Hello everyone! Good job, y’all made it through another week!!

I’ll be posting weekly resources on the topics that will be covered in class the following week. Reach out to me if you need help with anything. Also do let me know if there are any specific resources you find helpful in the discussion board. If you cannot make it to Group Tutoring, remember these resources are available to you on the tutoring center website.

Our Group Tutoring sessions will be every **Monday from 5:00-6:00 PM**. We will go over important topics that you will be covering in class and we will practice problems that you will need to be familiar with. You can reserve a spot at https://baylor.edu/tutoring. I hope to see you there!

**Some topics I’ll be covering:** Naming compounds, writing formulas, the difference between binary acids and oxyacids, VSEPR

**Keywords:** Nomenclature, formula, VSEPR

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**TOPIC OF THE WEEK**

**Non-polar and Polar molecules**

- **Non-polar molecules:** Has a net dipole that is zero; the electric charges of nonpolar molecules are evenly distributed across the molecule
- **Polar molecules:** Has a permanent dipole moment (dipole moment that is not equal to zero, resulting from unsymmetrical electronic geometries); a polar molecule is a molecule in which one end of the molecule is slightly positive, while the other end is slightly negative

**Key point to note:** The molecular geometry plays a significant role in determining if a molecule is polar or non-polar. A tetrahedral structure is symmetrical, thus making the entire molecule a non-polar molecule. However, a bent structure is asymmetrical (because of the lone pairs) which makes the molecule polar.
HIGHLIGHT #1: Naming compounds

Two rules that should be followed
#1) The first word will be the name of the cation which is the parent element
#2) The second word will be the name of the anion, it replaces the parent element and ends with -ide

For example,
CaCl$_2$ is Calcium Chloride
Calcium forms Ca$^{2+}$ ion
Chloride forms Cl$^-$
Therefore, two of the anions (Cl$^-$) will be required to produce a neutral compound

**Cation:** From groups 1, 2 or 13 (Ag$^+$, Zn$^{2+}$, Cd$^{2+}$)

**Anion:** From groups 15, 16 or 17

This flowchart below will help in determining how to name an inorganic compound

[Flowchart image: Inorganic Nomenclature Flow Chart]

https://in.pinterest.com/pin/426997608404210844/
Some more examples of those metals that have alternative forms of ions:

<table>
<thead>
<tr>
<th>formula</th>
<th>systematic name</th>
<th>common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CuCl</td>
<td>copper(I) chloride</td>
<td>cuprous chloride</td>
</tr>
<tr>
<td>CuCl₂</td>
<td>copper(II) chloride</td>
<td>cupric chloride</td>
</tr>
<tr>
<td>Hg₂Cl₂</td>
<td>mercury(I) chloride</td>
<td>mercurous chloride</td>
</tr>
<tr>
<td>HgO</td>
<td>mercury(II) oxide</td>
<td>mercuric oxide</td>
</tr>
<tr>
<td>FeS</td>
<td>iron(II) sulfide</td>
<td>ferrous sulfide</td>
</tr>
<tr>
<td>Fe₂S₃</td>
<td>iron(III) sulfide</td>
<td>ferric sulfide</td>
</tr>
</tbody>
</table>

https://courses.lumenlearning.com/boundless-chemistry/chapter/naming-compounds/

Writing formulas:

Steps to writing formulas:
1. Identify the cation
2. Write down the symbol and charge of the cation
3. Identify the anion
4. Write down the symbol and charge of the anion
5. Combine the two ions to form an electrically neutral compound

HIGHLIGHT #2: Difference between Binary acids and Oxyacids

The picture to the left explains the difference between binary acids and oxyacids. To understand the definition of an oxyacid, it is important to understand the meaning of polyatomic ions. Polyatomic ions are those ions that consist of more than one atom. The atoms in a polyatomic ion are usually covalently bonded to one another and therefore stay together as a single, charged unit. For example, NO₃⁻ contains one nitrogen atom and three oxygen atoms.
The picture to the left gives some common oxyacids and their anions. Take a note of the subscript on these anions as it determines the difference in nomenclature. For example, $\text{SO}_3^{2-}$ (subscript of 3) is called sulfite ion, however, $\text{SO}_4^{2-}$ (subscript of 4) is called sulfate ion.

**Table 2.4: Some Common Oxoacids and Their Anions**

<table>
<thead>
<tr>
<th>Oxoacid</th>
<th>Oxoanion</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{HNO}_2$, Nitrous acid</td>
<td>$\text{NO}_2^-$, Nitrite ion</td>
</tr>
<tr>
<td>$\text{HNO}_3$, Nitric acid</td>
<td>$\text{NO}_3^-$, Nitrate ion</td>
</tr>
<tr>
<td>$\text{H}_3\text{PO}_4$, Phosphoric acid</td>
<td>$\text{PO}_3^-$, Phosphate ion</td>
</tr>
<tr>
<td>$\text{H}_2\text{SO}_3$, Sulfurous acid</td>
<td>$\text{SO}_3^-$, Sulfite ion</td>
</tr>
<tr>
<td>$\text{H}_2\text{SO}_4$, Sulfuric acid</td>
<td>$\text{SO}_4^{2-}$, Sulfate ion</td>
</tr>
<tr>
<td>$\text{HClO}$, Hypochlorous acid</td>
<td>$\text{ClO}^-$, Hypochlorite ion</td>
</tr>
<tr>
<td>$\text{HClO}_2$, Chlorous acid</td>
<td>$\text{ClO}_2^-$, Chlorite ion</td>
</tr>
<tr>
<td>$\text{HClO}_3$, Chloric acid</td>
<td>$\text{ClO}_3^-$, Chlorate ion</td>
</tr>
<tr>
<td>$\text{HClO}_4$, Perchloric acid</td>
<td>$\text{ClO}_4^-$, Perchlorate ion</td>
</tr>
</tbody>
</table>

**HIGHLIGHT #3: VSEPR Theory**

I included VSEPR again in this week’s resource because it is a challenging concept and some of the content I will mention in this week’s resource will make this concept much more clear.

VSEPR theory, basically assumes that each atom in a molecule will achieve a geometry that minimizes the repulsion between electrons in the valence shell of that atom. The table on the left can help determine the molecular geometry. Begin with finding the coordination number of the central atom and then use the chart to the left to determine its shape.

<table>
<thead>
<tr>
<th>Number of Electron Denso Areas</th>
<th>Electron-Pair Geometry</th>
<th>Molecular Geometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Linear</td>
<td>Linear</td>
</tr>
<tr>
<td>3</td>
<td>Trigonal planar</td>
<td>Bent</td>
</tr>
<tr>
<td>4</td>
<td>Tetrahedral</td>
<td>Bent</td>
</tr>
<tr>
<td>5</td>
<td>Trigonal bipyramidal</td>
<td>Bent</td>
</tr>
<tr>
<td>6</td>
<td>Octahedral</td>
<td>Linear</td>
</tr>
</tbody>
</table>

**Note:** The angles pertaining to each shape

- **Linear:** 180 degrees
- **Trigonal Planar:** 120 degrees
- **Tetrahedral:** 109.5 degrees
- **Trigonal Bipyramidal:** 90 degrees (axial and equatorial); 120 degrees (equatorial and equatorial)
- **Octahedral:** 90 degrees
Steps to predict the molecular geometry:

- Correctly draw the lewis structure for the molecule or ion
- Determine the number of electron groups
- Classify as bonding or nonbonding
- Determine the molecular geometry based on the table (memorize it!)
- Memorize the bond angles as well

CHECK YOUR LEARNING

1. What are the names and the formulas of the following:
   a. Potassium and iodine
   b. Sodium and oxygen
   c. Aluminum and sulfur
   d. Magnesium and Iodide
   e. Iron (II) and oxygen
   f. Iron (III) and oxygen

2. Determine the shape and bond angles for the following:
   a. HCN
   b. O₃
   c. SF₆

THINGS YOU MAY STRUGGLE WITH

- Separating polyatomic ions: Polyatomic ions are like conjoined twins and these atoms move together and can’t be separated. When drawing out the cations and anions to show how balancing charges work, make sure to draw out the anions as a single circle- even if they are polyatomic ions.
- Charge on a polyatomic ion: polyatomic ions always have the same charge and that charge is not on the periodic table. You’ll have to memorize it!
- Visualizing the molecular geometry: I would recommend getting a molecular model kit so you can build the molecules to see what it looks like and it will help you identify the geometry.
- For identifying the molecule geometry in VSEPR theory, make sure you take the lone pairs into account. They play a very important role in determining molecular geometry.

Thank you!! Hope y’all have a great time learning chemistry! Please reach out if you have any questions and don’t forget to visit the Tutoring Center website for further information at www.baylor.edu/tutoring.
Answers:

I.  
   a. Potassium iodide (KI)  
   b. Sodium oxide (Na$_2$O)  
   c. Aluminium sulfide (Al$_2$S$_3$)  
   d. Magnesium iodide (MgI$_2$)  
   e. Iron (II) oxide (FeO)  
   f. Iron (III) oxide (Fe$_2$O$_3$)  

II.  
    a. Linear (180 degrees)  
    b. Bent (less than 120 degrees)  
    c. Octahedral (90 degrees)