**GENERAL & ANALYTICAL CHEMISTRY I**

**CHMG-141**

With Dr. Bailey Name: \_\_\_\_\_\_\_\_\_\_\_

Recitation

Week 7

**Covalent Bonding II**

1. **Working with Lewis Structures**
2. *Write Lewis Structures; show number of valence electrons and electrons pairs*
3. *If there are Resonance structures; show all of them.* *What structure is* ***predominant****?*
4. *Calculate formal charges on each atom*
5. *Bond polarity. Show electronegativity difference for each bond; show dipoles*
6. *Predict Molecular Geometry around each atom*

**How to work: draw Lewis Structures for each of the species that follow and answer the questions:**

Step 1: How many valence electrons are available for bonding?

Step 2: Determine the atom-to-atom connectivity. For every atom-to-atom connection, make a single bond (a shared electron pair).

Step 3: Distribute the remaining electrons to lone –pair positions on atoms that need an octet.

Step 4: Identify atoms that need an octet, but do not yet have one.

Step 5: Rearrange electrons from lone pairs of adjacent atoms, forming multiple bonds, so that the atoms identified in Step 4 have an octet. Count the electrons to make sure you have the number you started with!

Step 6: Calculate the formal charge **on each atom**.

Step 7: Are the **bonds** in the structure nonpolar covalent, polar covalent, or ionic? Show electronegativity difference for each bond; show dipoles.

Step 8: Can you draw resonance structures? If so, how many? Show all of them. Based on the formal charges, what structure is **predominant**?

Step 8: Predict Molecular **Geometry**

1. C2H6
2. C2H2
3. NH3
4. HBr
5. H2O2
6. SO4-2
7. N2O (use N-N-O) arrangement
8. NO3-
9. CO3-2
10. BeCl2
11. C6H6 (What if the two ends of the chain connect? A ring?)
12. **Molecular Geometry**

Complete the rows in the table below by

1. finding an example of a molecule or an ion with the given structure **(show both molecular formula and Lewes Dot Structure)**
2. predicting the molecular geometry
3. estimating bond angles

“A” represents a central atom; “B” represents a terminal atom, and “E” represents an unshared (lone) electron pair on the central atom.

|  |  |  |  |
| --- | --- | --- | --- |
| Structure | Example | Molecular Geometry | Bond Angles |
| AB2 | CO2  Co2ls | Linear | 180 |
| AB2E |  |  |  |
| AB3 |  |  |  |
| AB4 |  |  |  |
| AB3E |  |  |  |
| AB2E2 |  |  |  |
| AB5 |  |  |  |
| AB6 |  |  |  |