5.9 Polyatomic Ions
Pg. 202 – 205

• A **polyatomic ion** is an ion made up of more than one atom that acts as a single particle
  - The ionic charge is shared over the entire ion rather than being on just one atom
• Common polyatomic ions

<table>
<thead>
<tr>
<th>Name of Polyatomic Ion</th>
<th>Ion Formula</th>
<th>Ionic Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate ion</td>
<td>NO$_3^-$</td>
<td>-1</td>
</tr>
<tr>
<td>Nitrite ion</td>
<td>NO$_2^-$</td>
<td>-1</td>
</tr>
<tr>
<td>Hydroxide ion</td>
<td>OH$^-$</td>
<td>-1</td>
</tr>
<tr>
<td>Hydrogen carbonate ion (also called bicarbonate ion)</td>
<td>HCO$_3^-$</td>
<td>-1</td>
</tr>
<tr>
<td>Chlorate ion</td>
<td>ClO$_3^-$</td>
<td>-1</td>
</tr>
<tr>
<td>Carbonate ion</td>
<td>CO$_3^{2-}$</td>
<td>-2</td>
</tr>
<tr>
<td>Sulfate ion</td>
<td>SO$_4^{2-}$</td>
<td>-2</td>
</tr>
<tr>
<td>Sulfite ion</td>
<td>SO$_3^{2-}$</td>
<td>-2</td>
</tr>
<tr>
<td>Phosphate ion</td>
<td>PO$_4^{3-}$</td>
<td>-3</td>
</tr>
<tr>
<td>Ammonium</td>
<td>NH$_4^+$</td>
<td>+1</td>
</tr>
</tbody>
</table>

**Naming Compounds Involving Polyatomic Ions**

• Same strategy as with binary ionic compounds, except the ion given the polyatomic name, rather than the names of each individual element
  1. Write the name of the compound e.g. Na$_2$CO$_3$
  2. Check whether to see if the metal has more than one ionic charge. Sodium always has a charge of +1
  3. Name the metal – sodium
  4. Name the polyatomic ion – carbonate
  5. Write the name of the compound – sodium carbonate

E.g. Ca(OH)$_2$
Calcium hydroxide
*The brackets show that there are two atoms of hydroxide, and not just two hydrogens

**Writing Formulas Involving Polyatomic Ions**

• Same rules as with binary ionic compounds, except the polyatomic ion must be treated as one unit

E.g. sodium phosphate
Na$^+$ PO$_4^{3-}$
Na$_3$PO$_4$
E.g. copper (II) nitrate

\[ \text{Cu}^{2+} \quad \text{NO}_3^- \]

\[ \text{Cu(NO}_3\text{)}_2 \]

**Polyatomic Ions in the Food Industry**

- Processed foods have a lot of sodium, mostly from sodium chloride, \( \text{NaCl} \) (table salt) – makes the food taste better and last longer
- Processed foods have other additives that add to your sodium intake
  - Sodium phosphate (\( \text{Na}_3\text{PO}_4 \)) helps the meat in a hot dog stay together
  - Sodium nitrite (\( \text{NaNO}_2 \)) makes it taste better and last longer and gives it its pink colour
  - The World Health Organization (WHO) has now declared processed meat as a carcinogen

**Homework**
- Read 5.9 Polyatomic Ions, Pg. 202 – 205
- Pg. 205 #1, 2, 5, 10

**Applied**
- Read 5.6 Ionic Compounds, Pg. 181 – 183
- Pg. 205 #1, 2, 5a-d SNC2D Textbook