**Rules for Assigning Oxidation Numbers:**

1. Each atom in a pure element has an oxidation number of zero.
2. For monoatomic ions, the oxidation number is equal to the charge on the ion.
3. Fluorine always has an oxidation number of -1 in compound with all other elements.
4. Cl, Br, and I always have oxidation numbers of -1 in compounds, except when combined with oxygen or fluorine.
5. The oxidation number of H is +1 and of O is -2 in most compounds.
   - Exception for H: In compounds with metals, H is -1
   - Exception for O: In peroxides, the \( \text{O}_2^2^- \) ion gives O an oxidation number of -1
6. The sum of the oxidation numbers for atoms in a neutral compound must be zero; in a polyatomic ion, the sum must be equal to the ion charge.

**Recognizing Redox Reactions:**

Metals reacting with Nonmetals:

\[ 2 \text{Al} + 3 \text{Br}_2 \rightarrow \text{Al}_2\text{Br}_6 \]

Almost anything with Oxygen:

\[ 2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO} \]
\[ \text{S} + \text{O}_2 \rightarrow \text{SO}_2 \]

Organic Compounds:

\[ \text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} \]

Others, more difficult to detect:

\[ 5 \text{Fe}^{2+} + \text{MnO}_4^- + 8 \text{H}^+ \rightarrow 5 \text{Fe}^{3+} + \text{Mn}^{2+} + 4 \text{H}_2\text{O} \]