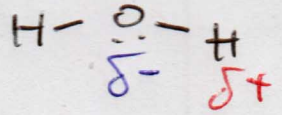
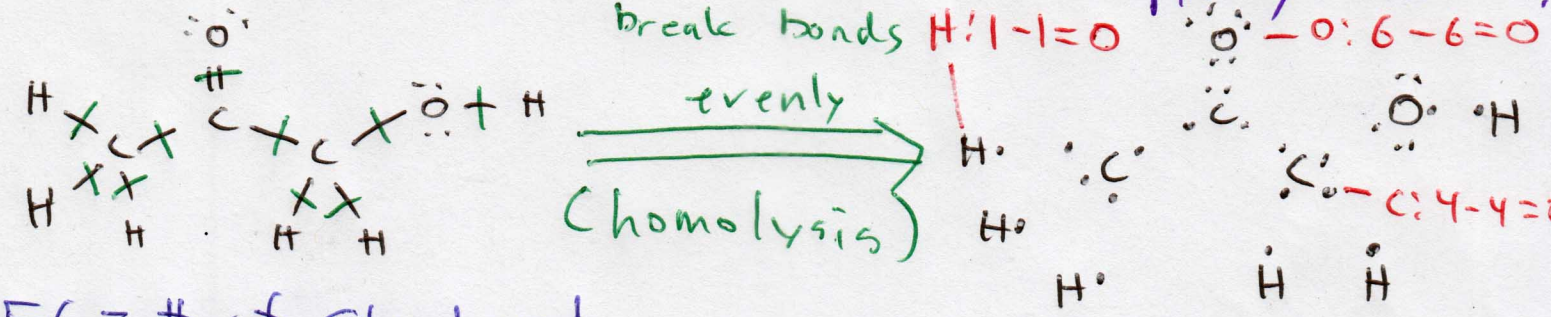


The O-H bond in water is very polar due to the difference in EN between O + H. The bond is therefore neither completely covalent – because electrons are not evenly shared - or completely ionic – because sharing does occur.

Should the bond be considered covalent or ionic when counting electrons? Yes – meaning both,

Formal charge – An electron counting system in which all bonds are treated as completely covalent.



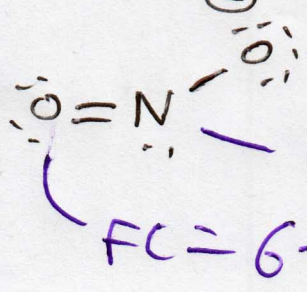
FC = # of standard valence electrons – # of e^- present (for unreacted element)

Lewis dot structures are based on a covalent bonding model, so formal charge is used in drawing Lewis dot structures.

→ Sum of individual formal charges must equal the overall charge of the molecule.

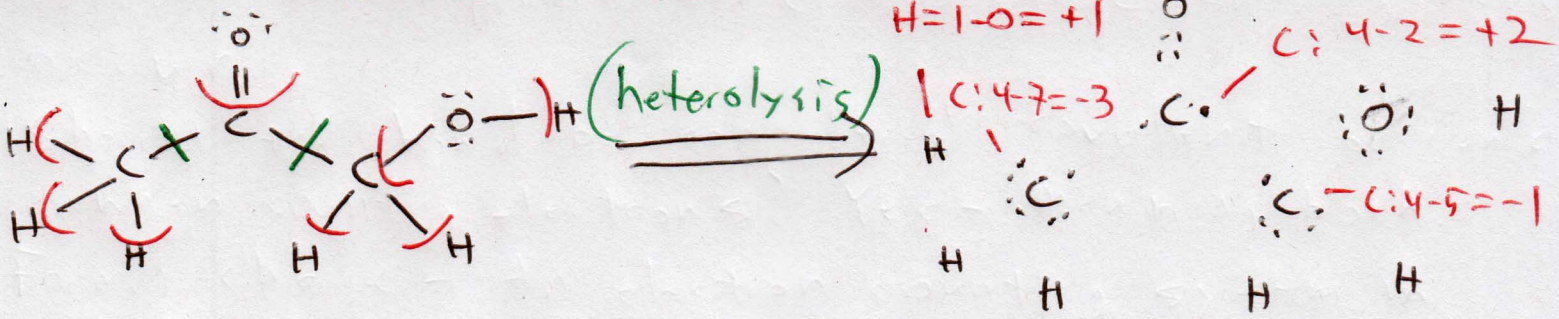
$FC = \#\text{ of valence } e^- - (\#\text{ of lone } e^- + \frac{1}{2}\#\text{ bonding } e^-)$

$= \#\text{ of valence } e^- - \#\text{ of lone } e^- - \#\text{ of bonds}$



Oxidation state – An electron counting system in which all bonds are treated as completely ionic* (unless the bond is composed of two of the same atom),

* The electrons in each bond are given to the more EN element in that bond.

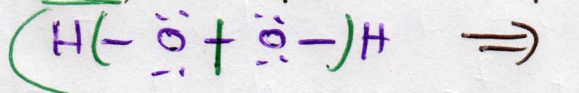


OS = # of standard valence electrons – # of $\bar{e}$ present

→ Sum of individual oxidation states must equal the overall charge of the molecule

OS Rules

- H: +1, except in metal hydride −1
  H is usually less EN than most elements it forms bonds with, except metals
- For monatomic ions, F.C. = O.S. because there are not bonds
- O: −2, except in peroxides



└ O: 6-7=-1

+1 +4 −2
H_2SO_3

O = 2(H) + 1(S) + 3(O)
= 2(+1) + S + 3(−2)
0 = 2 + S − 6
S = 4

O is more EN than all elements except F

$Cr_2O_7^{-2}$

−2 = 2(Cr) + 7(O)
−2 = 2Cr + 7(−2)
12 = 2 Cr
6 = Cr