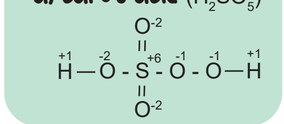
REDOX REACTION

RULES FOR ARRANGING OXIDATION NUMBER (ON)

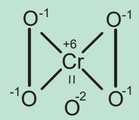
a) Oxidation Number of single element is always 0.
b) Oxidation Number of monoatomic ions is equal to charge on ion
c) Oxidation Number of oxygen in most of the compound is -2.
d) Oxidation Number of hydrogen is +1, except when it is bonded to metals in binary compounds.
e) Halogens have an oxidation number of -1, when they occur as halide ions in their compounds.
f) Algebric sum of oxidation number of all the atoms in a neutral compounds must be zero.

OXIDATION NUMBERS BY STRUCTURE

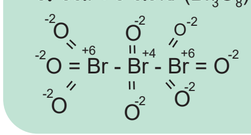
a) caro's acid (H_2SO_5)



b) Chromium (VI) Peroxide



c) caro's acid (Br_3O_8)



OXIDATION NUMBER

It indicates the number of electron gained or lost by a particular atom.

STEPS

1. Write the correct formula of the reaction
2. Identify atoms undergoing change in Oxidation Number
3. Calculate increase or decrease in Oxidation Number per atom for entire ion or molecule. If unequal, multiply by suitable number to make equal.
4. Add H+/OH- ion to make total ionic charges of reactants and product equal
5. Equalize H^+ on two sides by adding water.

STEPS

1. Seperate equation into two half reaction.
2. Balance atoms other than O and H
3. For reaction occuring in acidic medium. Add H_2O to balance O atoms and H+ to balance H atoms.
4. Balance charges by adding e- to one side of the half reaction.
5. Add two half reactions and cancel the e- on each side.
6. Scale the equation has same type and no. of atoms and same charges on both sides of the equation.

OXIDATION NUMBER METHOD

1st Method

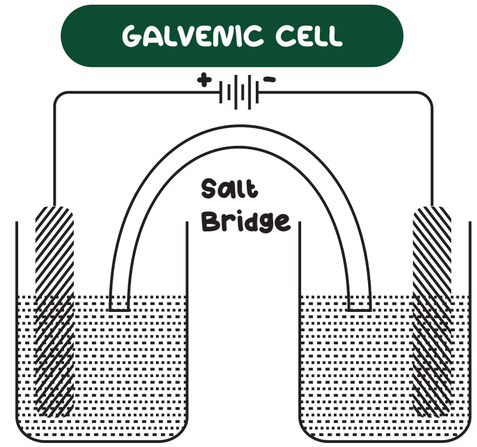
HALF REACTION METHOD

2nd Method

BALANCING REDOX REACTION

ELECTRO-CHEMICAL SERIES

A series of electrodes on half cells arranged in order of their increasing standard oxidation potentials or in the decreasing order of their standard reduction potential.



REDOX REACTION

Modern Theory

1. Oxidation is loss of electrons.
2. They are considered as reducing agents.
3. Lower oxidation number.

Classical Theory

OXIDATION

Addition of oxygen or removal of hydrogen from a substance.

$C + O_2 \longrightarrow CO_2 + Heat$

REDUCTION

Removal of oxygen or addition of hydrogen from a substance.

$H_2 + S \longrightarrow H_2S$

Modern Theory

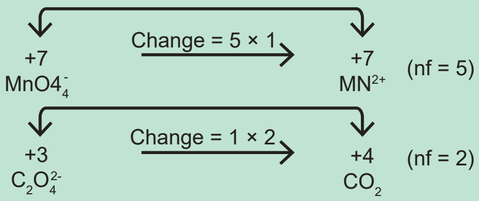
1. Reduction is gain of electrons.
2. They are considered as oxidising agents.
3. Increases Oxidation Number.

REDOX IN DAILY LIFE

Photosynthesis
Extraction of metals
Combustion process
Electrochemical cells

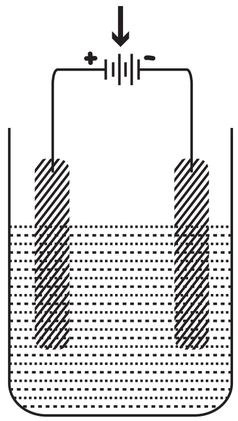
CALCULATION OF n - FACTOR

n - factor of oxidising agent/reducing agent = Change in oxidation number per molecule



OXIDATION AND REDUCTION

APPLICATION



Study of electrode processes and cells

TYPES OF REDOX REACTIONS

COMBINATION REACTION	Two reactants combine to form single product. $H_2(g) + O_2(g) \longrightarrow H_2O(l)$
DECOMPOSITION REACTION	Breakdown of a compound into two or more compounds. $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$
DISPLACEMENT REACTION	An ion/atom in a compound is replaced by an ion/atom of another elements. $CuSO_4(aq) + Zn(s) \longrightarrow ZnSO_4(aq) + Cu$
DISPROPORTIONATION	An element in one oxidation stateis simultaneously oxidised and reduced. $2H_2O_2(l) \longrightarrow 2H_2O(l) + O_2(g)$