Name: _____

**Unit 6 Covalent Molecules- Guided Notes**

- Covalent Bonding
  - A _____ is the force that holds two atoms together and makes them function as a unit
  - Atoms form bonds to become most _____ and to obtain an _____
  - Covalent Bonding: Electrons are _____ between two or more elements.
    - Always between 2 _____
    - Never involves _____
  - The bonding results from mutual attraction of the two nuclei for the _____ electrons
  - Not all electrons are shared in a covalent bond. The unshared electrons are called _____
  - How is covalent bonding different than ionic bonding?

- Properties of Covalent Molecules
  - _____ conductors
  - _____ melting and boiling points
  - Soft
  - Brittle
  - Typically more _____ than ionic compounds
  - Many don't dissolve in water well

- Covalent Prefixes

| Prefix | Number Indicated |
|---|---|
| | 1 |
| | 2 |
| | 3 |
| | 4 |
| | 5 |
| | 6 |
| | 7 |
| | 8 |
| | 9 |
| | 10 |

- Rules for Naming Covalent Molecules
  1. The first element in the formula is named first, and the full element name is used.
  2. The second element is named as though it were an anion (ending gets _____).
  3. _____ are used to denote the numbers of atoms present (AKA represents the _____)
  4. The prefix mono- is never used for naming the first element. For example, CO is called carbon monoxide, NOT monocarbon monoxide.
  5. Prefix(not mono)1st element space prefix2nd element
  - Example:
    - $BF_3$

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- Practice:
  1. NO
  2. $N_2O_5$
  3. $CO_2$
  4. $SiO_3$
  5. $CCl_4$
  6. $IF_5$
  7. $PCl_5$
  8. $P_4H_6$

- Writing Formulas for Covalent Molecules
  - Use the prefixes as _____ (do not crisscross)
  - Do NOT _____ covalent molecules
  - Practice:
    1. Carbon Monoxide
    2. Carbon tetrafluoride
    3. Dinitrogen Trioxide
    4. Selenium dioxide
    5. Nitrogen Monoxide

- Diatomic Molecules
  - Diatomic molecules: A molecule composed of _____ of the same atoms
  - You must memorize the following diatomic molecules (Br I N Cl H O F)

| Name | Formula |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

- **End Video 1**

- Lewis Structures
  - A _____ is a representation of a molecule showing how valence electrons are arranged among the atoms in the molecule or ion.
  - In writing Lewis Structures, we ONLY include _____ electrons
  - Electrons involved in bonding are called _____ pair. Electrons not involved in bonding are called _____ pairs or unshared pairs
  - Keep in mind the octet rule when drawing Lewis structures
  - Exceptions to the octet rule:
    - _____ and _____ only need a duet
- Steps to writing Lewis Structures
  1. Calculate the total number of valence electrons you _____. H and He need ___; all other elements need _____. Add these all together.
  2. Calculate the total number of valence electrons you _____. This is the number of valence electrons each elements has according to the periodic table. Add these all together.
  3. Subtract NEED- HAVE to get your _____ number. Divide this number by_____ to tell you how many _____ you should draw.
  4. The _____ element in the formula is USUALLY your _____ atom (except _____, which cannot be a central atom). Write this element. Write the

Name: _____

remaining element as symmetrically as possible around the central atom. Draw the appropriate number of lines (step 3) to connect the central atom to the other atoms.

5. Draw _____ on elements to make them match the NEED once you've ran out of lines.
   - Example: Write the Lewis Structure for water:
     - Need:
     - Have:
     - Share:
       - Lines:
     - Central Atom?
     - Drawing:

   - Practice: Draw the Lewis Structure for the following molecules:
     - $CCl_4$

     - $PH_3$

- Lewis Structures with Multiple Bonds
  - Draw the Lewis Structure for Carbon Dioxide
    - Need:
    - Have:
    - Share: Lines:
    - Draw structure:

    - Is this correct? (Did we draw 4 lines?)
  - We need a double or triple bond
  - Correct Lewis Structures:

- Types of Bonds
  - Single Bond- a covalent bond in which _____pair of electrons is shared by two atoms
  - Double Bond- A covalent bond in which _____ pairs of electrons are shared by two atoms
  - Triple Bond- A covalent bond in which _____ pairs of electrons are shared by two atoms
  - No more than _____ pairs can be shared

Name: _____

- Having multiple possible valid structures is referred to as having _____
- Practice: Draw Lewis structure for the following molecules
  1. HF
  2. $N_2$
  3. $NH_3$
  4. $CH_4$
  5. $CF_4$

Name: _____

**Unit 6- Covalent Molecules Part 2 Notes**

- Bond Polarity
  - _____- The ability of an atom to attract an electron in a bond
  - Increases _____ and to the _____
  - _____- having opposite ends
  - Nonpolar bonds- Share electrons _____
  - Polar bond- the electron is shared _____
    - Creating a partially _____ end and a _____ negative end
    - Why would the electron not be shared equally?

    - It is a tug-of-war with the electron and the _____ electronegative element is winning
  - Polar bond: Electronegativity difference > _____
  - Nonpolar bond: electronegativity difference ≤ _____
  - Practice: Determine if the bond is polar or nonpolar
    1. Carbon and Oxygen
    2. Hydrogen and Carbon
    3. Hydrogen and Oxygen

| Electronegativity | |
|---|---|
| H | 2.1 |
| C | 2.5 |
| O | 3.5 |

- Bond Polarity
  - Molecules are considered to be polar if they have an overall _____ (partially positive end and partially negative end)
  - Polar molecules have one or more _____
  - A molecule can have a polar bonds and be _____
    - This happens when the polar bonds cancel each other out
  - Water is VERY _____
- Draw the molecular polarity diagram in the space below:

Name: _____

- Intramolecular Forces
  - _____molecular forces act _____ molecules. These are the _____ that hold molecules together.
  - Fill-in the table below:

| Intramolecular Force | How is it formed? | Relative Strength |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

- Intermolecular Forces
  - _____molecular forces act _____ molecules.
  - They determine the _____ properties of a substance such as:_____
  - They are _____ than intramolecular forces
- Dipole-Dipole
  - _____ occur when the _____ charged part of a molecule interacts with the _____ charged part of a neighboring molecule
  - Often seen happening between _____ molecules.
  - Draw diagram below

- Hydrogen Bonding
  - _____ is a special type of _____ that occurs between a _____ atom bond to either an _____, _____, or _____ atom.
  - The _____ becomes partially _____ and the other element becomes partially _____,
  - Draw diagram below

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- London Dispersion Forces
  - Exist between _____ types of molecules (_____ and _____)
  - The more _____ a molecule has, the _____ the London dispersion forces are.
  - Draw diagram below

- Intermolecular Forces Summary

| Intermolecular Force | How is it formed? | Relative Strength |
|---|---|---|
| | | |
| | | |
| | | |

- Forces and Physical Properties
  - _____ forces have _____ boiling points, _____ melting points, and _____ vapor pressures
  - _____ forces have _____ boiling points, _____ melting points, and _____ vapor pressures