

Name: _____


Period: _____

Date: _____

Honors Chemistry Rules for Assigning Oxidation Numbers

The oxidation number, roughly corresponds to the charge on the ion, or 0 if neutral.

The following table lists the rules for assigning oxidation numbers.

Rule	Example
1. 0 for a “pure element,” a neutral atom	Na(s) is 0. “Pure element” means neutral atom
2. Matches the charge for a monatomic ion	Na ⁺ is +1, Ca ²⁺ is +2, Cl ⁻ is -1
3. In a binary compound, the more electronegative element is assigned a number that would be its charge if it were an ion. Note that a molecule, being neutral, will have an oxidation number of 0	 <p>In NO, a neutral molecule, O is more electronegative (to the right of N in the periodic table) and would be O²⁻ when an ion, therefore O is -2.</p>
4. Fluorine in a compound is always -1	F in LiF is -1
5. Oxygen is always -2 unless combined with F, in which case it is either +1 or +2 (F being more electronegative), or in a peroxide, in which it is -1	In NO ₂ , both oxygens are -2. In a peroxide group, [O-O] ²⁻ each oxygen will have an oxidation number of -1, which implies the peroxide group has an oxidation number of -2, matching its charge.
6. Hydrogen is +1 most of the time (matching the H ⁺ ion). But when bonded with a metal, it is -1 (matching the hydride ion, H ⁻)	H in H ₂ O is +1. H in LiH is -1.
7. In compounds, Group 1 elements (alkali metals), Group 2 elements (alkaline earth metals), and aluminum are +1, +2 and +3 respectively	K is +1 (ion K ⁺) Mg is +2 (ion Mg ²⁺) Al is +3 (ion is usually Al ³⁺ , remember Al ₂ O ₃)
8. The sum of all oxidation numbers of all atoms in a neutral compound is 0	Remember, electrically neutral is 0. You must account for atom count. Ca in CaCO ₃ is +2 while each O atom is -2. Think algebraically. One Ca atom, 3 O atoms: +2 + (-2)(3) = 0.
9. The sum of all oxidation numbers of all atoms in a polyatomic ion is the same as the ion's charge	Just like above, but the sum is the ion's charge. When you think about it, the above rule and this rule are the same. Dihydrogen phosphate, H ₂ PO ₄ ⁻ , each H is +1, each O is -2, the total is -1, therefore the P is +5: 2(+1) + (1)(+5) + (4)(-2) = -1.