HW 7 – November 8

The difference between the electronegativities of bound atoms defines nature of the bond. 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 give 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		

1. Determine the nature of the bond and put the compounds below into one of the following 3 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

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 ${}_6C$ and four atoms of ${}_1H$; 2) two atoms of ${}_6C$ and two atoms of ${}_1H$. What is the bond order (number of bonds) between the carbons in these two compounds? Write down their structural formulas.
3. Using the structural formulas write down Lewis formulas with all the non-shared electrons:

a) H-C≡N b) F-Mg-F

4. **The valence** is the number of electron pairs that binds the atom with other atoms. We learned how to determine the valence using "octet rule". For some common elements it may be useful to remember their valences. The table below gives valences of some common elements. (The numbers in parentheses show possible valences for elements that may exhibit more than a single valence.) Using the table find a mistake in the structural formula below and explain why this compound cannot be synthesis.

Valences of some common elements

Element	Valence	Element	Valence
H	I	Ba	II
Na	I	O	II
K	I	Zn	II
Ag	I	Sn	II (IV)
F	I	Pb	II (IV)
Cl	I (III, V, VII)	Fe	II, III
Br	I (III, V, VII)	Cr	III, VI
I	I (III, V, VII)	S	II, IV, VI
Hg	I, II	Al	III
Cu	I, II	N	III (IV)
Be	II	P	III, V
Mg	II	C	IV
Ca	II	Si	IV (II)