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CHM. 121.004
Inst. Mark Novak
Lab Report – Experiment 10
11/16/17

100
great job!

Experiment Objective

The objective of this experiment was to use the concept of Lewis dot structures to find the bond angle, hybridization, shape name, and overall polarity of a molecule.

Conclusion

This was a very straightforward lab. We were able to implement what we learned about Lewis structures, bond angle, hybridization, shape name, and polarity. The part of the lab that took the longest was creating the dot structures. After creating the dot structures, the rest was simply plugging in the rest of the data using the given dot structure chart. The only resonance structure that I noticed was for the SO_2 molecule; the double bond is just switched to the other side. I then started to do the polarity of molecules worksheet. This was also pretty straight forward; the lab manual gives the nonpolar, polar, and ionic bond ranges. After finding the electronegativity difference, then it's simply finding which range the bond belongs in. Overall, the lab was fairly easy and straightforward.

Example: In H_3PO_4, there is a P-O bond. Oxygen has an electronegativity of 3.5 and phosphorus has an electronegativity of 2.1

O	=	3.5
- P	=	2.1
Electronegativity Difference	=	1.4

Therefore, the P-O bond is a POLAR bond.

Here are the electronegativities of some elements:

bromine 2.8	fluorine 4.0	oxygen 3.5
carbon 2.5	hydrogen 2.1	sulfur 2.5
chlorine 3.0	nitrogen 3.0	

Complete the following table, calculating the electronegativity difference and determining the bond polarity.

Bond	Electronegativity Difference	Bond Polarity	Bond	Electronegativity Difference	Bond Polarity
C – H	.4	nonPolar	O – O	0	nonPolar
C – Cl	.5	Polar	N – N	0	nonPolar
C – O	1	Polar	C – C	0	nonPolar
O – H	1.4	Polar	C – F	1.5	Polar
H – F	1.9	Ionic	S - O	1	Polar
N - H	.9	Polar			

B3) After you have drawn the dot structure for each substance, look at the center atom in each one. Count how many atoms are directly bond to the center atom, and also how many spare electron **pairs** are on the center atom.

Add those two numbers together in order to get the "SUM" listed on the "DOT STRUCTURE CHART". From the "DOT STRUCTURE CHART" and the sum calculated, complete the "Second Chart On The Data Sheet", except for Overall Polarity.

Finally, follow the directions in the section "Predict From Lewis Dot Structure", to determine the overall polarity of each substance in the "Second Chart On The Data Sheet" and also for all substances in Part C.

Part C Working with ChemSketch

In this part of the experiment you will create space-filling models of six compounds from the ChemSketch program. Then you will print out the color picture of each of the compounds on separate sheets. Finally, you will add, computer printed from a blank template you have to make, the molecular formula, overall polarity (POLAR or NONPOLAR), your name in the upper right-hand corner after being stapled (Of Course!) and the correct dot structure. If necessary, you may print the correct dot structure in ink, instead of computer printout. However, everything else must come from the computer.

The six compounds are:

1) cis (Z) **-$C_2H_2Br_2$**	2) trans (E) **-$C_2H_2Br_2$**	3) no-name-**$C_2H_2Br_2$**
4) **CH_4O**	5) **SO_2**	6) **CH_2O_2**

Even though two of the six compounds are included in the previous chart, sulfur dioxide and methanol, you still have to include their molecular formula, dot structure and overall polarity on the individual space-filling model picture sheet. Be aware that the three carbon-carbon double bond isomers **are NOT the same compounds** as those in the previous chart.

To start, first draw a correct Lewis dot structure for each compound. Since you can't draw a correct space-filling model without a correct dot structure, you may want to check your dot structures with your instructor. Once you have the correct dot structures, then you can determine if the bonds are single, double or triple, and the correct bond angles.

USING CHEMSKETCH

Turn on the computer. You don't have to log on to the Chemistry laptops, but you may need to if you use another computer on campus. Double-click on ChemSketch icon on the desktop. Then also click on the OK in "Did you know?" tip box

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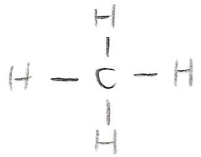
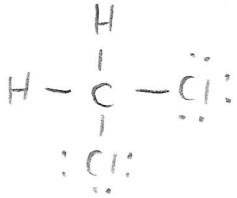
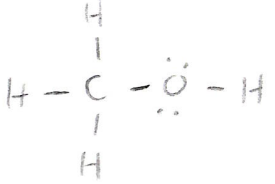
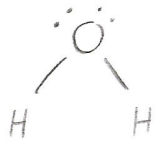
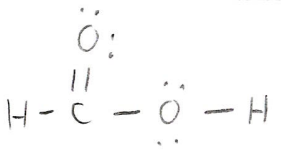
Skip except for Resonance Structure

Skip

#	FORMULA	Lewis Structure DOT STRUCTURE	BOND ANGLE	HYBRID-IZATION	SHAPE NAME	SYMMETRY (S or U)	ISOELECTRONIC RESONANCE OR ISOMERS	OVERALL POLARITY (P or NP)
1	CH_4 VE = 8		109.5	sp^3	Tetrahedral			NP
2	CH_2Cl_2 VE = 20		109.5	sp^3	Tetrahedral		X	-1 ~~NP~~
3	CH_4O VE = 14		109.5	sp^3	Tetrahedral		X	P
4	H_2O VE = 8		109.5	sp^3	Bent (v-shaped)			P
5	CH_2O_2 VE = 12		120	sp^2	Trigonal planar		X	P

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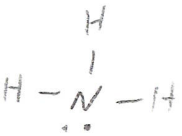
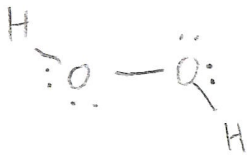
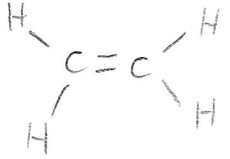
#	FORMULA	DOT STRUCTURE	BOND ANGLE	HYBRID-IZATION	SHAPE NAME	SYMMETRY (S or U)	ISOELECTRONIC RESONANCE OR ISOMERS	OVERALL POLARITY (P or NP)
6	HF 1+7 =8							P
7	NH_3 VE =8		109.5	sp^3	Trigonal Pyramid			P
8	H_2O_2 2+12 =14		109.5	sp^3	Bent (v-Shaped)			P
9	N_2 VE = 10							NP
10	C_2H_4 VE=12		120	sp^2	Trigonal Planar			NP

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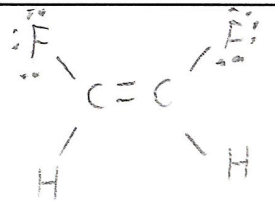
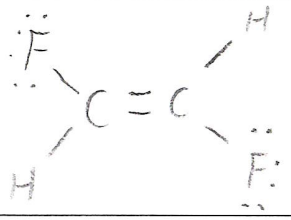
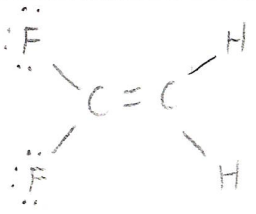
#	FORMULA	DOT STRUCTURE	BOND ANGLE	HYBRID-IZATION	SHAPE NAME	SYMMETRY (S or U)	ISOELECTRONIC RESONANCE OR ISOMERS	OVERALL POLARITY (P or NP)
11	cis-$C_2H_2F_2$ VE=24		120	sp^2	Trigonal planar			P
12	trans-$C_2H_2F_2$ VE=24		120	sp^2	Trigonal planar			NP
13	no-name-$C_2H_2F_2$ VE=24		120	sp^2	Trigonal planar			P
14	C_2H_2 VE=10		180	sp	Linear			NP
15	SO_2 VE=18		120	sp^2	Bent (V-Shaped)			P

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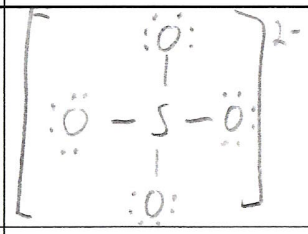
#	FORMULA	DOT STRUCTURE	BOND ANGLE	HYBRID-IZATION	SHAPE NAME	SYMMETRY (S or U)	ISOELECTRONIC RESONANCE OR ISOMERS	OVERALL POLARITY (P or NP)
16	SO_4^{-2} VE = 32		109.5	sp^3	Tetrahedral			NP
17	CO_2 VE = 16		180	sp	Linear			NP

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