

Rules for Assigning Oxidation States

1. The oxidation state for an atom in its elemental form is zero: thus, the oxidation states for the following are all 0:

Cu

Ag

O₂

2. The oxidation state of a monatomic cation or anion is the same as the ions charge: thus

Cu²⁺ has an oxidation state of +2

Cl⁻ has an oxidation state of -1

3. The algebraic sum of oxidation states for the elements in a polyatomic compound must equal the compound's or ion's total charge; thus

CH₄: (oxidation state of C) + (4 × oxidation state of H) = 0

NO₃⁻: (oxidation state of N) + (3 × oxidation state of O) = -1

4. There are a few elements that have only one or two possible oxidation states; these are
 - a. hydrogen is always +1 when bound to a non-metal and -1 when bound to a metal
 - b. fluorine is always -1
 - c. alkali metals are always +1
 - d. alkaline earths are always +2
 - e. boron is always +3, aluminum is always +3, and silicon is always +4
 - f. oxygen is usually -2 (although it is -1 in the peroxide ion, O₂²⁻, and -1/2 in the super oxide ion, O₂⁻; these are rare, however)
5. Metals have only positive oxidation states, but nonmetals (other than fluorine and oxygen) may have either positive or negative oxidation states.