Oxidation numbers

Oxidation # is a “Bookkeeping” system were a number represents the charge an atom appears to have.

Rules for determining oxidation #'s

1. Oxidation # of an element in it’s elemental state is zero. Elemental state of metals is an atom of the metal (such as Cu, Fe, Na). Elemental state of a nonmetal is the element alone or with itself with no charge (C, N₂, O₂).

2. The oxidation # of a monoatomic ion is equal to the charge on the ion. (Ca²⁺ = +2, Fe³⁺ = +3)

3. The oxidation # of fixed charge metals equal to ions fixed charge.
   (Group IA metal = +1, IIA = +2 etc…)

4. Oxidation # of H is +1 in most compounds

5. Oxidation # of O is -2 in most compounds

6. In binary molecular compounds the oxidation number of the more electronegative element is assigned it’s negative ion charge (group # - 8)

7. For polyatomic ions the total of all oxidation #'s must equal the charge of the ion.
   (NO₃⁻ => 1 times the oxidation # of N + 3 times the oxidation # of O = -1)

8. For a compound the sum of all oxidation #'s must equal zero. (Fe₂O₃ => 2 times oxidation # of Fe + 3 times oxidation # O = 0)

   Solubility Rules

   1. All Group IA and ammonium (NH₄⁺) ionic compounds are soluble in water.

   2. All nitrate (NO₃⁻) compounds are soluble in water.

   3. Chloride (Cl⁻), bromide (Br⁻¹) and iodide (I⁻¹) ionic compound are soluble in water except when combined with Ag⁺, Pb²⁺, and Hg₂²⁺

   4. sulfate (SO₄²⁻) ionic compounds are soluble in water except when combined with Ca²⁺, Sr²⁺, Ba²⁺, and Pb²⁺

   5. carbonate (CO₃²⁻) ionic compounds are insoluble in water except when combined with Group IA and NH₄⁺

   6. phosphate (PO₄³⁻) ionic compounds are insoluble in water except when combined with Group IA and NH₄⁺

   7. hydroxide (OH⁻) ionic compounds are insoluble in water exceptions when combined with Group IA, NH₄⁺, Ca²⁺, Sr²⁺, and Ba²⁺