1. Determine the indicated number of subatomic particles in each of the following.

**Subatomic Particles in Neutral Atoms (Ex. Set 3B pg. 66):**

- $^{37}$Cl: # p = ___, # e- = ___, # n = ___
- $^{235}$U: # p = ___, # e- = ___, # n = ___
- helium-4: # p = ___, # e- = ___, # n = ___
- cobalt-60: # p = ___, # e- = ___, # n = ___

**Subatomic Particles in Ions (Ex. Set 3D pg. 70):**

- H$: # p = ___, # e- = ___
- H: # p = ___, # e- = ___
- N$^{-3}$: # p = ___, # e- = ___
- Fe$^{+2}$: # p = ___, # e- = ___
- C$^{4-}$: # p = ___, # e- = ___

2. How many atoms of each element are present in the following compounds.

**Chemical Compounds (Ex. Set 3C pg. 68):**

- Al$_2$(SO$_4$)$_3$
- (NH$_4$)$_2$HPO$_4$
- BaCl$_2$•2H$_2$O

3. Determine the number of electrons in the outermost shell (i.e. # of valence electrons) of each of the following atoms.

**Outermost Electrons/Valence Electrons (Ex. Set 3E pg. 74):**

- Ba: # e- in outermost shell = ___
- I: # e- in outermost shell = ___
- Si: # e- in outermost shell = ___
- P: # e- in outermost shell = ___
- He: # e- in outermost shell = ___
- Ne: # e- in outermost shell = ___
4. Use the position of the element in the periodic table to determine what ions are formed by the following atoms in ionic compounds.

**Typical Ions (Ex. Set 3F pg. 76):**

<table>
<thead>
<tr>
<th>Sr</th>
<th>S</th>
<th>Al</th>
<th>P</th>
<th>Cs</th>
</tr>
</thead>
</table>

5. Give the neutral formula unit for combination of the following.

**Formula Units (Ex. Sets 3G and 3J pgs. 80 & 82):**

- lithium and oxygen
- calcium and chlorine
- magnesium and sulfur
- sodium and nitrogen
- aluminum and fluorine
- iron(III) and $\text{SO}_4^{2-}$
- cobalt(II) and $\text{ClO}_4^{-}$
- silver(I) and $\text{CrO}_4^{2-}$
- $\text{NH}_4^{+}$ and $\text{CO}_3^{2-}$
- magnesium and $\text{NO}_3^{-}$
- calcium and $\text{SO}_3^{2-}$

6. Determine what ions are indicated (i.e. what ions make up) the following compounds.

**Ions in Ionic Compounds (Ex. Sets 3H and 3I pgs. 81 and 82):**

<table>
<thead>
<tr>
<th>ZnS</th>
<th>CoCl$_3$</th>
<th>Cr$_2$O$_3$</th>
<th>CeF$_4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na$_3$PO$_4$</td>
<td>Al(ClO$_4$)$_3$</td>
<td>SrSO$_4$</td>
<td>NaAlO$_2$</td>
</tr>
</tbody>
</table>

7. Classify the compounds shown below as ionic or covalent (molecular).

**Compound Type (Ex. Set 3K pg. 87):**

| KBr | ClO$_2$ | CaCl$_2$ | NO | Al$_2$(SO$_4$)$_3$ |