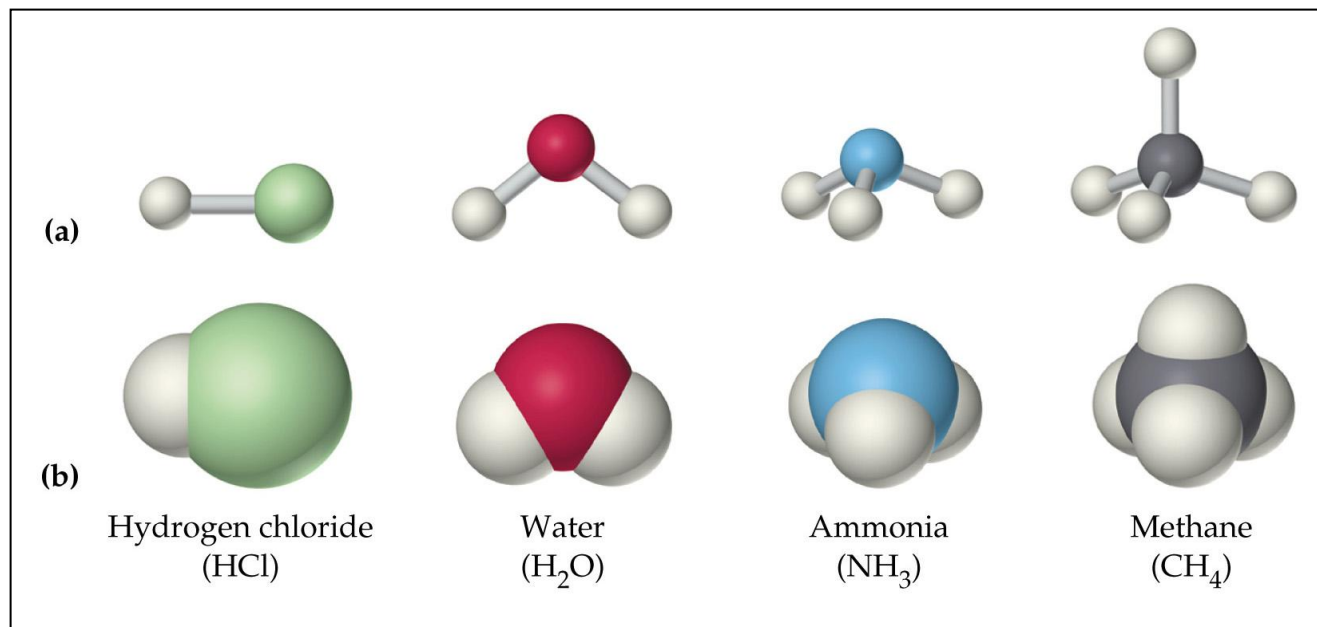
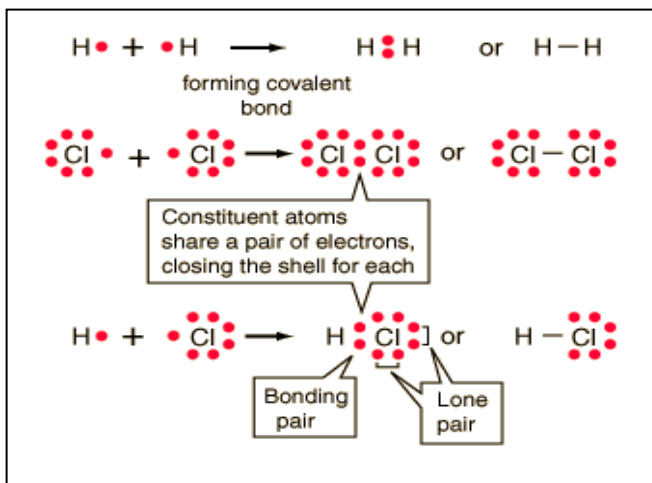
Lewis dot structure is a way to show a molecule using dots to represent valence electrons. In a covalent bonding, the atoms share a pair of electrons. That pair is referred to as a bonding pair. The pairs of electrons which do not participate in the bond is called "lone pairs" or non-bonding pairs.

In simpler structural formula, a single bond can be represented a single line. See the diagram on the right. Don't forget to draw in all the lone pairs.

In determining the 3D shapes of molecule, electron-electron repulsion must be considered.

In more technical term **Valence shell electron pair repulsion (VSEPR) theory**.

What the theory states is that the valence electrons surrounding the atom will mutually repel each other and will adopt an arrangement that minimize the repulsion in determining the shape of the molecule. Four major shapes that will be discussed in our class are **linear**, **bent**, **trigonal pyramid**, and **tetrahedral**. See the diagram below and label with your teacher.



Activity:

Part 1. Demonstration: Your teacher will show how the electrons repel each other to form the 3D shapes.

Part 2. Your instructor will guide you in how in constructing the ball and stick model. You will share a modeling kit with your partner at your desk. Please complete the table below and construct ball and stick model to determine 3D shapes.

Table 1. Various way to represent covalent molecules

Chemical Formula	HCl	H ₂ O	NH ₃	CH ₄
Structural Formula				
Ball & Stick Model				
3D Shape (Name)				

Questions:

1. Why does water molecule (H₂O) assume the bent shape instead of a linear shape?

2. Complete the following table. You need to construct molecules

Chemical Formula	SCl ₂	CCl ₄	OF ₂	F ₂
Structural Formula				
Ball & Stick Model				
3D Shape (Name)				