This homework is due on Monday, February 26, at classtime.

(90)  1. State for each of the following whether it is:
   a. an acid, base, or salt (A/B/S)
   b. a strong or weak electrolyte (SE/WE)
   c. soluble or insoluble (S/I)
   d. whether its formula would be separated into ions or left intact in a net ionic equation.
   e. if its formula would be split into ions in a net ionic equation, write the formulas for the ions into which it would split, including charge.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HNO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HNO₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BaCl₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PbSO₄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NH₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Ca(OH)₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BaSO₄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NaHCO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AgNO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H₂CO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H₂SO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HC₆H₅O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H₃PO₄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>KCH₂O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbCl₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Na₂HPO₄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HC₂H₃O₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HNC₃H₄SO₃</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Circle the acids and draw a box around the bases in the following reactions. There should be one circle on each side of the reaction and one box on each side of the reaction.

\[
\begin{align*}
\text{HCl (aq)} & + \text{OH}^- (\text{aq}) \rightarrow \text{HOH (R)} + \text{Cl}^- (\text{aq}) \\
\text{NH}_3 (\text{aq}) & + \text{HOH (R)} \rightarrow \text{NH}_4^+ (\text{aq}) + \text{OH}^- (\text{aq}) \\
\text{HF (aq)} & + \text{HOH (R)} \rightarrow \text{H}_3\text{O}^+ (\text{aq}) + \text{F}^- (\text{aq}) \\
\text{H}_2\text{CO}_3 (\text{aq}) & + \text{NH}_3 (\text{aq}) \rightarrow \text{HCO}_3^- (\text{aq}) + \text{NH}_4^+ (\text{aq}) \\
\text{HOH (R)} & + \text{HOH (R)} \rightarrow \text{H}_3\text{O}^- (\text{aq}) + \text{OH}^- (\text{aq})
\end{align*}
\]

3. a. Write the formula (with charge) for the conjugate base of each of the following:

\[
\begin{align*}
\text{H}_2\text{PO}_4^- & \quad \text{H}_2\text{SO}_4 \\
\text{HF} &
\end{align*}
\]

b. Write the formula (with charge) for the conjugate acid of each of the following:

\[
\begin{align*}
\text{H}_2\text{PO}_4^- & \quad \text{NH}_3 \\
\text{H}_3\text{O}^+ &
\end{align*}
\]

4. Write the equilibrium constant expression for each of the following equilibria:

\[
\begin{align*}
\text{HC}_2\text{H}_3\text{O}_2 (\text{aq}) + \text{HOH (R)} & \rightarrow \text{H}_3\text{O}^+ (\text{aq}) + \text{C}_2\text{H}_3\text{O}_2^- (\text{aq}) \\
\text{NH}_3 (\text{aq}) + \text{HOH (R)} & \rightarrow \text{NH}_4^+ (\text{aq}) + \text{OH}^- (\text{aq})
\end{align*}
\]

5. Give the initial concentrations of each ion present from dissolving the following solutes in water.

\[
\begin{align*}
0.25 \text{ M HCl} & \quad 0.15 \text{ M NH}_4\text{Cl} \\
0.10 \text{ M Ba(C}_2\text{H}_3\text{O}_2\text{)}_2 & \quad 0.30 \text{ M CaF}_2
\end{align*}
\]