Lewis Structures

1. Recognizing Trends … in each group of atoms, circle the atom with the …

a. Largest atomic radius	Li	Be	Na	Mg
b. Largest ionization energy	C	N	Al	Si
c. Smallest atomic radius	S	Cl	Se	Br
d. Smallest ionization energy	Cl	Ar	Br	Kr

2. Use the following KEY to answer these questions (more than one answer may be correct):

KEY: H = hydrogen AM = Alkali Metals AEM = Alkali Earth Metals
Halo = Halogens NG = Noble gases

AEM 1. form +2 ions
Halo 2. all are diatomic
NG 3. have full valence orbitals
AM 4. react quickly with water
H/Halo 5. form -1 ions
NG 6. highest ionization energy
AM 7. lowest ionization energies
H/Halo 8. gain 1 electron when forming ions
H 9. family only has one member
Halo 10. members include (s), (l), & (g)

3. For each pair, circle the LARGER one (size, not mass)

a. N F
b. Ne Ar
c. Mg Mg^{+2}
d. Br Br^{-1}
e. K Ca
f. Si O
g. O O^{-2}
h. Al Al^{+3} nope
i. S Ar
j. Na F

4. Complete the following tables:

	O^{-2}	F^{-1}	Ne	Na^{+1}	Mg^{+2}
# protons	8	9	10	11	12
# electrons	10	10	10	10	10

	S^{-2}	Cl^{-1}	Ar	K^{+1}	Ca^{+2}
# protons	16	17	18	19	20
# electrons	18	18	18	18	18

Al^{+3} has the same number of electrons as the noble gas, Ne - 10.
I^{-1} has the same number of electrons as the noble gas, Xe - 54.

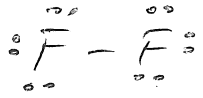
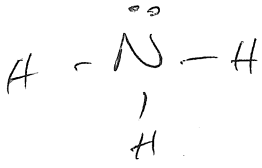
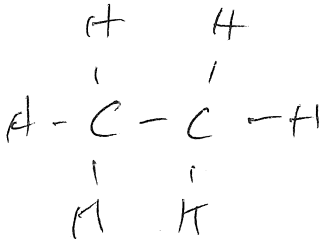
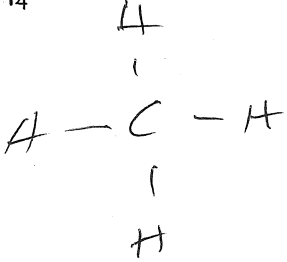
5. Match the following compounds to the bond types. Each answer may be used once, more than once, or not at all. C = covalent bond; I = ionic bond; PC = polar covalent.

I a. KBr
PC c. CO_2 (non polar (same))
C e. CH_4
C g. Br_2
PC i. SiO_2
I k. NaCl
PC b. CuCl – Ionic? metal-nonmetal
PC d. PbO Ionic? metal Non-met
I f. $CaCl_2$
I h. Na_2O
PC j. ZnI_2 – Ionic metal non-metal
C l. C_3H_8

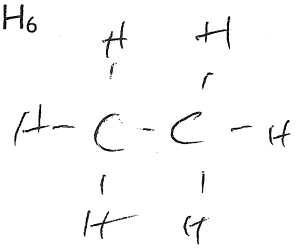
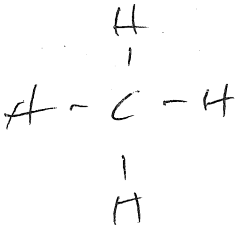
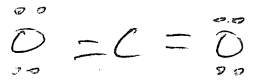
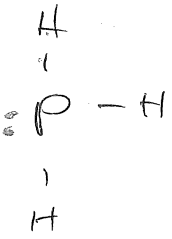
6. Complete the following chart by writing the electron configuration notation below each symbol and drawing the Lewis Dot Structure of each element.

H						He
$1s^1$						$1s^2$
Li	Be	B	C	N	O	F	Ne
$2s^1$	$2s^2$	$2s^2 2p^1$	$2s^2 2p^2$	$2s^2 2p^3$	$2s^2 2p^4$	$2s^2 2p^5$	$2s^2 2p^6$
Na	Mg	Al	Si	P	S	Cl	Ar
$3s^1$	$3s^2$	$3s^2 3p^1$	$3s^2 3p^2$	$3s^2 3p^3$	$3s^2 3p^4$	$3s^2 3p^5$	$3s^2 3p^6$

7. Draw the Lewis Structures for the following molecules.

H_2 	F_2 	H_2O 
NH_3 	C_2H_6 	CH_4 

8. More Lewis Structures to Draw …

C_2H_6 	CH_4 	CO_2 
N_2 	O_2 	PH_3 

Steps for Writing Lewis Structures

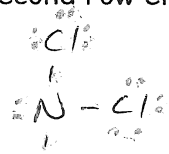
1.) Obtain the sum of the valence electrons from all of the atoms. Do not worry about keeping track of which electrons come from which atoms. It is the total number of valence electrons that is important.

2.) Identify the central atom/s (They are few in number (like only one) and can form more than one bond (NOT Hydrogen)!)

3.) Use one pair of electrons to form a bond between each pair of bound atoms. For convenience, a line (instead of a pair of dots) is often used to indicate each pair of bonding electrons.

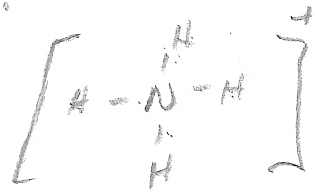
4.) Arrange the remaining electrons to satisfy the duet rule for hydrogen and the octet rule for each second row element.

Do More:

1. NCl_3 

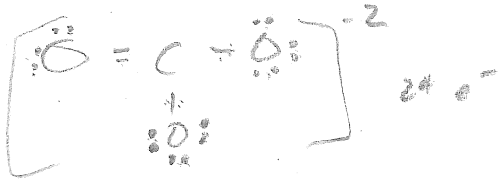
2. C_3H_8 

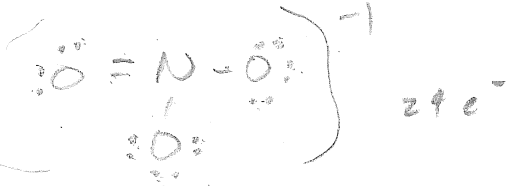
3. SO_4^{-2} 

4. NH_4^{+1} 

5. PO_4^{-3} 

6. C_2H_2 

7. CO_3^{-2} 

8. NO_3^{-1} 

9. NF_3

10. NO^+