### **Lab - Lewis Electron Dot Models**

A chemical bond is a strong attractive force between atoms or ions in a compound. Electrons in the outermost orbitals, s and p, are involved in chemical bonding. The type of atoms involved determines the type of bond.

This has everything to do with ELECTRONEGATIVITY!

lonic bond - transfer electrons and create charge as one atom gains electrons and the other atom loses

Covalent bond-shared electrons to achieve noble gas configuration

- Non polar covalent shared electrons equally
- · Polar covalent- unequal sharing of electrons

\*The group number = the number of valance electrons for the representative elements (IA – VIIA)

A Lewis dot diagram- DOTS = #OF VALANCE ELECTRONS

#### Example:

- K group IA = 1 dot; 1 valance electron
  - Br group VIIA = 7 dots; 7 valance electrons

The atoms are trying to follow the octet rule to achieve stability and thus a noble gas configuration......  $S^2P^6$ 

### In general:

- Hydrogen- NO DOTS!!!
- 2. Follow the NAS step by step:
  - a. N= electrons needed to obtain full octet
    (This equals 8! Exceptions are: H=2, Be=4, B=6)
  - b. A= valance electrons available OR actual (check out the group number)
  - c. S= N-A electrons shared
- 3. Draw the skeleton diagram. Put the least electronegative element in the center of the diagram (Never hydrogen)

Example: HCN

Diagram is complete and correct. Hydrogen is stable with 2 electrons (1 bond), carbon is stable with 8 electrons (4 bonds), and nitrogen is stable with 8 electrons (3 bonds and 1 unshared lone pair of electrons)

# Lab Activity - Chemical concepts: Molecular bonding

Materials needed: Element squares and bingo chips

### Part I - Elements

- 1. Locate data table 1
- 2. Fill in group number, electron configuration, and dot diagram.

## Part II- Covalent Compounds (non-me

(non-metal + non-metal)

- 1. Locate data table 2
- 2. Calculate NAS for each molecular compound
- Find the element squares for each atom in the compound. Choose a color of bingo chip to represent an atom. For example I will only use red chips for hydrogen and blue chips for carbon. The number of bingo chips used will = ACTUAL in NAS calculation.
- 4. Build a dot diagram for each atom in the molecule.
- 5. Observe how the dot diagrams come together.
- 6. Do this for each compound listed in data table 2

### Conclusion questions:

- 1. Why do all elements in group 7A have similar chemical and physicals?
- 2. Why can any atom have no more than 8 valance electrons? (think about which orbitals the valance electrons are located)
- 3. Is there a relationship between the number of valance electrons and electronegativity?

4. Write the electron configurations for the following:

Zn <sup>+2</sup>	N <sup>-3</sup>	0-2
AI <sup>+3</sup>	Br-1	C-4

- 5. From Data Table 1, which atoms form ions that have electron configurations that are isoelectronic (exactly like noble gas, hence,- iso means mirror) with Neon?
- 6. If the polar bonds are symmetrical then the compound is considered non polar, how can you take a symmetrical tetrahedral compound CH4 and make it polar? What has to change?
- 7. Why is it possible for fluorine to bond with xenon?

Data table 1

Element	Group #	Electron configuration	Dot diagram
1. H	B MO & SHEET TO	en a servicio transferit, a	Ed I po all reparts sayour
2. Li	5 T HE HE ST. 5 (192)	ISSE A SIVE TO	
3. Be	all aloct ours our	trial o charge a may lare	the second and sed the
4. B			
5. C		sharing of electron	
6. N	sar- and a self truck	HOE GLECTHOMA	
7. O	DIA Frent Sestaton :		
8. F	400000000000000000000000000000000000000	e macteorio authoribatio achievo ete	Olifer and their a mobile
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Data table 2: covalent compounds

Formula	Dot diagram	Molecular geometry	Polar or non-polar?	Hybridization of Central Atom
1. SO <sub>2</sub>	X & A STATE OF A STATE OF	es un estal japon o	4 the grows :	(alkei)
			Sincer in the	
2. CH <sub>4</sub>				
N 2 - 8 - 18 - 18				
3. AICI₃				
S 18-50 = 3 slight				
plecirons (4 bonds	to and correct. Hydroger ), and nitrogen is stable to		(1 bond), car and 1 umshare	
4. CHCI <sub>3</sub>				
	Iltanoitasuo no	nswer all conclusi	sure to a	

5. SO <sub>4</sub> -2	Checked concept	its: Motecular beside		Pelbals
	Dot diagram	Electron	8 quora	
	nís			
Locate deta to	bin t			
6. OH-				
		(sun-metal + non-met	21)	
	AS for each molecular ment squares for each	rechipound halber to the perhoon of	Cremin a char	
7. BF <sub>3</sub>	in the balling of the second	zon. List number of hargo	cities have will -	AGTUAL In
	displan for walk who	THE ONE PROLING.		
	eech compound listed			
				li li
8. N <sub>2</sub>	elements in group 7A	have similar chemical and	f atyricals?	
		Bar d vilands slocifons		
	on ulschross are locate			
9. CH <sub>2</sub> Cl <sub>2</sub>				
			lent company	
	re relation 1 Was	Molecular geometr	a lastificato soci	
				- 68
10. BeH₂		to be a fellowing.	-101	
	E			
11. SiCl <sub>4</sub>	and what alter's h		n conferences	Chair and the control
11. SiCl₄	all while above to	on loss that was note to necession with Book ?		District Control
11. SiCl <sub>4</sub>	all: what atoms h	om long that the risks needs follow) with Birth r		MAD :
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11. SiCl <sub>4</sub>	atoris is a toris is a			Alota can you
	and the state of t			bar in banda

Be sure to answer all conclusion questions!!!