DRAWING DOT STRUCTURES FOR SIMPLE MOLECULES

1. Count valence electrons

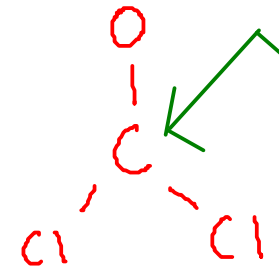
2. Pick central atom and draw skeletal structure
   - central atom is usually the one that needs to gain the most electrons!
   - skeletal structure has all atoms connected to center with single bonds

3. Distribute remaining valence electrons around structure, outer atoms first. Follow octet rule until you run out of electrons.

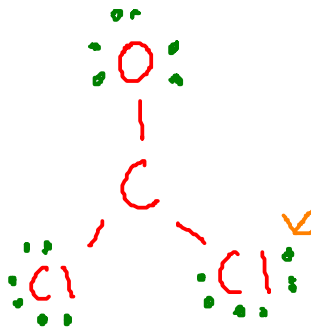
4. Check octet rule - each atom should have a share in 8 electrons (H gets 2). if not, make double or triple bonds.

$COCl_2$

C: 1 x 4
O: 1 x 6
Cl: 2 x 7
24 electrons

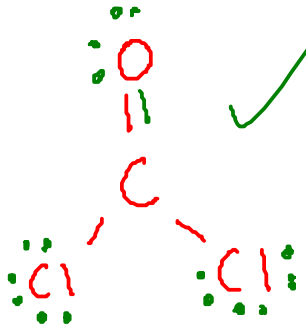


We pick CARBON as our central atom, since it needs to gain more electrons than either chlorine or oxygen to get a share in eight outer-shell electrons!



We stopped adding electrons to the structure here because we'd used all 24 electrons!

... but CARBON has a share in only six electrons! Need to fix it!



Where do we put the double bond? Since OXYGEN needs to gain more electrons, it's more likely to share additional electrons than ch;lorine is. So we put the double bond between oxygen and carbon!

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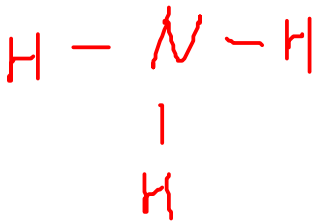
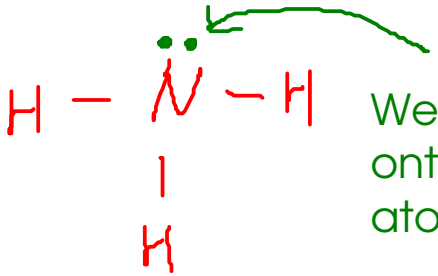
NH_3

N: 1 x 5
H: 3 x 1
8 electrons



We pick NITROGEN as the central atom, since it needs to gain three more electrons (Hydrogen only needs one since its outer shell is completely full with two electrons ... the first shell has no "p" subshell!)



We put the remaining two electrons onto NITROGEN, since the hydrogen atoms are "full" with two electrons.,

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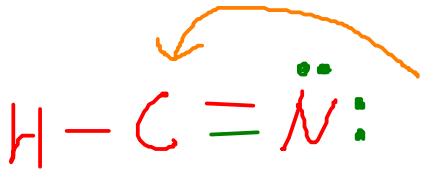
HCN

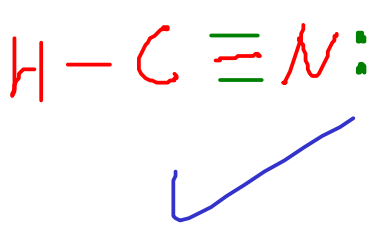
H: 1 x 1
C: 1 x 4
N: 1 x 5
10 electrons

We stop here because we're out of electrons.

We only have FOUR electrons on the carbon



Now SIX ...



With a TRIPLE BOND between carbon and nitrogen, all atoms have a share in enough electrons!

A DOT STRUCTURE FOR A LARGER MOLECULE

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2. Pick central atom and draw skeletal structure
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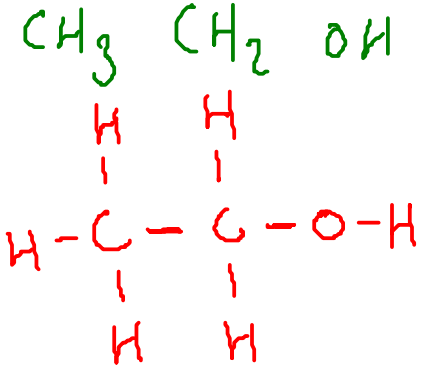
3. Distribute remaining valence electrons around structure, outer atoms first. Follow octet rule until you run out of electrons.

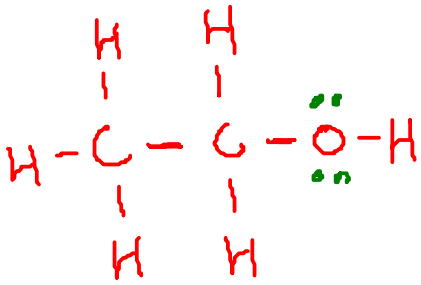
4. Check octet rule - each atom should have a share in 8 electrons (H gets 2). if not, make double or triple bonds.

CH_3CH_2OH ← ETHANOL

C: 2 x 4
H: 6 x 1
O: 1 x 6
20 electrons

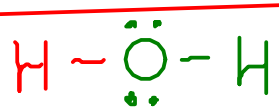
This molecule has three "parts", and three "central atoms"!





Where do the remaining four electrons go?

The only viable place to put them is on the OXYGEN atom (all others are "full")



The ALCOHOLS like ethanol, methanol, and isopropanol mix very well with water.

Small-molecule alcohols dissolve so well in water because they are structurally similar to water!