

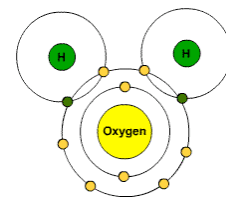
Chp 14: Lect 3: Chemical Bonding

2 pts ec printing

Part 3: Covalent Bonds, Chemical Formulas, Structural Diagrams

Bond with me

A chemical bond forms when atoms _____ or _____. For example, in a water molecule, each hydrogen atom shares its single electron with the oxygen at the center. This way, all of the atoms are happy with full shells. Almost all elements form chemical bonds easily - which is why most matter is found in compounds.



Types of bonds

There are a couple different types of bonds. 1. _____ Bond, 2. _____ Bond, 3. _____ Bond. Today we are going to just talk about covalent bonds.

Covalent Bonds

What is a covalent bond? A bond formed by _____. Also, _____ are groups of atoms

COVALENT BONDS:
electrons are shared.

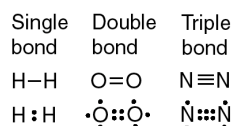


that are held together by covalent bonds in a specific ratio & shape.

A _____ is formed when atoms _____ electrons. The bonds between oxygen and hydrogen in a water molecule are covalent bonds. There are two covalent bonds in a water molecule, between the oxygen and each of the hydrogen atoms. Each bond represents one electron. In a covalent bond, electrons are _____ between atoms, not transferred.

“M” is for Molecule

A group of atoms held together by covalent bonds is called a _____. Water is a molecule, and so is sugar. Other examples of molecules are methane (CH₄), ammonia (NH₃), oxygen (O₂), nitrogen (N₂).



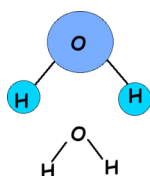
Fancy Bonding

Sometimes, atoms share more than one electron. Occasionally, they can share 2 or even 3 electrons. These are called _____ and _____ bonds.

Chemical Formulas

Molecules are represented by a _____. The chemical formula tells you the _____ of each kind of atom in the molecule. For example, the chemical formula for water is H₂O. The _____ 2 indicates there are two hydrogen atoms in the molecule. The chemical formula also tells you that water always contains twice as many hydrogen atoms as oxygen atoms.

Water is a simple molecule, so the formula is pretty easy. Let's look at a more complex molecule. Baking soda, or sodium bicarbonate, is NaHCO₃. That means it has: 1 Sodium (Na), 1 Hydrogen (H), 1 Carbon (C), 3 Oxygen (O)



Structural Diagrams

The shape of a molecule is also important to its function and properties. For this reason, molecules are represented by _____

_____ which show the shape and arrangement of atoms. A single bond is represented by a bold short line.

You Try It! Chemical Formulas

Chemical Formula	Elements - #
C ₆ H ₆	
NH ₃	
Al(OH) ₃	
CO(NH ₂) ₂	

Structural Diagram – Take 2

Double and triple bonds are indicated by _____ and _____ lines.

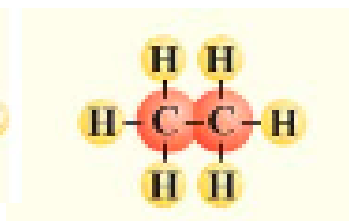
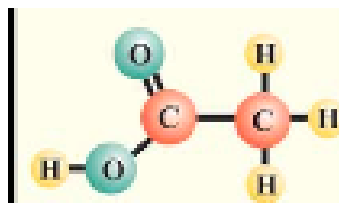
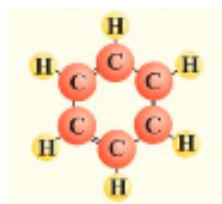
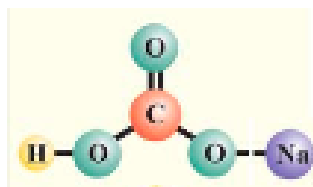
Of course, real molecules are _____

not flat as shown in a structural diagram. For example, methane - CH_4 - has the shape of a 4-sided pyramid called a tetrahedron.

Chemical Formula	Diagram with Electrons	Flat Structural Diagram	3D Structural Diagram
CH_4			

You Try It! Match the structural diagram with its chemical formula.

1. C_2H_6 _____ 2. NaHCO_3 _____ 3. $\text{HC}_2\text{H}_3\text{O}_2$ _____ 4. C_6H_6 _____



Lewis Dot Molecules

We've already seen how you draw a Lewis dot structure. The dots represent the valence electrons of an atom. We can draw Lewis dot structures for molecules too. Each element forms bonds to reach one of the magic numbers of valence electrons: _____ or _____.

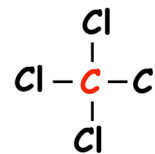
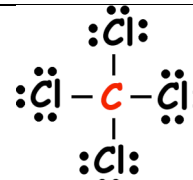
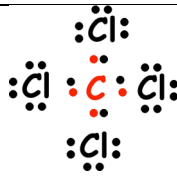
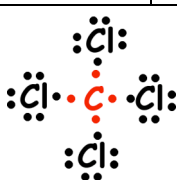
In dot diagrams of a happy molecule, each element symbol has either 2 or 8 dots around it.

Lewis Dot Molecule – Example

Draw the dot diagram for carbon tetrachloride, CCl_4 .

- List the elements in the molecule
- Determine how many valence electrons each element has.
- Match the elements so that each atom has 8 (or 2 for H & He) electrons.

Notice that with this molecule, each atom has 8 electrons. The shells are all full!!! Each chlorine atom shares an electron with carbon. In return, carbon shares its electrons with chlorine.



You can see how the drawing changes & becomes simpler & simpler.

You Try it! Lewis Dot Pg 7 & 9 in your little book.