1. Complete the table. Assume neutral atoms.

<table>
<thead>
<tr>
<th>name</th>
<th>Chlorine</th>
<th>Symbol</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>symbol</td>
<td>Chlorine</td>
<td>N</td>
<td>15</td>
</tr>
<tr>
<td>atomic #</td>
<td>Chlorine</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td># protons</td>
<td>Chlorine</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td># neutrons</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td># electrons</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td># electrons in 1st shell</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td># electrons in 2nd shell</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td># electrons in 3rd shell</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
<tr>
<td># valence electrons</td>
<td>Chlorine</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Draw **Bohr diagrams** for the atoms below.
   a) nitrogen  
   b) argon  
   c) phosphorus

3. Draw **Lewis dot diagrams** for the atoms below.
   a) argon  
   b) phosphorus  
   c) beryllium

4. Draw the **Lewis illustration of ionic bond formation** for Aluminum Phosphide. Use 3 steps as done in class.
5. For the following molecules, draw partial charges ("deltas") over the appropriate atoms and then state in the blank whether the molecule as a whole is polar or non-polar.

a) \[ \begin{array}{c}
\text{Cl} \\
| \\
\text{Cl-C-Cl} \\
| \\
\text{Cl}
\end{array} \]

b) \[ \begin{array}{c}
\text{O=Si=O}
\end{array} \]

c) \[ \begin{array}{c}
\text{H} \\
/ \\
\text{0=C} \\
\text{H}
\end{array} \]

d) \[ \begin{array}{c}
\text{N} \\
/ | \ \\
\text{H H H H}
\end{array} \]

6. a) Consider a molecule with 2 carbon atoms joined by a single bond. How many hydrogen atoms does the molecule need so that each carbon has a complete octet? __________

b) Make a sketch of the molecule showing all atoms and bonds.
c) Make a **sketch of a molecule** which contains the atoms listed below. Make sure that each atom has the correct number of bonds. There is no single correct answer.

5 C, 3 N, 2 O, 1 Cl, and as many H as needed

7. **Polar or charged** substances dissolve well in water (a polar liquid). Indicate whether each of the following will or will not **dissolve well** in water by writing “Yes” or “No”.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>H₂O</td>
<td>d)</td>
<td>glucose</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Na⁺</td>
<td>e)</td>
<td>O₂</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>H-H</td>
<td>f)</td>
<td>HCl</td>
<td></td>
</tr>
</tbody>
</table>

8. “One hundred human volunteers were involved in clinical trials of a new acne medicine. Fifty individuals took 80 mg of AcneGone with 500 mL of water, twice a day; the other fifty individuals drank 500 mL of water, twice a day. Ninety-five percent of individuals taking AcneGone experienced a noticeable decrease in acne. However, two percent of individuals taking water only experienced a noticeable decrease in acne.”

Identify the:

a) **independent** variable _____________________________
b) **dependent** variable _____________________________
c) **controlled** variable(s) _____________________________

How would you explain the fact that two percent of individuals taking **water only** experienced a decrease in acne?

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________