

Announcements – Lecture IX – Thursday, Oct 2nd

1. **Second Lab – Saturday, October 4th ... 1-4pm ... ISB 155/160 (A-E)**

a) Print lab prior to coming to lab -- use the 'Print Friendly Version' located on the top left hand side of the page – this is the version that contains the 'Data Sheet' that you will hand in upon completing the lab.

b) First set of Lab Owls will appear in Owl after this lab. There are a total of 4 sets of Lab Owls and they are worth 25% of the Lab Grade.

2.

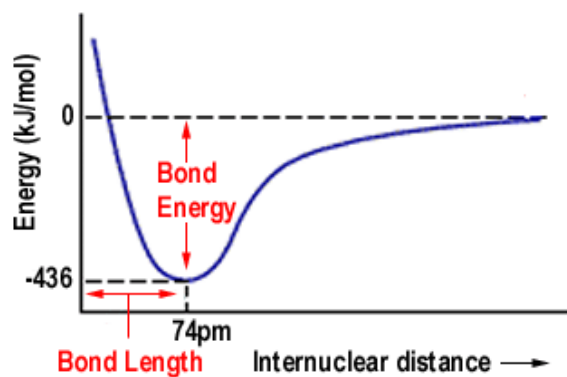


iClicker:

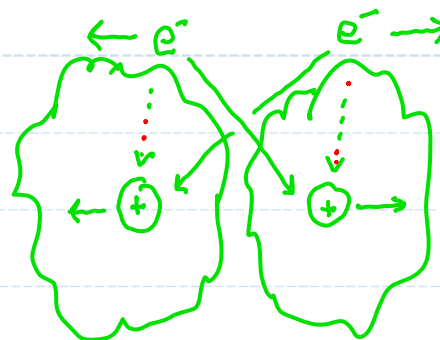
Choose any letter: A-E

3.7 A

What Is a Covalent Bond and How Does One Form? The Pro's and Cons of Orbital Overlap



See animation on class web site



Con :

- electron/electron repulsion
- proton/proton repulsion

Pro:

- electron/proton attraction

3.7

What Is a Covalent Bond and How Does One Form?

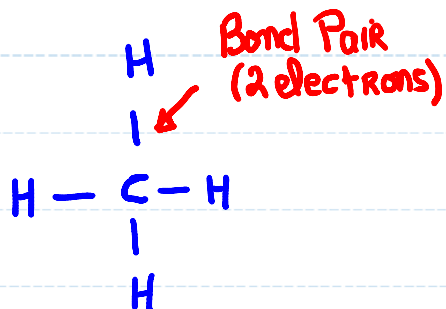
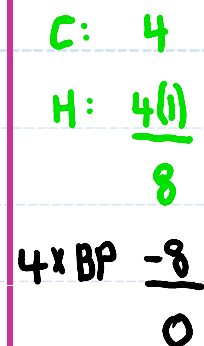
C

Drawing Lewis Structures of Covalent Compounds

Group I:

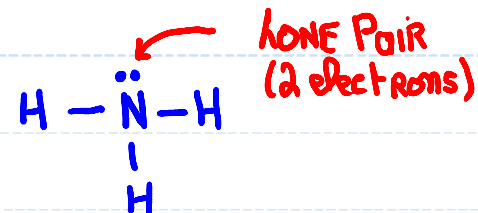
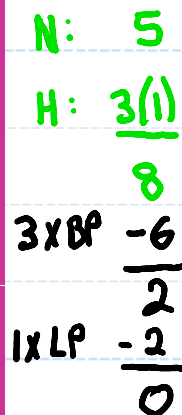
Bond Pair and Lone Pair Electrons

CH₄



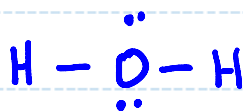
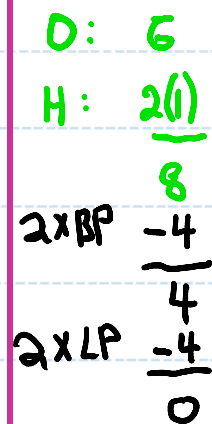
BP = Bond Pair

NH₃

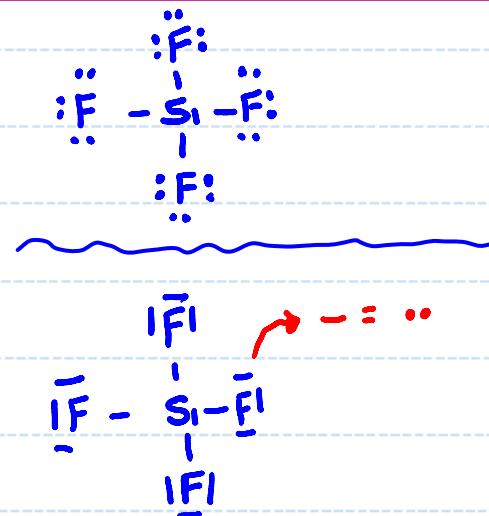
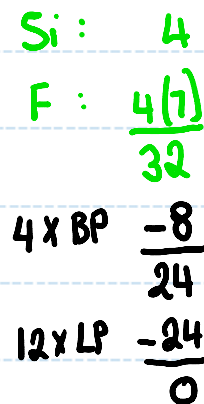


LP = LONE PAIR

H₂O



SiF₄



3.7

What Is a Covalent Bond and How Does One Form?

C

Drawing Lewis Structures of Covalent Compounds

Group I:

Bond Pair and Lone Pair Electrons

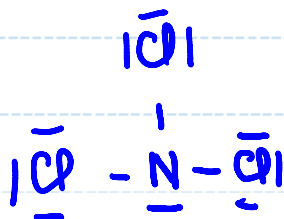


$$\begin{array}{r} \text{N: } 5 \\ \text{O: } 3(7) \\ \hline 26 \end{array}$$

$$\begin{array}{r} 3 \times \text{BP} \quad - 6 \\ \hline 20 \end{array}$$

$$\begin{array}{r} 9 \times \text{LP} \quad - 18 \\ \hline 2 \end{array}$$

$$\begin{array}{r} 1 \times \text{LP} \quad - 2 \\ \hline 0 \end{array}$$



Lone pairs on Cl?

- a) 1
- b) 9
- c) 3



Notes

- i) The least electronegative atom is the center ... *Why?* ... unless otherwise indicated.
- ii) Hydrogen ... 2 ... [He] ... all other atoms ... 8 ([Ne] → [Rn])
- iii) Allocate electrons to the outer atoms first then attend to the central atom.
- iv) Be able to distinguish between Bond Pair (BP) and Lone Pair (LP) electrons.
- v) Acceptable shorthand .. - = ..

3.7

C

Group II:

What Is a Covalent Bond and How Does One Form?

Drawing Lewis Structures of Covalent Compounds

Dealing With Charges

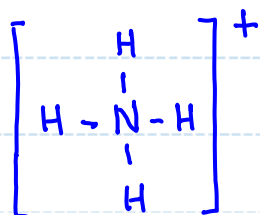


$$\text{N: } 5$$

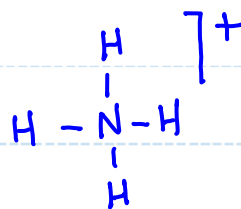
$$\text{H: } 4(1)$$

$$+ : \underline{-1}$$

$$\begin{array}{r} 8 \\ 4 \times \text{BP} \quad -8 \\ \hline 0 \end{array}$$

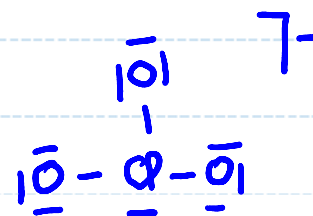


OR



$$\begin{array}{r} \text{Cl: } 7 \\ \text{O: } 3(6) \\ - : \quad \underline{1} \\ \hline 26 \end{array}$$

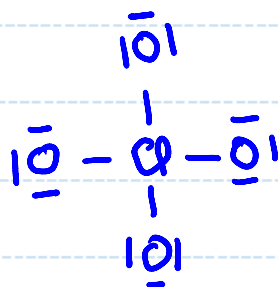
$$\begin{array}{r} 3 \times \text{BP} \quad -6 \\ 9 \times \text{LP} \quad -18 \\ 1 \times \text{LP} \quad -2 \\ \hline 0 \end{array}$$



Class HOMEWORK EXERCISE

$$\begin{array}{r} \text{Cl: } 7 \\ \text{O: } 4(6) \\ - : \quad \underline{1} \\ \hline 32 \end{array}$$

$$\begin{array}{r} 4 \times \text{BP} \quad -8 \\ 12 \times \text{LP} \quad -24 \\ \hline 0 \end{array}$$



Notes

- Negative charges increase the valence electron total.
- Positive charges decrease the valence electron total.
- Use parenthesis ... [] or ⁺.

3.7

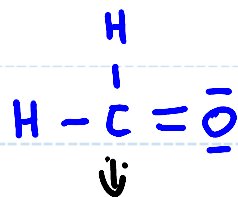
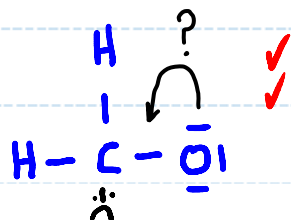
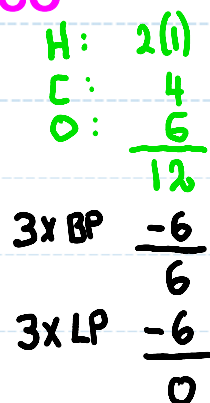
C

Group III:

What Is a Covalent Bond and How Does One Form?

Drawing Lewis Structures of Covalent Compounds

Shortage of Electrons ... Multiple Bonds

 H_2CO 

? Do I have a terminal atom with at least one lone pair on it?

? Are both atoms that are about to form a multiple bond members of **INOPS**?

Yes to both questions ... make a multiple bond

 HCN 