

LEWIS STRUCTURES IN CHEMISTRY

A Lewis structure is a diagram that shows how many valence electrons are in an atom or how the valence electrons are shared in a molecule or polyatomic ion. Most first, second, and third period atoms follow the octet rule; i.e., *each atom must have 8 valence electrons in their outer shells* (shared and unshared). There are exceptions: Boron and aluminum only need 6 electrons, and hydrogen and helium only need 2 electrons. The below examples show how to construct Lewis diagrams:

Lewis Structures of First, Second, & Third Period Elements:

H•

He: (First Period)

Li• Be: •B• •C• :N• :O• :F: :Ne: (Second Period)

Na• Mg: •Al• •Si• :P• :S• :Cl: :Ar: (Third Period)

Example: Draw the Lewis Structure for Carbon Dioxide. (Shown below)

▲ = Electron for Carbon

▪ = Electron for Oxygen



Lewis Structure Example for Polyatomic Ions:

- Find the Lewis diagram for SO_3^{-2} (Sulfite ion)

Solution: First, find the number of valence electrons for the Lewis diagram which is shown below:

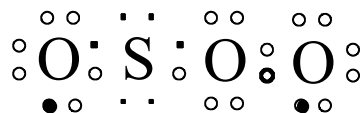
6 valence electrons for S = Sulfur = 6 electrons

3 x (6 valence electrons) for Oxygen = 18 electrons

2 valence electrons for the -2 charge = 2 electrons

Total: 26 electrons

Note that sulfur goes somewhere in the middle because of lower electronegativity. Notice that each atom has 8 electrons surrounding it. (Octet Rule) The diagram is shown below:



● = Electrons picked up by the -2 charge

○ = Electron shared by the 2 oxygen atoms