

Math Tutor

DRAWING LEWIS STRUCTURES

Drawing Lewis dot structures can help you understand how valence electrons participate in bonding. Dots are placed around the symbol of an element to represent the element's valence electrons. For example, carbon has four valence electrons, and its Lewis dot structure is usually written as $\cdot\dot{\text{C}}\cdot$. An atom of fluorine has seven valence electrons. Fluorine's Lewis dot structure can be written as $\cdot\dot{\text{F}}\cdot$. When Lewis structures for covalently bonded atoms are written, the dots may be placed as needed to show the electrons shared in each bond. Most atoms bond in a way that gives them a stable octet of *s* and *p* electrons in the highest energy level. So, whenever possible, dots should be arranged in a way that represents a stable octet around each atom.

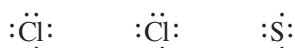
Problem-Solving TIPS

- Hydrogen is an exception to the octet rule because hydrogen has only one electron and becomes stable with two electrons.
- Some elements, such as boron, can bond without achieving an octet because they have three or fewer electrons to share.

SAMPLE

Draw the Lewis dot structure for a molecule of sulfur dichloride, SCl_2 .

First, write the electron dot notation for each atom.



Next, determine the total number of valence electrons in the atoms.

S	$1 \times 6e^-$	=	$6e^-$
2Cl	$2 \times 7e^-$	=	$14e^-$
Total e^-		=	$20e^-$

Arrange the atoms to form a skeleton structure for the molecule, and place electron pairs between atoms to represent covalent bonds. You can predict the arrangement of atoms by figuring out how many covalent bonds each atom must form in order to achieve a stable octet. Each chlorine atom, which has 7 valence electrons, must form a single covalent bond. Sulfur, which has 6 valence electrons, must form two covalent bonds. The only possible structure is $\text{Cl}-\text{S}-\text{Cl}$.

Finally, insert dots representing the remaining electrons (16 in this case), in order to give each atom an octet.



PRACTICE PROBLEMS

1. Draw the electron dot notations for a silicon atom and a strontium atom.
2. Draw Lewis structures for hydrogen sulfide, H_2S , and for formic acid, HCO_2H .