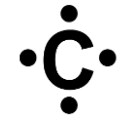
Lewis Structure Handout

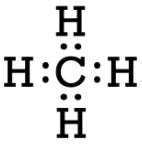
for Chemistry Students

An **electron dot diagram**, also known as a **Lewis Structure**, is a representation of valence electrons in a single atom, and can be further utilized to depict the bonds that form based on the available electrons for covalent bonding between multiple atoms.
-Each atom has a characteristic dot diagram based on its position in the periodic table and this reflects its potential for fulfillment of the octet rule. As a general rule, the noble gases have a filled octet (column VIII with eight valence electrons) and each preceding column has successively one fewer.

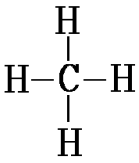
- For example, Carbon is in column IV and has four valence electrons. It can therefore be represented as:



- Each of these "lone" electrons can form a bond by sharing the orbital with another unbonded electron. Hydrogen, being in column I, has a single valence electron, and will therefore satisfy carbon's octet thusly:

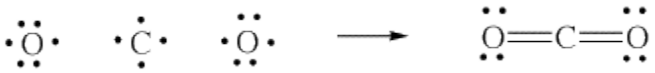


- When a compound has bonded electrons (as with CH_4) it is most accurate to diagram it with lines representing each of the single bonds.



- Using carbon again for a slightly more complicated example, it can also form double bonds. This is the case when carbon bonds to two oxygen atoms, resulting in CO_2. The oxygen atoms (with six valence electrons in column VI) are each represented as:

- Because carbon is the **least electronegative** of the atoms involved, it is placed centrally, and its valence electrons will migrate toward the more electronegative oxygens to form two double bonds and a linear structure. This can be written as:



where oxygen's remaining lone pairs are still shown.

Practice Problems:

Draw each of the following with all valence electrons (bonded or unbounded) represented
Single Atom
1) Mg
2) Br
3) N
Compounds:
1) BCl_3
2) N_2H_2
3) HClO