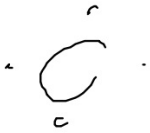
Good Morning

- Please grab a whiteboard.
- Draw the dot diagrams for the following atoms:
  - Carbon:
  - Oxygen:

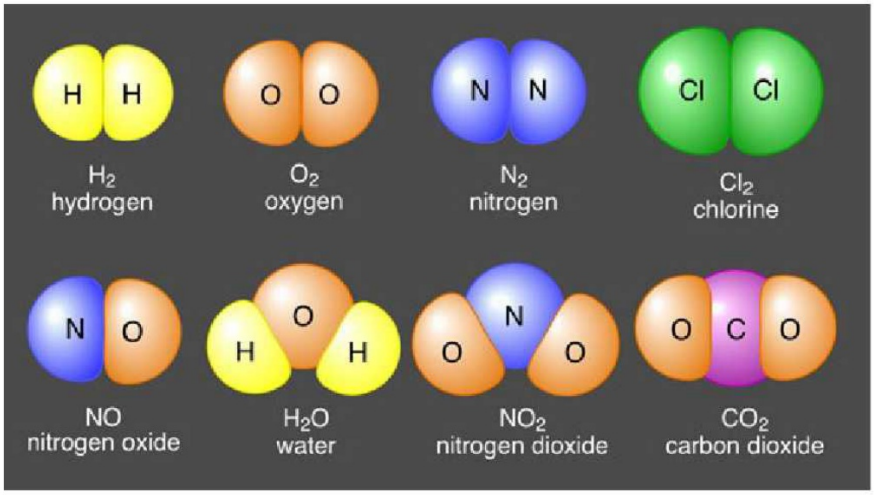


This Week

- Monday: 8.1 and 8.2
- Tuesday: 8.3 and 8.4
- Wednesday: Finish 8.4 and lab
- Thursday: Review
- Friday:

Chapter 7 and 8 Quiz

Tonight: Book Problems



Molecular Compounds

8.1 Molecular Compounds

- Describe the information a molecular formula provides.
- Made of two or more different elements.
- Distinguish between the boiling and melting points of molecular ~~and~~ vs ionic compounds.

Tug of War

- In the Copper (II) Chloride lab, there was a winner.
- Why did one win out over the other?

Do Now:

Please grab a handout from the front desk.

Begin filling out the columns on the back about metallic and ionic bonding.

We will fill in the rest today throughout class.

Take out the book problems from last night.

Covalent Bonds

Valence e⁻

together / Sharing

- Compounds that "share" electrons.
- This sharing bonds them together.
- The tug of war is a stalemate.
- Electrons occupy orbitals in **both** atoms.

Molecules

- Neutral group of atoms bonded together.
- The electrons that they share keep the atoms from breaking apart.
- These are joined together by covalent bonds.

Covalent Bonds

- Formed in Non-Metals.
- Non-Metals tend to want to gain electrons.
- Really don't want to give them up.
- Compromise - share electrons so that they are more stable.

Molecular Formulas

- Molecular compounds of a particular substance form in the same way all the time.
- A molecule of water always has 2 hydrogen and 1 oxygen atom.
- The molecular formula shows the ratio of atoms of each element a molecule contains.

Formulas

O_2 CO H_2 F_2 Cl_2 N_2

- Diatomic Molecules: usually gasses.
- Red letters on the PTE indicate state at room temperature.
- With the exception of 8A, all of the elements with red letters are gasses at room temp and are diatomic.

Examples

- Hydrogen Gas: 2 hydrogen atoms. H_2
- Oxygen Gas: 2 oxygen atoms. O_2
- Carbon Monoxide: 1 carbon and 1 oxygen. CO

Molecular vs. Ionic

- Ionic compounds could grow and grow. Not true in molecular compounds.
- Alternating charges held them together. We talked about **formula units**.
- Molecular compounds are made up of two or more non-metals. Not all molecules are compounds. Why?

Boiling/Melting Point

- Substances with molecular bonds have a low boiling and melting point compared ionic or metallic bonds.

True or False

- On your whiteboards, write T or F for the following statements:

- All compound contain molecules.

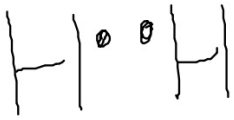
- Most molecular compounds are composed of two or more non-metals.

- Atoms in molecular compounds share electrons.

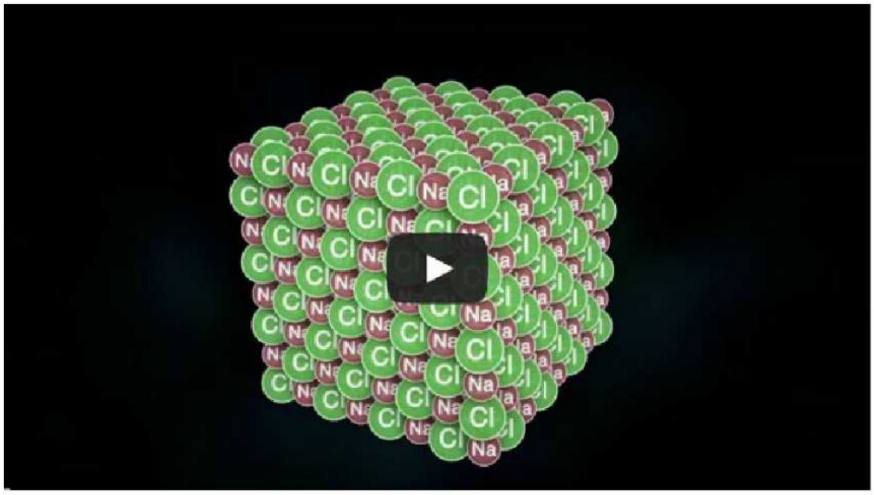
8.2 Covalent Bonding

- Electrons are shared.
- The Octet rule and it's exceptions.
- Dot Structures.
- Double and triple covalent bonds.
- Covalent vs. coordinate covalent bonds.

Octet Rule

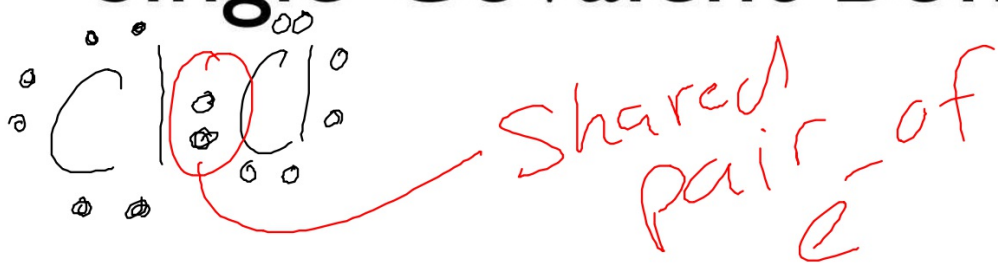


- Everyone wants 8 valence electrons.
- Covalent bonds allow atoms to share electrons so that they get electron configurations similar to noble gases.
- Example: Oxygen Gas: O_2.



How Atoms Bond

Single Covalent Bond



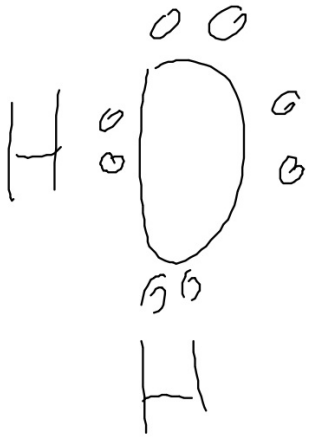
- Each atom shares **one** of it's unpaired electrons with another atom.
- Hydrogen gas.

Dot Structure

- Oxygen: O
- Hydrogen: H

Shared Electrons

- We use dot structure to note molecular bonds.
- H_2:
- H_2O:



You Try

lone pair

Bonded pairs

- Methane (CH_4)
- Ammonia (NH_3)

Chapter 9 Quizzes

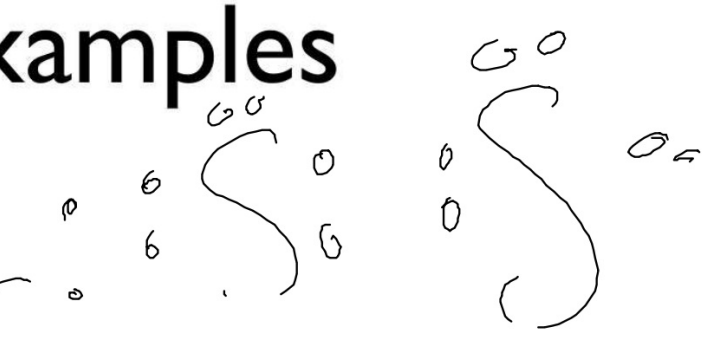
Please check IC to see that the score on the quiz is the same online.

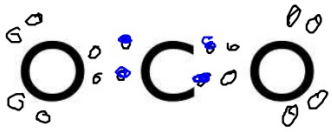
I will address questions once all quizzes are handed out.

Double and Triple Covalent Bonds

- Atoms share 2 or 3 unpaired electrons.
- Atoms gain noble gas electron configuration.
- These are noted in similar ways that single covalent bonds are.

Examples

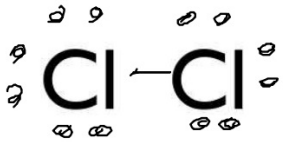
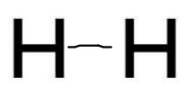
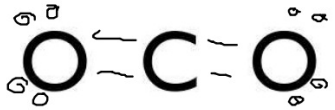
Sulfur: 

- ~~Nitrogen: N N~~
- Carbon Dioxide: 

Electrons Move Fast

- If we could see electrons being shared, what would it look like?
- How can we draw this?

Examples

- 
- 
- 

Bonding Models and Lewis Structures

Notes

- There is no contact between ~~ions~~ atoms in covalent ~~ionic~~ bonds.
- There are single, double and triple covalent bonds.
- No more, right?

Coordinate Covalent Bonding

- Sometimes an atom will share paired electrons with another atom.
- One atom shares more electrons than the other.
- The electrons still act as shared electron between atoms much like other covalent bonds.

Noting Coordinate Covalent Bonds

- Because one atom donates more electrons to be shared, an arrow is drawn from the atom that donates electrons to the atom that received the electrons.
- This happens in many polyatomic ions.
- Example: C O

Polyatomic Ions

- We are familiar with the charge on many polyatomic ions.
- Lewis structures help to explain the reason why these things bond the way that they so and why they still have a charge.

Examples

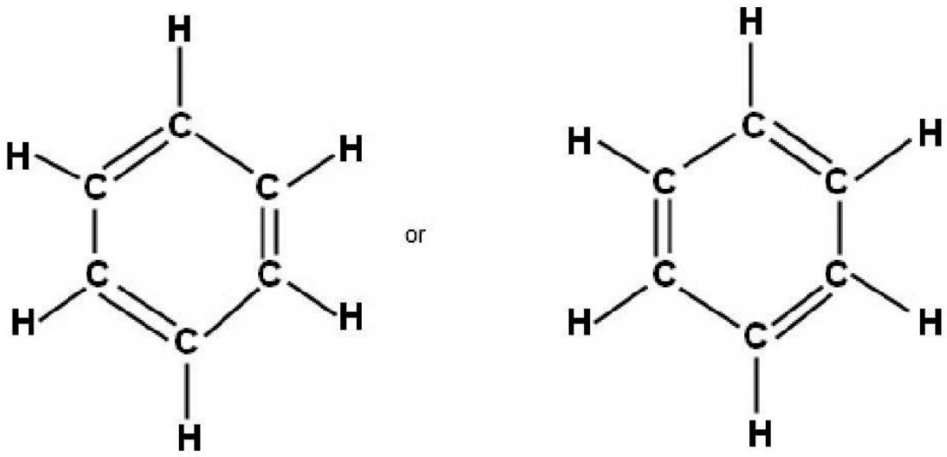
- Hydroxide:
- Carbonate:
- Sulfate:

Bond Dissociation Energy

- When atoms create bonds energy is released.
- Products are more stable than the reactants.
- If you want to break the bond, you need to add energy.
- The stronger the bond, the more energy is needed.

Covalent Dissociation

- Covalent bonds vary in their strength.
- Double bonds take more energy than single bonds.
- Triple bonds are even stronger.



Hydrocarbons

Calculating Dissociation Energy

- The energy released when one molecule breaks apart is relatively small, but so is one molecule.
- Dissociation energy is calculated by the energy given off when a **mole** of bonds is broken.

The Mole

- 6.02 x 10^23.
- A mole represents this number the way that a dozen means 12.

Resonance

- It is possible to represent some molecules with more than one valid dot structure.
- Originally scientists though that the structure must alternate between the two structures, creating a vibration.
- They have found that this is not the case, but still refer to it a resonance.

Ozone O_3

- How would you draw the dot structure for this molecule?

Exception to the Octet Rule

- It is impossible to draw some molecules so that there are 8 valence electrons on each atom.
- These compounds can be less stable than other molecular compounds.
- Example: NO_2: O N O

Other Examples

- Phosphorus pentachloride
- Sulfur hexafluoride