



**Al-Zahraa University for women**  
**College of health and medical technologies**  
**Radiology department**  
**The first stage**

# **oxidation and reduction**

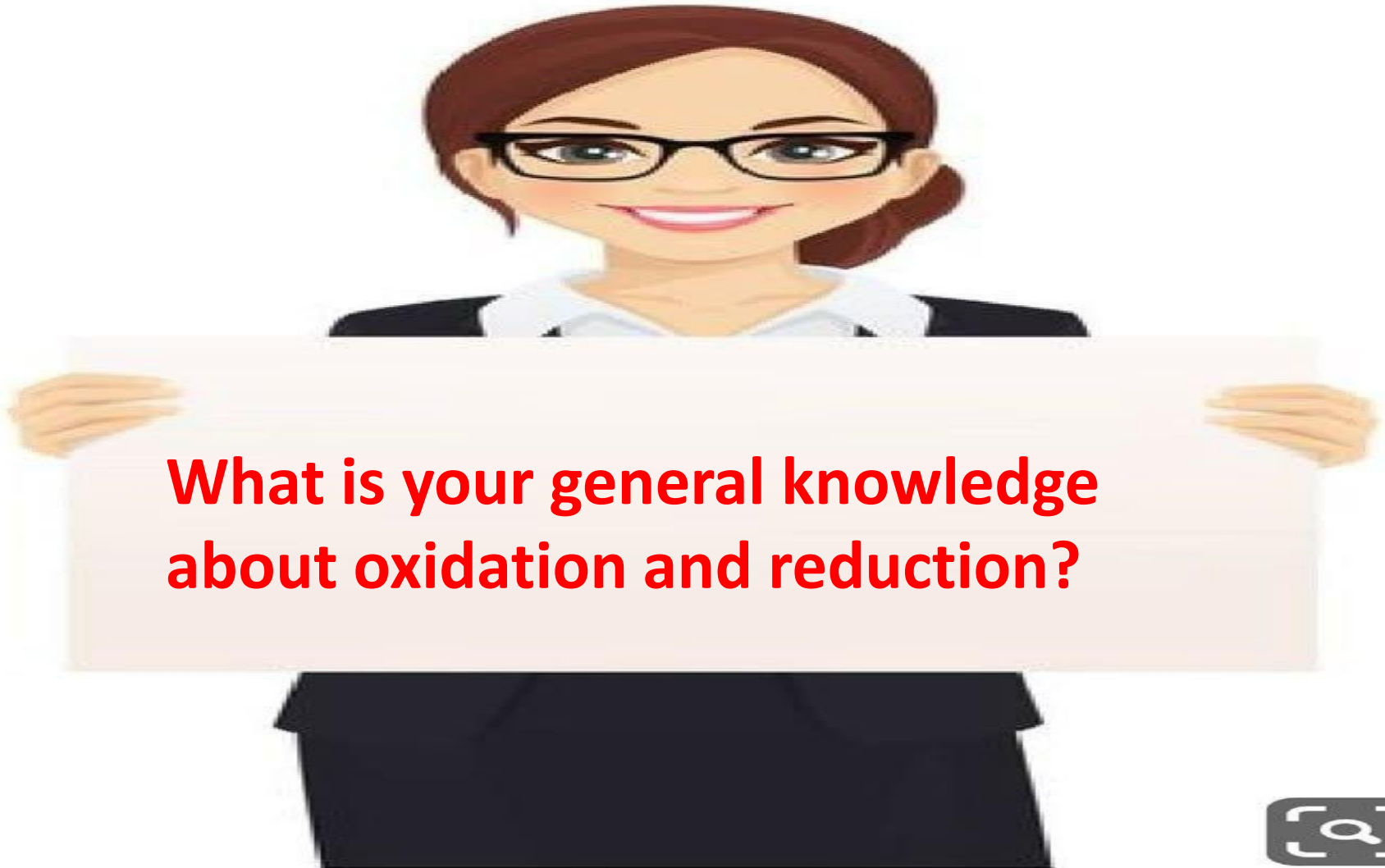
**Performed by: Ass.lect Noor AL-Huda Jabbar**

# Objective:

**At the end of the lecture, you must know :**

- ✓ Define Oxidation-reduction and what is the difference between them.
- ✓ What are Oxidizing agents & reducing agents .
- ✓ Importance of oxidation-reduction .

# Individual activity



❖ **Oxidation:** May be define as “a **loss of electrons**”. The sodium atom has one outer electron. When the sodium atom loses this one electron, it forms a sodium ion with a +1 charge: **This loss of an electron is defined as oxidation**. Therefore, the sodium atom was oxidized.



❖ **A second definition of oxidation:** states that it is an **increase in oxidation number**.



An uncombined element has an oxidation number of zero. The oxidation number of sodium in sodium chloride (NaCl) is +1 and that of chlorine -1. Therefore, may be written as follows.



- ❖ **A third definition of oxidation** is “**addition of oxygen**.” which involves the oxidation of formaldehyde to formic acid.



formaldehyde

formic acid

- **Note that this reaction involves the addition of oxygen**

- ❖ **A fourth definition of oxidation** involves the “**removal of hydrogen**”



- The following oxidation reactions take place in the body.

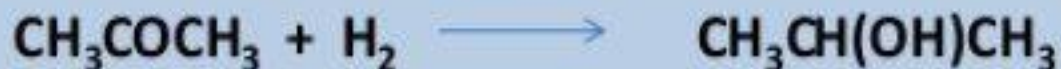


➤ Thus, oxidation may be defined as:

1. A loss of electrons
2. An increase in oxidation number
3. A gain of oxygen
4. A loss of hydrogen

❖ **Reduction:** reduction is the opposite of oxidation.

1. A gain of electrons
2. A decrease in oxidation number
3. A loss of oxygen
4. A gain of hydrogen



## Oxidizing agents & Reducing agents:

**Reducing agent:** The substance that causes the reduction of an element or compound.

**Oxidizing agent:** The substance that causes the oxidation of some element or compound.

## ■ Importance of oxidation-reduction:

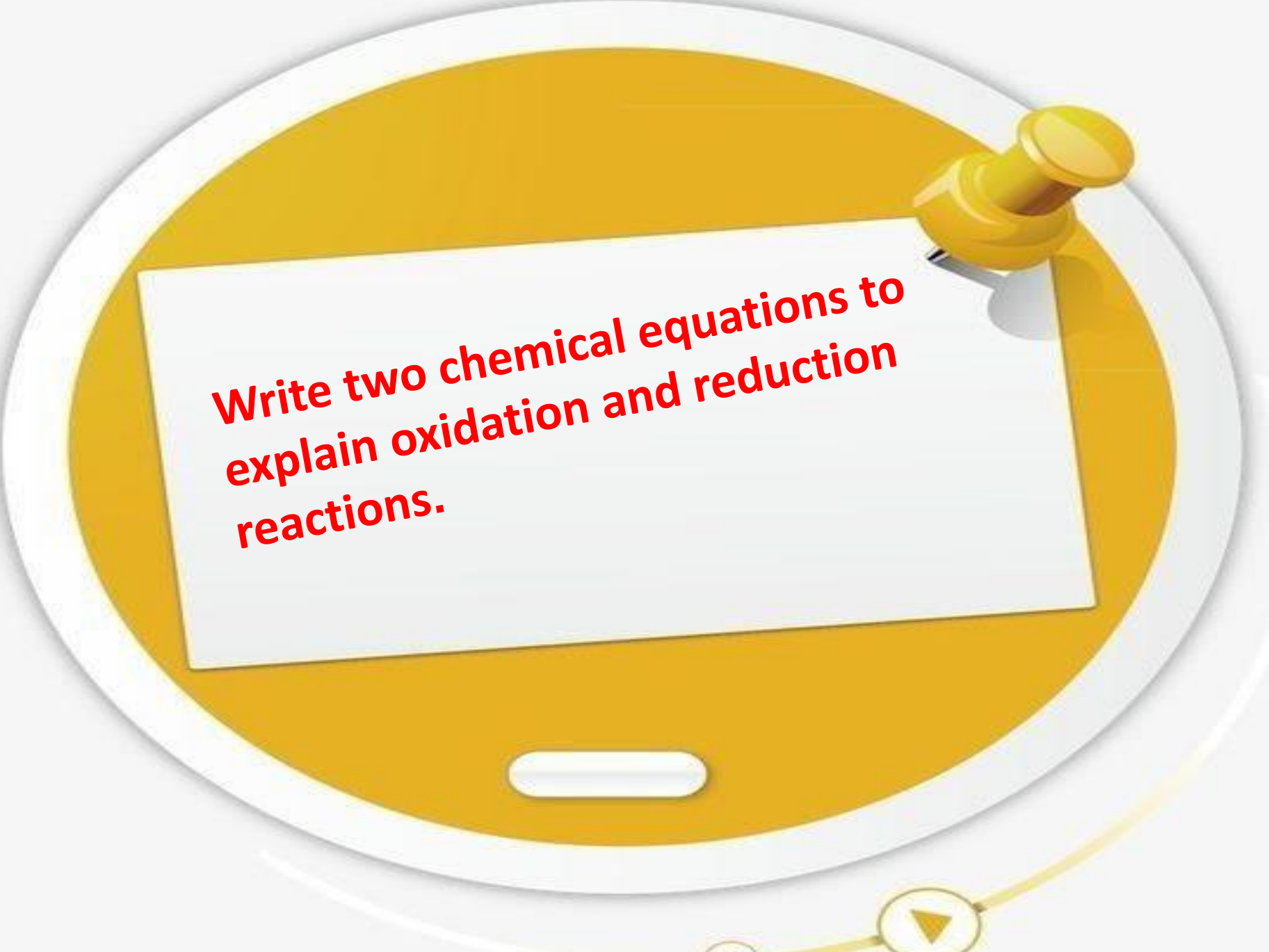
**1- Antiseptic effects:** many antiseptics have the property of killing bacteria. Among these is chlorine, which oxidizes organic matter and bacteria and so is used in the treatment of water to make it potable. Calcium hypochlorite  $\text{Ca}(\text{OCl})_2$ , another commonly used oxidizing agent and bleaching powder, is used as antiseptic for clothes and hospital beds.

**Table : Antiseptic agents**

| Formula                              | Name                                      | Use                                         |
|--------------------------------------|-------------------------------------------|---------------------------------------------|
| $3\% \text{H}_2\text{O}_2$           | Hydrogen peroxide                         | More cuts and scratches                     |
| $\text{KMnO}_4$                      | Potassium permanganate                    | Treatment of infection in urethra & bladder |
| $\text{KClO}_3$                      | Potassium chlorate                        | Treatment of sore throat                    |
| $\text{I}_2$ in $\text{H}_2\text{O}$ | Lugol's solution                          | Treatment of minor cuts                     |
| $\text{NaOCl}$                       | Sodium hypochlorite<br>(Dakin's solution) | Treatment of cuts                           |

**2- Effects on hair protein**

**3- Stain removal**



**Write two chemical equations to explain oxidation and reduction reactions.**

# الأكسدة والاختزال

أكسدة (فقد الكترون)



**Thank you  
for  
listening**

