

# Lewis Video Example

## “simple” script

This video example demonstrates how to draw simple Lewis structures for molecules and ions.

We are going to start with the structure for carbon tetrachloride. The first step in drawing Lewis structures is to determine the total number of valence electrons available for the molecule. This is done by summing the valence electrons for all atoms in the molecule.

To determine valence electrons for an atom, it is convenient to use the periodic table. Count the number of spaces in the row containing the atom, from left to right, until you reach your atom; each space counts as one electron. For our example carbon has four valence electrons, and chlorine has seven valence electrons.

The molecule carbon tetrachloride has four chlorine atoms and one carbon atom, therefore the molecule has thirty two valence electrons. Four from carbon and seven from each of the four chlorine atoms.

The next step is to draw the structure, generally the least electronegative atom is central, carbon has an electronegativity of 2.5, and chlorine has an electronegativity of 3.1. Carbon will be the central atom with each chlorine atom connecting to it. Draw lines joining each of the terminal atoms to the central atom, each line represents a single bond formed using two electrons. Subtract the number of electrons used in building the bonds from the total valence electron count for the molecule.

Arrange the remaining number of electrons around each of the terminal atoms, before adding electrons to the central atom. Each atom needs to satisfy an octet, so each atom needs access to eight electrons.

For ions, follow the same procedure, add an electron to your valence electron total for an anion, and subtract an electron from your valence count total for a cation.

The ammonium cation has eight valence electrons. When drawing the Lewis structure for ammonium remember that hydrogen atoms are always terminal. Once you have finished distributing electrons and have completed the Lewis structure for an ion, draw square brackets around the Lewis structure and place the overall charge as a superscript in the top right-hand corner.

The last Lewis structure we will look at is sulfur tetrafluoride. This molecule has thirty four valence electrons. After drawing out the Lewis structure and distributing electrons appropriately, we have two electrons remaining. Sulfur is an element that is located beyond the second row of the periodic table, this means it can have an expanded octet.

An expanded octet is called hyper valence, or hyper co-ordination. We can now place the two remaining electrons on the sulfur atom to complete the Lewis structure.

We have now covered how to draw simple Lewis structures, you should now be able to calculate the total number of valence electrons in a molecule, draw basic structures and be able to use hyper valance where appropriate.