

Role of Nickel in Biological system:

Role of micro trace element
Now a day are known

Nearly by the Nickel Proteins are a part of Plankts or bacteria. Nickel is lightly bound Component of Urease and is essential for the activity of the enzyme that Catalyses the hydrolysis of Urea to ammonia and Carbonic acid.

Methanogenic and several other type of bacteria are known to have Nickel containing hydrogenases which Catalyse the reaction, $2H_2 \rightarrow 2H^+ + 2e^-$, the reduction of Sulphate ion, the production of methane and perhaps other reductive processes.

Specific environments for Nickel are also indicated for nucleic acids (or Nucleic acid binding Proteins).

Since Nickel activates the gene for hydrogenase.

Role of Manganese (Mn) in Biological system:-

Manganese plays a Critical role in Oxygen evolution Catalysed by the Proteins of the Photosynthetic reaction Centre.

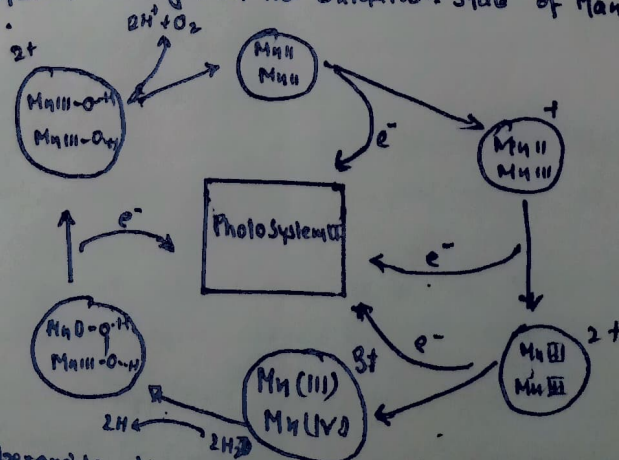
In the Photosystem II, a strong oxidising agent is formed (P680, where P stands for Pigment, 680 is the Wavelength of light absorbed) and is responsible for the production of $\frac{1}{2}$ Molecule Oxygen.

This Oxidising agent is reduced and recycled for further use by interaction with a manganese Complex.

During the sequence of events leading to reduction,

Manganese displays three of its Oxidising states.

The proposed changes in the Oxidation state of Manganese in Photosystem II is given below.



Moreover, the Superoxide dismutase of bacteria and Microchondria, as well as Pyruvate Carboxylase in mammals are also Manganese Proteins, responsible for various biological processes.

Zinc (A trace metal ion essential in biological system)

Zinc is an essential element for normal growth, reproduction, and longevity of Human or animals.

It is a Component of Several enzymes - alcohol dehydrogenase, alkaline Phosphatase, Carbonic anhydrase, Pro Carboxy peptidase and retinal - retinene reductase.

Zinc is necessary for maintaining the Plasma Concentration of Vitamin A.

The retina Contains a Zinc metalloenzyme, retinene reductase which is required for the formation of retinene.

Zn is required for the preparation of Insulin and increases the duration of Insulin action when given by injection.

Zn is used in the β -Cells of the pancreas to store and release Insulin as required.

Zn is also concerned with the healing of wounds.

Zn is very important for the normal growth and reproduction.

Source: - Rich source: Oysters and shellfish
Good source: Meat, eggs, milk & liver
Poor source: Cereals, Pulses, Nuts, oilseeds, Vegetable & fruit.

Blood Zinc

1. Zinc occurs in higher concentration in erythrocytes in Plasma.
2. Normal Plasma has about 20% of the Zinc present in whole blood.
3. Most of Zinc in erythrocyte exist in Carbonic anhydrase.

Absorption:

1. Zinc present in animal foods is well absorbed in small intestine, especially from the duodenum.
2. Zinc present in cereals, pulses, nuts and oil seeds is poorly absorbed because of the presence of Phytic acid which interferes in its absorption.

Excretion: - About 90% of Zinc intake by healthy adult human gets lost in the feces, about 5% is excreted in the urine and 5% retained in the body.

Deficiency: - (i) Causes dwarfism and hypogonadism
(ii) loss of taste acuity.
(iii) Causes hepatosplenomegaly, and anemia.

Role of trace element Zinc in biological system.

Role of trace element Zinc metal ion is relatively more important in our human biological system.

Zinc is found in metalloproteins, which also binds Copper, Chromium, Mercury and other materials.

Zinc is a common element in nucleic acid polymerases and transcription factors, where its role is structural rather than catalytic.

Zinc enhances the stereoselectivity of polymerisation of nucleotides under prebiotic reaction conditions.

Zinc plays a structural role forming the peptide into multiple domains of zinc by co-ordination with cysteine and histidine.

Here the Carboxylic Anhydride and Carboxypeptidase are first recognised Zinc enzymes. Later on 80 other Zinc enzymes have been reported, which are responsible for staggered physiological functions in the human body, in order to maintain the structure of proteins, that activate and deactivate genes.

Note the active Zn^{2+} site of Carboxypeptidase 1.

