Christopher Hunt
CH 201
Lab 8

Lab 8: Lewis Structures

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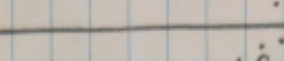
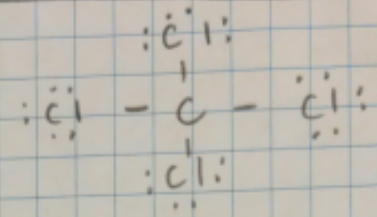
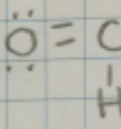
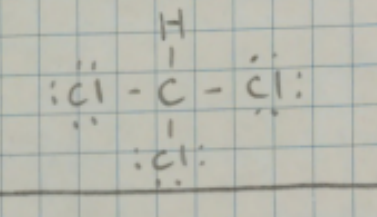
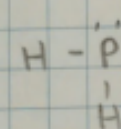
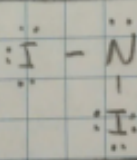
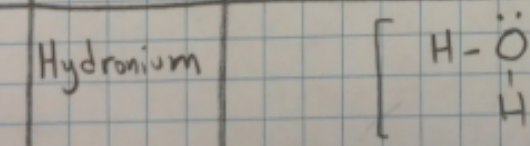
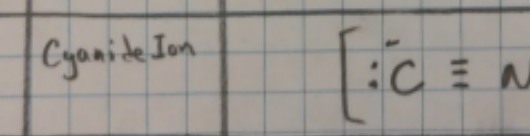
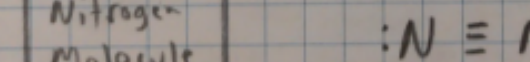
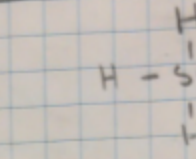
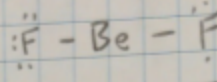
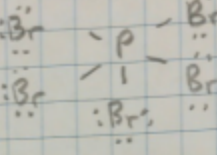
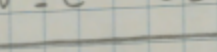
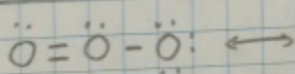
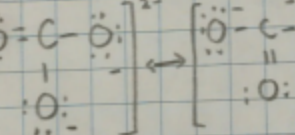
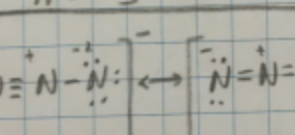
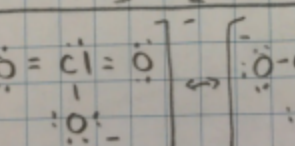
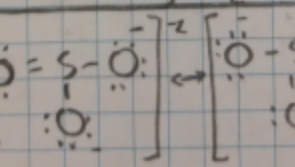
Results begin on the next page.

Results:

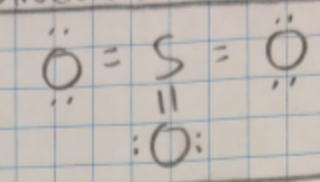
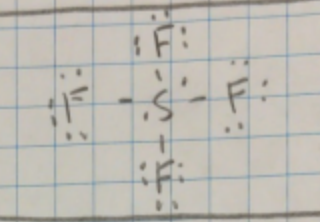
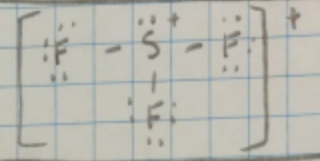
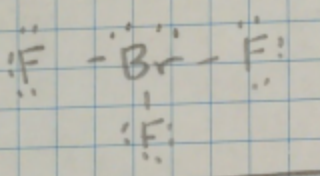
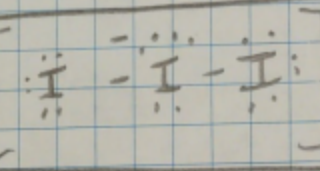
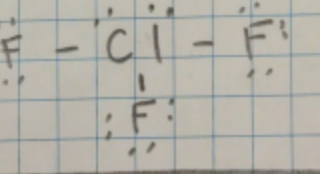
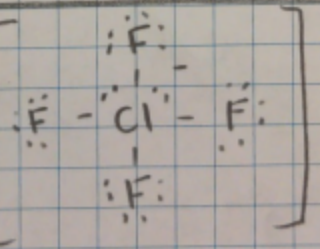
Results Table 1.

Formula	Name	Lewis structure and Reasonance structure
H_2O	Water	
CCl_4	Carbon Tetrachloride	
COH_2	Formaldehyde	
$CHCl_3$	Trichloromethane	
PH_3	Phosphorous Trihydride	
NI_3	Nitrogen Triiodide	
H_3O^+	Hydronium	 FC O=6-2-3=1 H=1-1=0
CN^-	Cyanide Ion	 FC C=4-2-3=-1 N=5-2-3=0
N_2	Nitrogen Molecule	

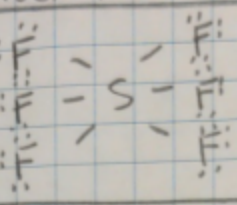
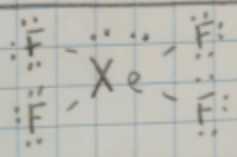
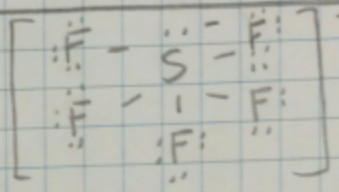
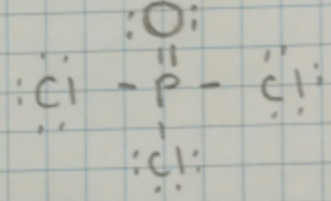
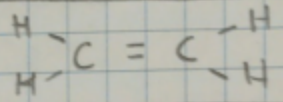
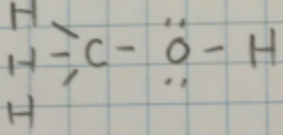
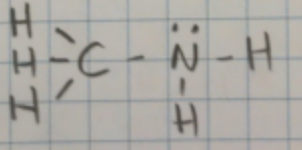
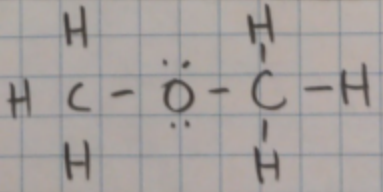
Results Table 1

Formula	Name	Lewis structure and Resonance Structure
SeH_4	selenium Tetrahydride	
BeF_2	Beryllium Fluoride	
PBr_5	phosphorus Pentabromide	
C_2N_2	Cyanogen	
* O_3	Ozone	
CO_3^{-2} ***	Carbonate Ion	 FC O: 6-6-1=-1
** N_3^-	Azide Ion	 FC N: 5-0-4=+1 N: 5-6-1=-2 N: 5-4-2=-1
** ClO_3^-	Chlorine Trioxide Ion	 FC O: 6-6-1=-1
SO_3^{-2}	Sulfite	 FC O: 6-6-1=-1

Results Table 1.

Formula	Name	Lewis structure and Resonance Structure
SO_3	Sulfur Trioxide	
SF_4	Sulfur Tetrafluoride	
SF_3^+	Sulfur Trifluoride Ion	 FC S=6-2-3=+1
BrF_3	Bromine Trifluoride	
I_3^-	Triiodide Ion	 FC I=7-6-2=-1
ClF_3	Chlorine Trifluoride	
ClF_4^-	Chlorine Tetrafluoride Ion	 FC Cl=7-4-4=-1

Results Table 1

Formula	Name	Lewis structure and Resonance structure
SF_6	Sulfur Hexafluoride	
XeF_4	Xenon Tetrafluoride	
SF_5^-	Sulfur Pentafluoride Ion	 FC S=6-2-5=-1
$POCl_3$	Phosphoryl-Chloride	
C_2H_4	Ethene	
CH_3OH	Methanol	
CH_3NH_2	Methylamine	
CH_3OCH_3	Dimethyl Ether	

Criteria	Formula	Explanation
Molecule with a central carbon atom and all single bonds.	CCl_4	The carbon atom is surrounded by four chlorine atoms, each making a single bond with the central carbon atom.
Molecule with a central carbon atom and at least 1 double or triple bond.	CO_3	The carbonate ion is composed of a central carbon atom, with three oxygen atoms surrounding it with one making a double bond with the carbon.
Molecule with a central halogen.	ClF_3	Chlorine Trifluoride is a halogen, chlorine, surrounded by 3 fluorine atoms.
Molecule with an expanded octet.	BrF_3	Bromine Trifluoride has an expanded octet, with the Bromine atom being made of three single bonds and 2 lone pairs.
Molecule with more than one central atom.	C_2H_4	Ethene has two carbon atoms, double bonded, as the central component of the compound.

Discussion and Conclusions:

The purpose of this lab was to gain more experience with creating lewis structures from given molecular formulas. This was achieved by iteratively performing the procedures to draw the correct structures. By developing the skills of drawing Lewis Structures and gaining more intuition on how molecular structures are composed it allows for a better understanding of how larger structures might be constructed and it gives the chemist a geometric understanding of the structures that have thus far only been theoretically understood. By being able to understand the geometric structure of compounds, it may be possible to predict how these molecular units might piece together to form larger structures, or how they might change when losing bonds and reforming in chemical reactions.

By performing this lab I have left feeling far more confident in the process of drawing Lewis Structures and understanding how formal charge and resonance occurs. Resonance occurs when a molecular structure requires different distributions of formal charge. When atoms are at their most balanced state, no resonance occurs, but when different elements can have different types of bonds in a structure, it resonates between these different potential structures. Central atoms in n greater than or equal to 3 can have an expanded octet because they have access to

the d and possibly the f sub levels, which can hold more than 8 electrons. The maximum number of bonds an element can form is determined by the number of valence electrons it has, and the number of electrons it needs to share to achieve a full valence shell. For most elements, this limits the number of bonds to three or less.