

HW10, December 5<sup>th</sup>, 2023

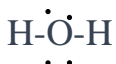
Rules for creating Lewis diagrams:

1. Sum the valence electrons (electrons from the outer shell) for all atoms. It is crucial to keep track of the total number of valence electrons.
2. A pair of electrons forms a bond between atoms.
3. Arrange the remaining electrons to satisfy the octet rule for second-row elements in the periodic table or the duet rule (two electrons) for hydrogen.
4. The octet rule has exceptions. For example, in certain cases, such as the Lewis structure of  $\text{BF}_3$ , there can be a deficiency of electrons. Additionally, structures starting from period 3 elements may have an extended octet, as seen in the Lewis structure of  $\text{SF}_6$ .
5. It is helpful to look at electron diagrams of elements (available on the website [ptable.com](http://ptable.com)) to gain a better understanding of Lewis structures.

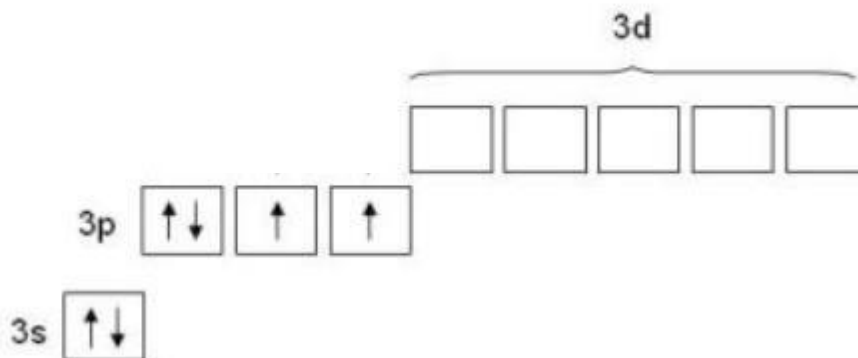
$\text{H}_2\text{O}$ :  $1+1+6 = 18$  valence electrons in water. Lewis structure  $\text{H}:\ddot{\text{O}}:\text{H}$

Structural formula with bonds H-O-H

Lewis structure with bonds (shared pair of electrons) and lone pairs of electrons



Example of electron diagram. Electron diagram for the outer shell of sulfur elements (S) looks like this:

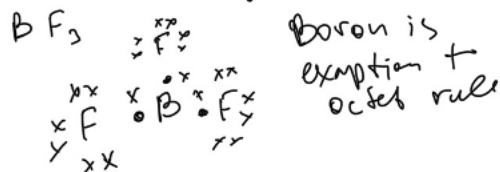


The Lewis structure from HW9

nitrogen trifluoride



boron trifluoride



Sulfur hexafluoride

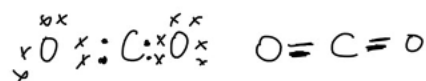
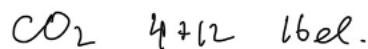


el. + 6x7el.

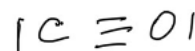
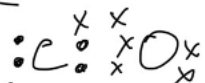
Sulfur exception to octet rule



carbon dioxide

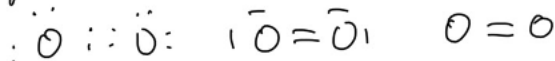


\* carbon monoxide

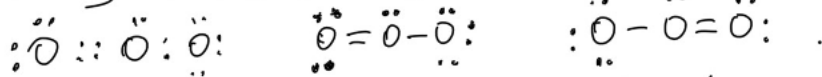


one of the bond here - coordinate when two electrons come from the same atom to form a bond, such bond will be called coordinate.

oxygen  $O_2$

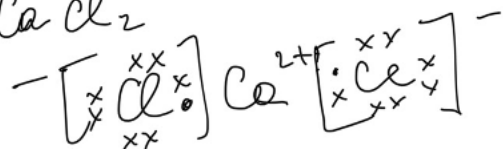


\* ozone  $O_3$  18 electrons



resonance structures

$CaCl_2$



Questions:

1. Write hydrogen peroxide Lewis structure,  $H_2O_2$
2. Write electron diagram for phosphorus (P) and Lewis structure for  $PCl_5$

3. Write electron diagram for chlorine (Cl) and Lewis structure for ClF<sub>3</sub>