**REDUCTION AND OXIDATION REACTION**

Reduction and Oxidation reaction are two reactions that take place simultaneously, in the sense that one substance participating in the reaction undergoes reduction while the other undergoes oxidation. One cannot take place without the other. This tow types of reaction are collectively called Redox reaction.

To understand this Redox reaction, we must understand the meaning of ***oxidation state/oxidation number.***

**Oxidation state/ Oxidation number**

Oxidation state of a substance is the number of electrons lost or gained by the substance during combination. It is also defined as the number of bonds formed by an atom during chemical bonding. Oxidation state or number of an atom is also called the valency.

**Rules for determining the oxidation state of element in their compounds**

1. The oxidation state of hydrogen (H) is +1 except in hydride where it is -1. Hydrides are binary compounds of hydrogen and metals. Examples: NaH, CaH2, etc.
2. The oxidation state of oxygen (O) is -2 except in peroxides where it is -1. Peroxides are higher oxides of metals. That is an oxide of a metal which has a higher proportion of oxygen. Example: Na2O2 instead of Na2O, CaO2 instead of CaO, etc.
3. The sum of the oxidation number of a charged substance is equal to the number of charge on it. Example: oxidation state of SO42- is equal to -2, the oxidation state of MnO4- is equal to -1, etc.
4. The sum of the oxidation number of a neutral compound is equal to zero (0). That is the oxidation state of MnO2 is zero.
5. The oxidation state of any element at its free or uncombined state is zero.

***Worked example***

1. Determine the oxidation state of Mn (manganese) in MnO4-.

***Solution***

MnO4- $=-1$

$$Mn+4\left(O\right)=-1$$

$$Mn+4\left(-2\right)=-1$$

$$Mn-8=-1$$

$$Mn=-1+8$$

$$Mn=+7$$

The IUPAC name of the substance of MnO4- is ***Tetraoxomanganate (vii) ion***

1. Determine the oxidation state of Cr (chromium) in Cr2O72-

***Solution***

$$Cr\_{2}O\_{7}^{2-}=-2$$

$$2Cr+7\left(O\right)=-2$$

$$2Cr+7\left(-2\right)=-2$$

$$2Cr+\left(-14\right)=-2$$

$$2Cr=-2+14$$

$$2Cr=12$$

$$Cr=\frac{12}{2}$$

$$Cr=+6$$

The IUPAC name is therefore ***heptaoxodichromate (vi) ion***

***Assignment***

1. Determine the oxidation sate of S in S2O32- and give the IUPAC name of S2O32-.
2. Determine the oxidation state of P in Na3PO4 and give the IUPAC name of Na3PO4