

## Rules for Assigning Oxidation Numbers

The effective ionic charge obtained by assuming 100% ionicity is called the oxidation number of the element. The oxidation number is a guide to the type of reactions that a substance can undergo because an element in its highest oxidation state may only be reduced whereas one in an intermediate oxidation state may either be oxidized or reduced.

1. The sum of the oxidation numbers of all the atoms in the species is equal to its total charge.
2. Atoms in their elemental form have an oxidation number of 0.
3. Atoms of group 1, +1.
4. Atoms of group 2, +2
5. Atoms of group 13/III (except B) +3 if  $\text{EX}_3$ , +1 if  $\text{EX}$
6. Atoms of group 14/IV (except C, Si) +4 ( $\text{EX}_4$ ) or +2 ( $\text{EX}_2$ )
7. Hydrogen is +1 in combination with nonmetals and -1 in combination with metals
8. Fluorine is always -1.
9. Oxygen is -2 unless combined with F, -1 in peroxides ( $\text{O}_2^{2-}$ ), -1/2 in superoxides ( $\text{O}_2^-$ ), and -1/3 in ozonides ( $\text{O}_3^-$ )
10. Halogens are -1 in most compounds, unless the other elements include oxygen or more electronegative halogens.

To determine an oxidation number, work through the following rules in the order given.