

NOTES#8/Aqueous Chem D/Assigning Oxidation Numbers/AP Chemistry

I. General Information:

- Oxidation-Reduction (REDOX) rxns involve ELECTRON TRANSFER.
- REDOX rxns are versatile and involve a number of different types of reactions.

The best way to identify a REDOX rxn is by a CHANGE IN OXIDATION NUMBER

HOW TO DETERMINE OXIDATION NUMBERS

II. Oxidation numbers (or oxidation states):

- these are a book-keeping method for tracking electrons during redox rxns.
- represent the charge an atom would have in a molecular compound if electrons were TRANSFERRED COMPLETELY

7 Rules for Determining Oxidation Numbers

EXAMPLE:

1. In free elements, each atom has an oxidation number of ZERO.
2. For monatomic ions, the oxidation number is equal to the charge on the ion
 - *all alkali metals have an ox # of +1
 - *all alkaline earth metals have an ox # of +2
3. The oxidation # of oxygen in MOST compounds is -2
 - *EXCEPTION: in hydrogen peroxide (H_2O_2) and the peroxide ion it is -1 (look for the 2:2 ratio to recognize the peroxide ion)
4. The oxidation number for hydrogen in MOST compounds is +1.
EXCEPTION: When hydrogen is bonded to metals in binary compounds, in this case, the oxidation number for hydrogen is -1.
5. THE HALOGENS: Fluorine ALWAYS has an oxidation number of -1
Cl, Br, and I have -1 oxidation number EXCEPT when bonded to oxygen.
When bonded to oxygen, they have a + (positive) oxidation number.
6. The SUM of all of the oxidation numbers for a compound, molecule or ion have to equal the net charge for that compound, molecule or ion.
7. Oxidation numbers DO NOT have to be whole number integers. For example: the oxidation number of O in the superoxide ion, O_2^- , is -1/2.

General Trends:

-Metallic atoms always have a (+) oxidation number. Transition metals can display a number of different oxidation numbers.

-An atom can NEVER have an oxidation number greater than it's group number. For example: the halogens can NEVER have an oxidation number greater than seven.

PRACTICE: Assign oxidation numbers for all of the atoms in the following compounds and ions.

