

## Drawing Lewis Structures

- Step #1: Look at the formula for the compound and determine the number of atoms of each element in the molecule.
- Step #2: Determine the number of valence electrons that each atom contributes.
- Step #3: Determine the total number of valence electrons contributed by all of the atoms.
- Step #4: Arrange the atoms to form a skeleton structure for the molecule. The atom that wants the most bonds (HONC rule) is at the center. If there is more than one carbon, the carbon atoms *usually* bond to each other. Hydrogens and halogens can only form one bond, so they are never at the center (unless the molecule is diatomic!)
- Step #5: Join the atoms with bonding pairs so that you fulfill the HONC rule.
- Step #6: Add unshared pairs of electrons so that each nonmetal (except hydrogen) is surrounded by eight electrons (4 pairs).
- Step #7: Count the electrons in the structure to be sure that the number of valence electrons used equals the number available.
- Step #8: Replace bonding pairs of electrons with lines representing bonds:  
≡ is three shared pairs, a triple covalent bond  
= is two shared pairs, a double covalent bond  
– is one shared pair, a single covalent bond  
DO NOT replace unshared pairs with lines!

You should attempt to construct the following molecules. They are “fair game on the benchmark, as are their structural analogs.

Structural analog = same basic structure with different elements.

Example:  $\text{CF}_4$  has the same basic structure as  $\text{CBr}_4$  and  $\text{SiF}_4$ .

Example:  $\text{H}_2\text{S}$  has the same basic structure as  $\text{H}_2\text{O}$

HI	$\text{OF}_2$	$\text{C}_2\text{I}_4$	$\text{O}_2$	$\text{H}_2\text{S}$
$\text{CH}_2\text{O}$	$\text{CS}_2$	$\text{CF}_4$	HCN	$\text{C}_2\text{H}_2$
$\text{CH}_4$	$\text{NH}_3$	$\text{CO}_2$	$\text{CS}_2$	$\text{H}_2\text{O}$
$\text{C}_2\text{H}_4$	$\text{CH}_2\text{I}_2$	$\text{PF}_3$	$\text{C}_2\text{H}_4\text{F}_2$	$\text{C}_2\text{H}_6$
$\text{NI}_3$	HF			

Here are some “challenges” for those of you who need a bit more. They are not “fair game” for the benchmark:

Benzene,  $\text{C}_6\text{H}_6$

Formic acid,  $\text{HCO}_2\text{H}$

Glycine,  $\text{NH}_2\text{CH}_2\text{CO}_2\text{H}$

Try to build two different structures that have two carbons, six hydrogens, and one oxygen!