



Name:.....

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Class:.....

CHEMISTRY

REDOX REACTIONS

GRADE 12 General

MAIN IDEA Oxidation and reduction are complementary—as an atom is oxidized, another atom is reduced.

OXIDATION

Oxidation reaction involves:

☛ **Addition of oxygen.**

Example: Combustion reactions like carbon burning in oxygen to form carbon dioxide.



Carbon is oxidised as it gains oxygen.

☛ **Loss of electrons.**

Example: When magnesium ribbon reacts with oxygen magnesium oxide is formed.



In this reaction magnesium atoms lose two electrons to oxygen and become magnesium ions. Magnesium is oxidised.

☛ **Increase in oxidation number.**

Example: In the above reaction, the oxidation number of magnesium increases from 0 (in Mg) to +2 in (MgO). Therefore magnesium is oxidised.

REDUCTION : Reduction reaction involves:

☛ **Removal of oxygen.**

Example: Oxygen can be removed from copper(II) oxide by heating with hydrogen.



CuO is reduced as it loses oxygen

Gain of electrons.

Example: When magnesium ribbon reacts with oxygen magnesium oxide is formed.



In this reaction oxygen atoms gain two electrons from magnesium and become oxide ions. Oxygen is reduced.

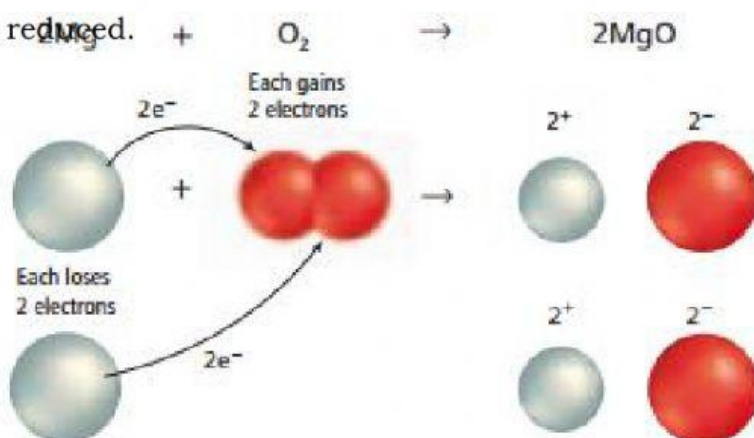


Decrease in oxidation number.



In the above reaction, the oxidation number of oxygen decreases from 0 (in O_2) to -2 in (MgO).

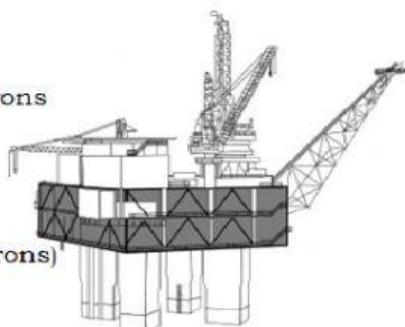
Therefore oxygen is reduced.



OIL RIG

Oxidation
Is
Loss of electrons

Reduction
Is
Gain of electrons



LEO says GER

Loss of
Electrons is
Oxidation

Gain of
Electrons is
Reduction





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Example:

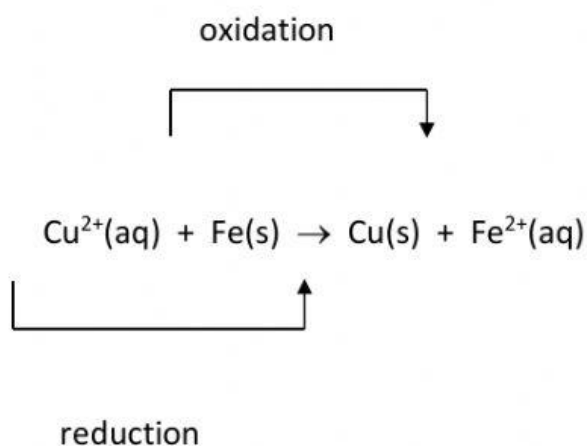
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When an iron nail is placed in a solution of copper(II) sulphate, copper metal and iron(II) sulphate are formed.

☛ Copper is gaining 2 electrons = reduction

☛ Iron is losing 2 electrons = oxidation

Therefore this is a redox reaction.



This reaction can also be explained in terms of oxidation number.

Oxidation number of copper decreases from +2 to 0 = reduction.

Oxidation number of iron increases from 0 to +2 = oxidation.

Finding oxidation states of the elements in a compound

1. The oxidation number of an uncombined atom is zero.

E.g. Na, O₂, Cl₂, H₂

2. The oxidation number of monoatomic ion is equal to the charge of the ion.

E.g. Ca²⁺ is +2, O²⁻ is -2



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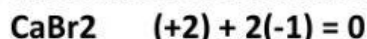
3. Common oxidation number of elements in group 1, 2 and 7 as follows

Group 1 +1 Group 2 +2 group 7 -1

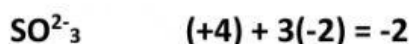
4. The common oxidation number of oxygen is -2

5. The common oxidation number of hydrogen is +1

6. The sum of the oxidation numbers in neutral compound is zero.



7. The sum of the oxidation numbers of the atoms in a polyatomic ion is equal to the charge of the ion.



Activity-

Grade 12G | Chemistry | Redox reactions | Chapter 5 | lesson 5 | Oxidation and reduction

Redox and Electronegativity



Identify the oxidized elements, the reduced elements, the oxidizing agent and the reducing agent in the following reactions:



Reaction	The oxidized element			The reduced element			Oxidizing agent	Reducing agent
	Element	Oxidation number change		Element	Oxidation number change			
		From	To		From	To		
$\overset{-1}{2\text{Br}^-} + \overset{0}{\text{Cl}_2} \rightarrow \overset{0}{\text{Br}_2} + \overset{-1}{2\text{Cl}^-}$	Br			Cl			Cl	Br
$2\text{Ce} + 3\text{Cu}^{2+} \rightarrow 3\text{Cu} + 2\text{Ce}^{3+}$	Ce	0	+3	Cu ²⁺	+2	0	Cu ²⁺	Ce
$2\text{Zn} + \text{O}_2 \rightarrow 2\text{ZnO}$								
$2\text{Na} + 2\text{H}^+ \rightarrow 2\text{Na}^+ + \text{H}_2$								