Redox worksheet 2 – oxidation number

Here are some rules to remember when doing oxidation numbers

1. A molecule consisting of only one element always has an oxidation number of zero, since it is neutral.

   For example the oxidation number of hydrogen in H_2 is 0. The oxidation number of bromine in Br_2 is also 0.

2. Monatomic ions (ions with only one element or type of atom) have an oxidation number that is equal to the charge on the ion.

   For example, the chloride ion Cl^- has an oxidation number of -1, and the magnesium ion Mg^{2+} has an oxidation number of $+2$.

3. In a molecule or compound, the sum of the oxidation numbers for each element in the molecule or compound will be zero.

   For example the sum of the oxidation numbers for the elements in water will be 0.

4. In a polyatomic ion the sum of the oxidation numbers is equal to the charge.

   For example the sum of the oxidation numbers for the elements in the sulfate ion (SO_4^{2-}) will be -2.

5. An oxygen atom usually has an oxidation number of -2. One exception is in peroxides (e.g. hydrogen peroxide) when oxygen has an oxidation number of -1.

   For example oxygen in water will have an oxidation number of -2 while in hydrogen peroxide (H_2O_2) it will have an oxidation number of -1.

6. The oxidation number of hydrogen is often $+1$. One exception is in the metal hydrides where the oxidation number is -1.

   For example the oxidation number of the hydrogen atom in water is $+1$, while the oxidation number of hydrogen in lithium hydride (LiH) is -1.

7. The oxidation number of fluorine is -1.

Exercise 1: Determine **the oxidation number nitrogen** in each of the following:

Hint: if you are determining nitrogen's oxidation no, then you can assume the other elements have their 'regular' charges. And compound's charges add up to zero.(unless it is a compound ion)

Instructions

- ✓ Write charge as +2 not 2+

1.1 N_2O

$+1(2) \ -2 \ = 0$

N_2O

Thus N alone = +1

1.2 NO_2

1.3 NO

1.4 NH_4OH

1.5 $NaNO_3$

1.6 Normally the charges should all add up to zero, but in the case of compound ions, they add up to the overall charge of the ion

$\square +1(4) = +1$

NH_4^+

Determine the oxidation number **sulphur** in each of the following:

1.7 SO_2

1.8 SO_4^{-2}

1.9 SO_3

1.10 H_2S

1.11 S