1. Identify the species oxidized, the species reduced, the oxidizing agent and the reducing agent in the following electron transfer reaction:

\[ \text{Hg}^{2+} \text{ reduced oxidizing agent} \]

\[ \text{I}^- : \text{oxidized reducing agent} \]

\[ \text{Hg}^2+ + 2\text{I}^- \rightarrow \text{Hg} + \text{I}_2 \]

\[ \text{ox.} \# \text{ increases} \rightarrow \text{oxidized} \]

\[ \text{ox.} \# \text{ decreases} \rightarrow \text{reduced} \]

2. What are the oxidation numbers of:

\[ \text{Ni and S in NiSO}_4 \]

\[ \text{Cl in ClO}_3^- \]

\[ \begin{align*}
\text{Ni} & : 1+ \\
\text{S} & : 6 \\
\text{Cl} & : +5
\end{align*} \]

\[ \text{ClO}_3^- \]

\[ +5 \]

\[ \begin{align*}
\text{ClO}_3^- & \rightarrow \text{Cl}^- + \text{O}_3^- \\
& \rightarrow \text{Cl}^- + \frac{3}{2} \text{O}_2
\end{align*} \]

\[ -8 - (-2) = +6 \]

3. A student is asked to standardize a solution of potassium hydroxide. He weighs out 0.930 g potassium hydrogen phthalate (KHCO₃, treat this as a monoprotic acid).

It requires 35.8 mL of potassium hydroxide to reach the endpoint.

A. What is the molarity of the potassium hydroxide solution? \( \text{M} \)

B. If 28.6 mL of the potassium hydroxide solution is required to neutralize 10.8 mL of hydrochloric acid, what is the molarity of the hydrochloric acid solution? \( M \)

4. Write net-ionic equations for the following reactions:

\[ \text{NiSO}_4 + \text{BaCl}_2 \]

\[ \text{HCl} + \text{NaCH}_3\text{CO}_2 \]

\[ \text{HNO}_3 + \text{MgCO}_3 \]

\[ \text{HBr} + \text{CaC}_2\text{O}_4 \]

\[ \text{H}_2\text{O} \rightarrow \text{H}_2\text{O} \]

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

\[ \text{H}_2\text{O} \rightarrow \text{H}_2\text{O} \]
Strong Acid

HBr + CaC$_2$O$_4$ (insoluble)

Total Ionic Equation:

\[ 2H^+ (aq) + 2Br^- (aq) + CaC_2O_4 (s) \rightarrow Ca^{2+} (aq) + 2Br^- (aq) + H_2C_2O_4 (s) \text{ (weak acid)} \]

Net Ionic Equation:

\[ 2H^+ + CaC_2O_4 (s) \rightarrow Ca^{2+} (aq) + H_2C_2O_4 (s) \]