

HW 10, Dec. 5th.

Electronegativity is a relative ability of atoms to attract electrons while binding to other atoms. It is an ability to polarize a covalent bond.

The difference in electronegativities of atoms defines the nature of the bond between them. For mostly covalent bond the difference is < 0.4 , for polar it is between 0.4 and 2 , and for ionic bonds it is > 2 . The table below gives electronegativities of different atoms.

E.g. the bond in $O=O$ molecule is covalent: $3.44-3.44 = 0$, the bond in $H-F$ molecule is polar covalent: $3.98-2.2 = 1.78$, and the bond $K-O$ in K_2O is ionic: $3.44-0.82=2.62$

Electronegativity:

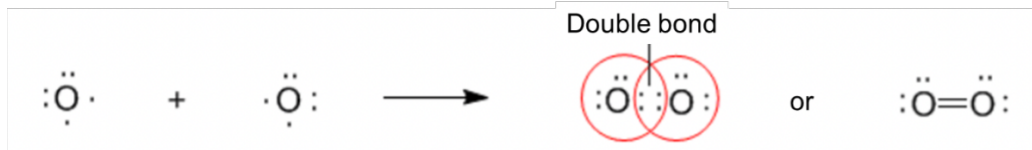
Element	Electronegativity	Element	Electronegativity
Cs	0.79	H	2.20
K	0.82	C	2.55
Na	0.93	S	2.58
Li	0.98	I	2.66
Ca	1.00	Br	2.96
Mg	1.31	N	3.04
Be	1.57	Cl	3.16
Si	1.90	O	3.44
B	2.04	F	3.98
P	2.19		

Question 1

Determine the nature of the bond and put the compounds below into one of the following three groups:
a) with covalent bonds; b) with polar covalent bonds; c) with ionic bonds

PH_3 , CaO , Br_2 , $BeCl_2$, $CsBr$, S_8 , BF_3 , H_2 , Li_2O

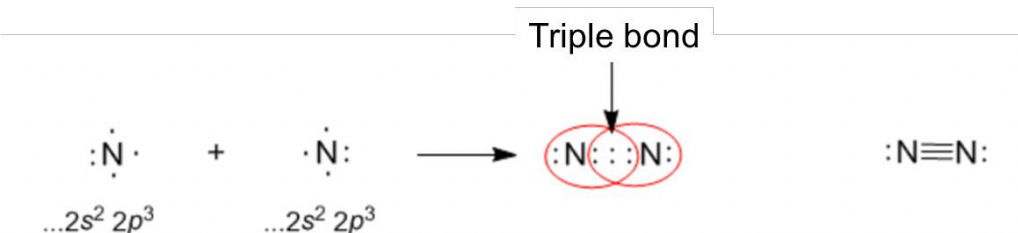
If the octet rule requires multiple bonds can form between two atoms (each bond is two shared electrons). These bonds are called double or triple bonds. E.g. oxygen can form a molecule from two oxygen atoms only when there are two shared electron pairs between the atoms:



Each oxygen atom has 6 electrons

Each oxygen atom has 8 electrons

Or a triple bond can be formed in the case of N_2 :



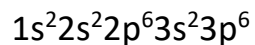
Question 2

Based on the atoms' electron configurations and the octet rule write down Lewis formulas for the following compounds that include: 1) two atoms of ${}_6\text{C}$ and four atoms of ${}_1\text{H}$; 2) two atoms of ${}_6\text{C}$ and two atoms of ${}_1\text{H}$. What is the bond order (=number of bonds) between the carbons in these two compounds? Write down their structural formulas.

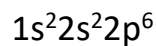
Question 3

Chemical compound has formula XY

where X is a positive ion with the following electron configuration:



and Y is a negative ion of this configuration:



Write down chemical formulas for two such compounds.

