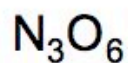





### 3. Molecular Compounds

- Molecular compounds contain only non-metal atoms
- Naming molecular compounds uses a system of prefixes or a common name is memorized

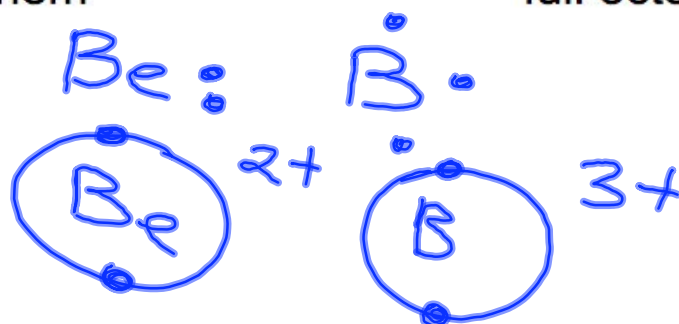


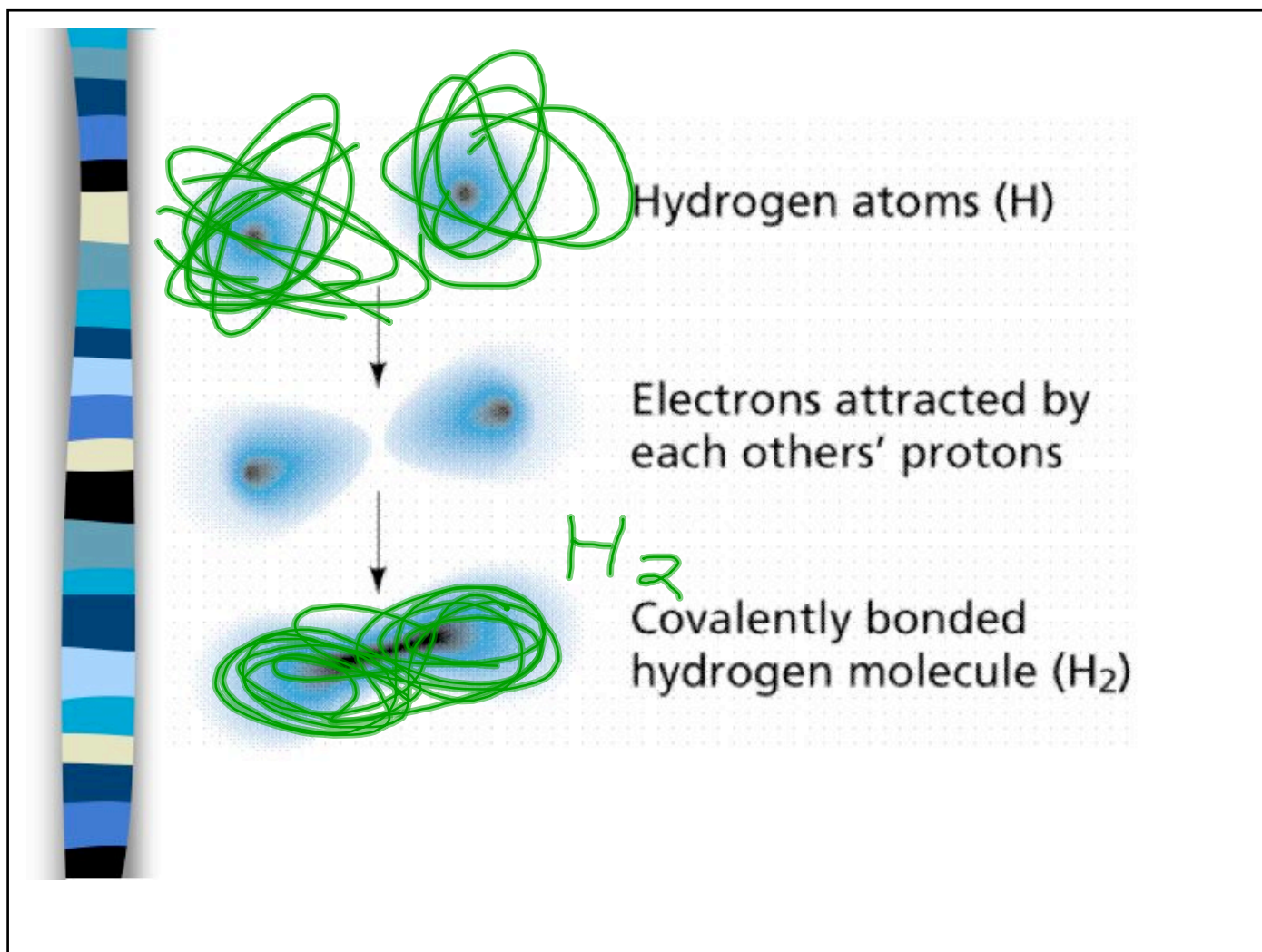
trinitrogen hexaoxide

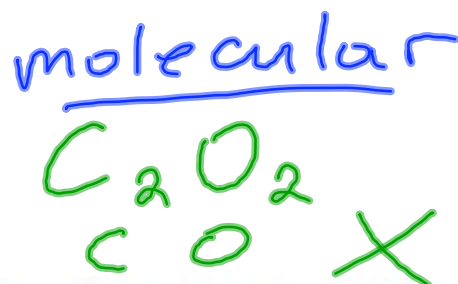
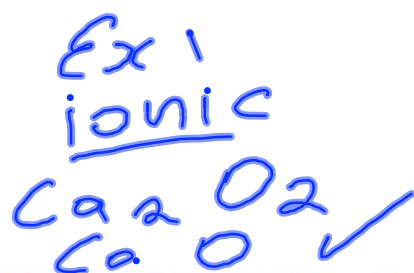
- 
- Atoms form **covalent** bonds in molecular compounds
  - Covalent bonds occur when two atoms with similar EN **share** electrons to form an octet around each atom
  - The EN difference between two atoms is 1.7 or less in a covalent bond

## Some atoms violate the octet rule


- Boron and beryllium can have less than a full octet around them
- Any atom in Period 3 or greater can have more than a full octet around it



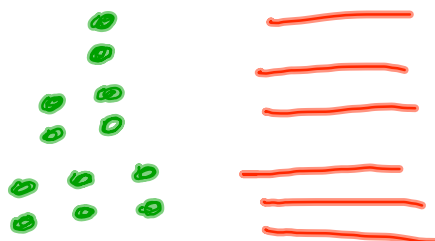




- The formula of a molecular compound is not reduced because the atoms are connected together by covalent bonds
- You can identify individual units (molecules) where all atoms are covalently bonded together



single  
double  
triple


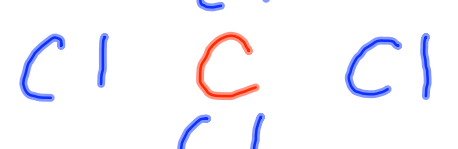
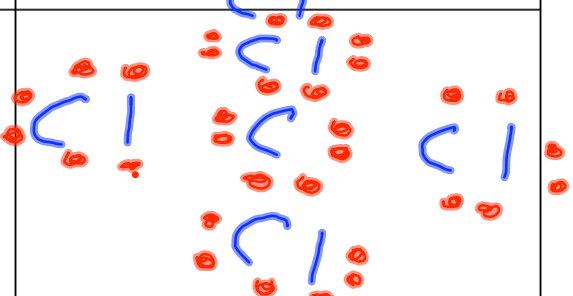
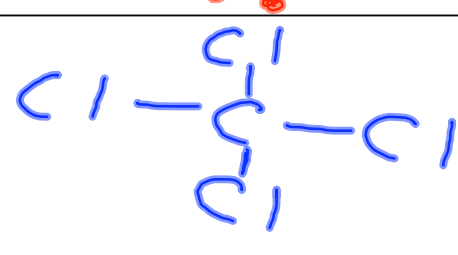


- An electron dot diagram of a molecule is called a Lewis Structure
  - A single bond is formed between atoms that share two electrons
  - A double bond is formed between atoms that share four electrons
  - A triple bond is formed between atoms that share six electrons


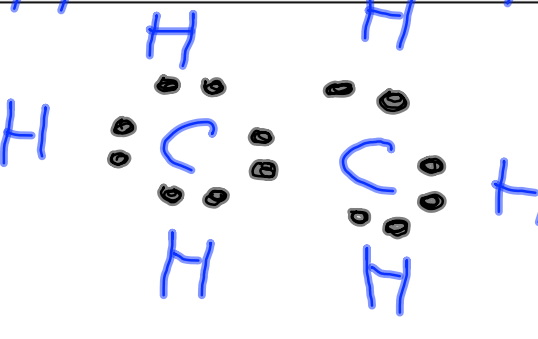



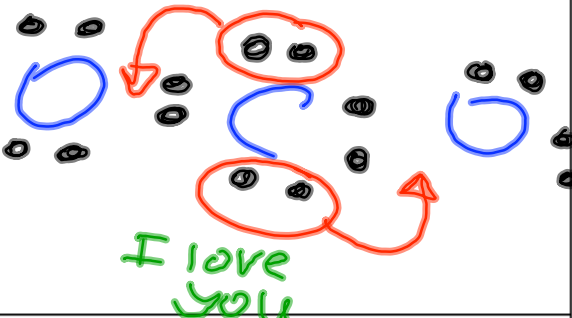
■ Handout

Drawing Lewis Structures for Polyatomic Species

Steps	Example: CCl <sub>4</sub>
Step 1: Determine the total valence electrons in the molecule <ul style="list-style-type: none"> <li>• Add the valence electrons for each atom</li> <li>• Add an electron for each negative charge</li> <li>• Subtract an electron for each positive charge</li> </ul>	
Step 2: Determine the arrangement of atoms <ul style="list-style-type: none"> <li>• Generally the atom with the most <u>bonding electrons</u> is the <u>central atom</u></li> </ul>	
Step 3: Place a pair of electrons between the central atom and each surrounding atom Step 4: Give each outer atom an octet by placing lone pairs around them Step 5: Give the central atom an octet by <ul style="list-style-type: none"> <li>• Adding lone pairs if there are sufficient electrons</li> <li>• Moving a lone pair from an outer atom to form a double bond</li> </ul>	
Step 5: Check your work <ul style="list-style-type: none"> <li>• Each atom should have an octet</li> </ul> <b>Exceptions</b> H Be B <ul style="list-style-type: none"> <li>• The total dots in the diagram should be equal to the electrons you determined in step 1</li> </ul>	

Steps	$24 e^-$ $NO_3^-$
Step 1: Determine the total valence electrons in the molecule •	$N$ $5 + 3 \times 6 + 1$
Step 2: Determine the arrangement of atoms	$O \quad N \quad O$
Step 3: Place a pair of electrons between the central atom and each surrounding atom Step 4: Give each outer atom an octet by placing lone pairs around them Step 5: Give the central atom an octet by <ul style="list-style-type: none"> <li>• Adding lone pairs if there are sufficient electrons</li> <li>• Moving a lone pair from an outer atom to form a double bond</li> </ul>	
Check your work!	

Steps	C <sub>2</sub> H <sub>6</sub>
Step 1: Determine the total valence electrons in the molecule •	$4 \times 2 + 1 \times 6 = 14$
Step 2: Determine the arrangement of atoms	
Step 3: Place a pair of electrons between the central atom and each surrounding atom Step 4: Give each outer atom an octet by placing lone pairs around them Step 5: Give the central atom an octet by <ul style="list-style-type: none"> <li>• Adding lone pairs if there are sufficient electrons</li> <li>• Moving a lone pair from an outer atom to form a double bond</li> </ul>	
Check your work!	

Steps	CO <sub>2</sub>
Step 1: Determine the total valence electrons in the molecule	$C \quad 4 + 2 \times 6 = 16$
Step 2: Determine the arrangement of atoms	
Step 3: Place a pair of electrons between the central atom and each surrounding atom Step 4: Give each outer atom an octet by placing lone pairs around them Step 5: Give the central atom an octet by <ul style="list-style-type: none"> <li>• Adding lone pairs if there are sufficient electrons</li> <li>• Moving a lone pair from an outer atom to form a double bond</li> </ul>	 <p style="color: green;">I love you</p>
Check your work!	

Structural Formulas:

- show all the atoms in a molecule
- uses a straight line to represent a shared electron pair
- does not show lone pairs

Example: Write structural formulas for  $\text{CCl}_4$ ,  $\text{NO}_3^-$ ,  $\text{C}_2\text{H}_6$ ,  $\text{CO}_2$

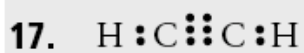
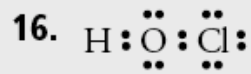
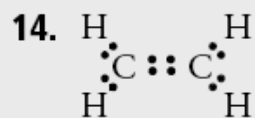
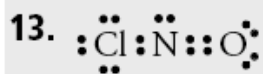
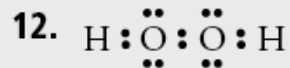
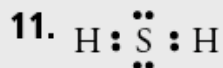
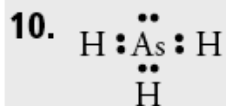
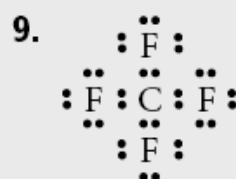
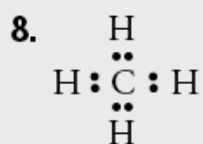
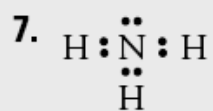
Assignment:

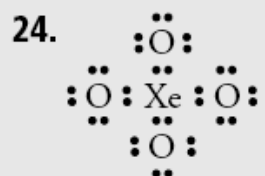
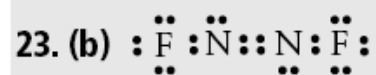
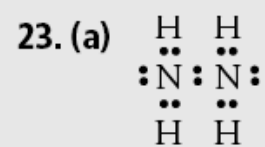
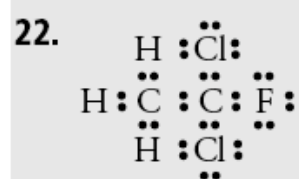
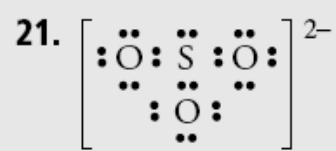
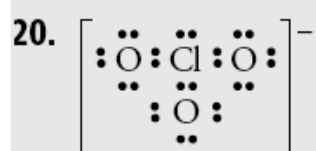
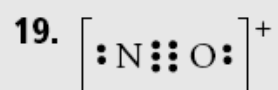
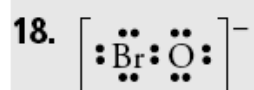
Page 27 7-17

Page 29 18-24

Page 31 8

P 27





Q8.

