

# Sant Gahira Guru Vishwavidyalaya Surguja (Chhattisgarh)



**M.Sc. (Chemistry) 4<sup>th</sup> semester CBCS**

**Fourth Paper –Photo-Inorganic Chemistry**

**Unit-5**

**Topic - Photolysis of Water**

**(Definition, Chemical process and mechanism of  
photolysis of water)**

**Lecture -1 (Part –A)**

**Presented by**

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# Photolysis of water

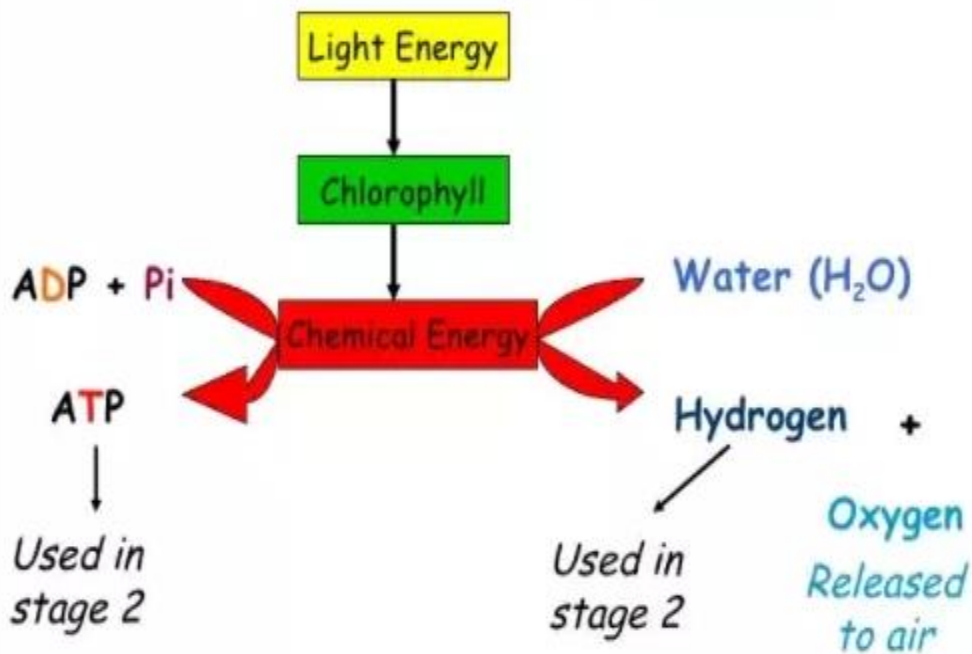
## Introduction :

- It is the process of breakdown of **water** molecule into hydrogen and oxygen under the influence of light during the light reaction of photosynthesis.
- It is also called photo-oxidation of water.



In photosynthesis, chemical process by which molecules are broken down into smaller units through the absorption of light.

Photolysis is the process by which energy from sunlight splits water molecules into hydrogen and oxygen



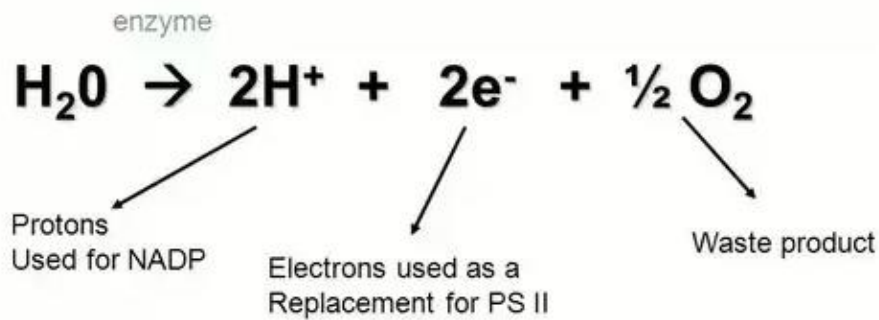
Explanation: Magnoprotein is associated with **photolysis of water**, which contains  $Mn^{++}$  and  $Cl^-$  as cofactor.

- It is the process by which water is split into  $H^+$ , oxygen and electrons in the presence of light by photosystem II.
- Robin Hill **discovered** the reaction in 1937. He demonstrated that the process by which plants produce oxygen is separate from the process that converts carbon dioxide to sugars.

## **Mechanism of Photolysis of water**

- **Photolysis of water** observes release of oxygen, as a by-**product**, and release of hydrogen. During photosynthesis when chlorophyll is left by its electrons, the place where the electrons were is left with a hole, which is filled by oxidised **water**. When this oxidised **water** splits, it releases oxygen and hydrogen.

## Photolysis of water

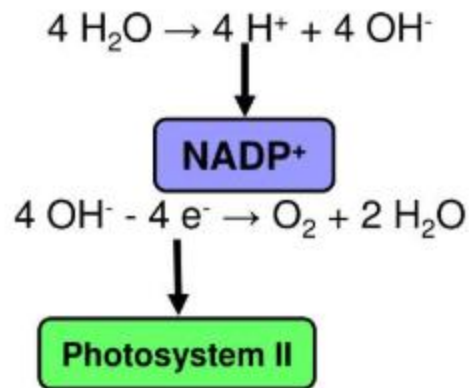


The above reaction occurs in presence of 4 photons energy.

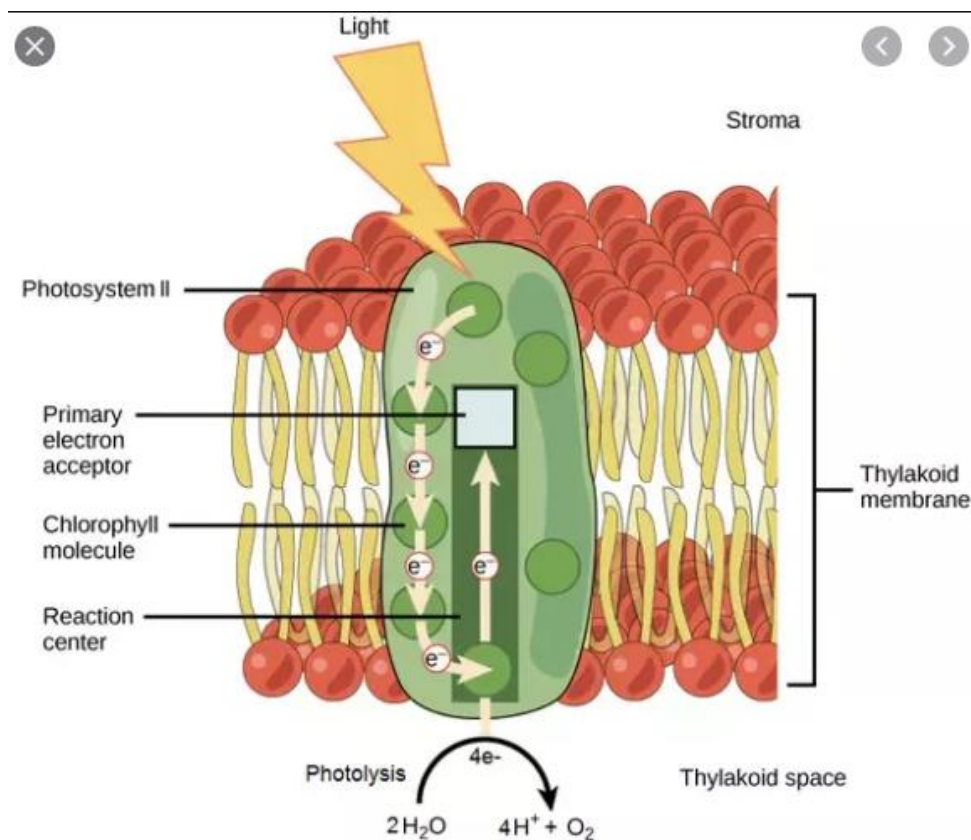
It involves two steps-

1. Splitting of **H<sub>2</sub>O molecules** into **OH<sup>-</sup>** and **H<sup>+</sup> ions**.
2. And then splitting of these **4OH<sup>-</sup>** into **2 H<sub>2</sub>O molecules**, **O<sub>2</sub> molecule** and **4 electrons**.

# Photolysis of water



Splitting of water is catalysed by an enzyme – perhaps PSII



Thank You

