

## RULES IN THE ALLOCATION OF OXIDATION NUMBERS

With the aid of the following rules it is easy to determine the oxidation number of an atom:

- **The oxidation number of a non-bonded element = 0.** It makes no difference how complex the molecule is, e.g. the oxidation number of an atom of each  $H_2$ ,  $P_4$ ,  $S_8$ , K, Ne and O is always 0.
- **The oxidation number of a simple monatomic ion is equal to its ionic charge.** E.g. the oxidation number of the magnesium ion ( $Mg^{2+}$ ) is +2 and that of the bromide ion ( $Br^-$ ) is -1.
- **Oxidation number of fluorine (F) is always -1 in compounds formed with other elements.**
- **The oxidation number of Cl, Br and I is always -1 in compounds with other elements, except when they are in a compound with oxygen (O) and fluorine (F).**  
This means that Cl has an oxidation number of -1 in NaCl (where Na = +1, as predicted by the fact that it is a Group 1 element). In the ion  $ClO^-$ , Cl has an oxidation number of +1 and O an oxidation number of -2).
- **The oxidation number of hydrogen = +1 in all compounds except the metal hydrides, such as LiH, KH, NaH and  $CaH_2$  the oxidation number of hydrogen is then -1.** (In metal hydrides hydrogen is bonded to a less electronegative element, which is why its oxidation number is then -1).
- **The oxidation number of oxygen = -2 in all compounds except for peroxides ( $H_2O_2$ ) and the peroxide ion ( $O_2^{2-}$ ) where the oxidation number of the oxygen atom = -1.** In compounds with fluorine, which is more electronegative ( $OF_2$ ) it is +2.
- **The oxidation number of Group I elements is always +1 and the oxidation number of Group II elements is always +2.**
- **When allocating oxidation numbers the charge is retained.** This means that the sum of the oxidation numbers of atoms of electrically neutral compound is zero, whereas the sum of the oxidation numbers of atoms of a polyatomic ion is equal to the ionic charge.
- **In a molecule the oxidation number of the most electronegative element is negative, and the less electronegative element has a positive oxidation number.**