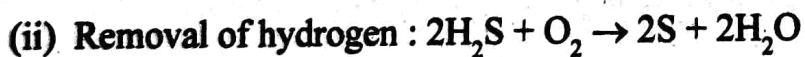


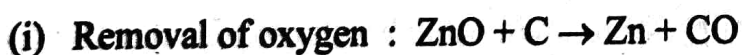
## **Classical concept of Oxidation and reduction**

According to the classical concept, oxidation is a process involving addition of oxygen/electronegative element or removal of hydrogen/electropositive element from a substance. Reduction is a process of removal of oxygen/electronegative element or addition of hydrogen/electropositive element to a substance.

### *Examples of oxidation*



### *Examples of reduction*

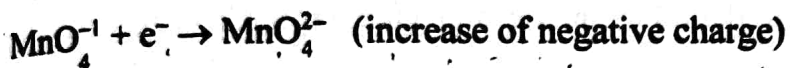


## **Electronic concept of oxidation and reduction**

According to electronic concept, oxidation is a process which involves loss of electrons by an atom or any species. Loss of electrons results in an increase of positive charge or decrease of negative charge. For example,



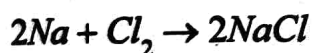
**Reduction is a process which involves gain of electrons by an atom or any species. By gaining electrons, there occurs an increase in negative charge or decrease in positive charge. For example,**



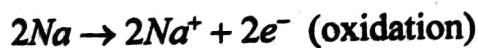
### **Redox reactions in terms of electron transfer reactions**

**Chemical reactions involving both oxidation and reduction are known as redox reactions. We have seen that oxidation involves loss of electrons and reduction involves gain of electrons. If one substance loses electrons, another substance at the same time must gain electrons because electrons cannot be the products in a chemical reaction. That is, in any process oxidation can occur only if reduction also takes place side by side and vice versa. In fact, during redox reactions there is transfer of electrons from one species to another.**

*During electron transfer, the species which loses electrons is said to be oxidised and the species which gains electrons is said to be reduced.* For example, consider the reaction of sodium with chlorine to form sodium chloride



Sodium chloride is formed by the transfer of electron from sodium to chlorine. Here, sodium gets oxidised to  $\text{Na}^+$  by loss of one electron and chlorine gets reduced to  $\text{Cl}^-$  by gaining this electron. The two half reactions can be represented as



Thus, the reaction of sodium with chlorine is a redox reaction involving transfer of electron from sodium to chlorine.

In this example, chlorine brings about the oxidation of Na to  $\text{Na}^+$  and thus chlorine is called oxidising agent or oxidant. Thus, an oxidising agent or oxidant is a substance which accepts one or more electrons in a reaction. An oxidising agent gets reduced in the reaction.

Similarly, chlorine is reduced to  $\text{Cl}^-$  ion by taking up the electron donated by sodium. Thus sodium is the reducing agent or reductant. A reducing agent or reductant is a substance which can give one or more electrons in a reaction. A reducing agent gets oxidised during the reaction.