



Name:.....

Mark:

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

العام الدراسي 2019 - 2020

### 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.

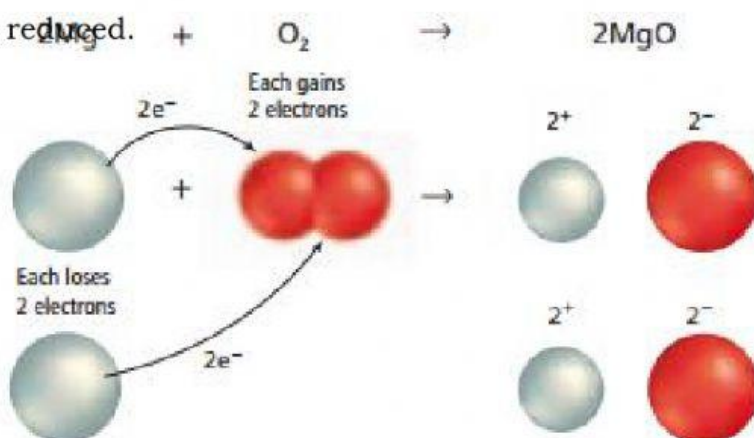


### Decrease in oxidation number.



In the above reaction, the oxidation number of oxygen decreases from 0 (in  $\text{O}_2$ ) to -2 in ( $\text{MgO}$ ).

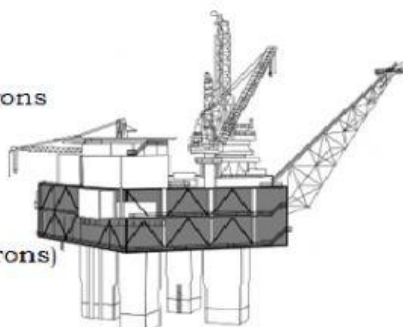
Therefore oxygen is reduced.



#### 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





العام الدراسي 2019-2020

**Example:**

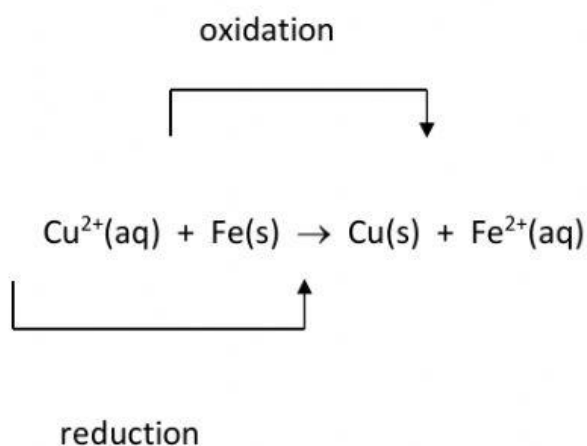
مدرسة الاتحاد - الحلقة الثالثة

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, O<sub>2</sub>, Cl<sub>2</sub>, H<sub>2</sub>

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

E.g. Ca<sup>2+</sup> is +2, O<sup>2-</sup> is -2





العام الدراسي 2019-2020

مدرسة الاتحاد - الحلقة الثالثة

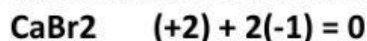
3. Common oxidation number of elements in group 1, 2 and 7 as follows

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

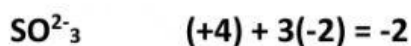
4. The common oxidation number of oxygen is -2

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

مؤسسة الإمارات للتعليم المدرسي  
EMIRATES SCHOOLS ESTABLISHMENT

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 <sup>2+</sup>    | +2                      | 0  | Cu <sup>2+</sup> | Ce             |
| $2\text{Zn} + \text{O}_2 \rightarrow 2\text{ZnO}$                                                                         |                      |                         |    |                     |                         |    |                  |                |
| $2\text{Na} + 2\text{H}^+ \rightarrow 2\text{Na}^+ + \text{H}_2$                                                          |                      |                         |    |                     |                         |    |                  |                |