A redox reaction refers to the chemical reaction where one substance undergoes reduction, while another substance undergoes oxidation. Both processes always occur together.

Oxidation happens when:

- Gaining of oxygen

- Loss of hydrogen

- Loss of electrons

- **Increase in oxidation state**

Reduction happens when:

- Loss of oxygen

- Gaining of hydrogen

- Gaining of electrons

- **Decrease in oxidation state**

How to calculate Oxidation State

From GenieTeach

General Rules For Oxidation State

Rule	Condition	Examples	Oxidation state
1	Neutral elements	H_2, Na, Mg, O_2	0
2	Ions with fixed charge e.g. Group I, II, VII ions and Al	Na^+, Ca^{2+}, Br^- etc...	Same as charge +1, +2, -1, -2
3	Hydrogen in a compound (with exception)	HCl, H_2O, NH_3, KOH	+1
4	Oxygen in a compound (with exception)	MgO, Na_2O	-2
5	Sum of O.S is same as charge on anion/cation	SO_4^{2-}, CO_3^{2-}, NH_4^+	Same as charge

Exception in Hydrogen

1. Metal Hydride (e.g. MgH_2)

2. Hydrogen Peroxide

Exception in Oxygen

Hydrogen Peroxide

Examples of Calculating Oxidation State

1. SO_4^{2-}

2. SO_2

3. $KMnO_4$

OXIDISING AGENTS

An oxidising agent refers to a reagent that causes another substance to be oxidised.

An oxidising agent itself would undergo reduction instead.

1. Acidified potassium manganate (VII), $KMnO_4$ is an oxidizing agent. Hence, it will undergo reduction in the reaction.

MnO_4^- (aq) + 8 H^+ (aq) + $5e^-$ → Mn^{2+} (aq) + 4 H_2O (l)

The oxidation state of manganese decreases from +7 in the manganite (VII) ion to +2 in the manganese (II) ion.

The colour of the solution will turn from purple to colourless.

REDUCING AGENT

A reducing agent refers to a reagent that causes another substance to be reduced.

A reducing agent itself would undergo oxidation instead.

1. Potassium iodide, KI is an reducing agent. It will undergo oxidation in the reaction.

$2I^-$ (aq) → I_2 (aq) + $2e^-$

The oxidation state of iodine has increased from -1 in iodide to 0 in iodine.

The colour of the solution will turn from colourless to brown.