Unit - I

① Name some trace elements in biological system. What are the general roles of Na, Mg, Cu, Zn, Fe in biological system.

Ans:- The trace elements present in biological system are- Fe^{+2}, Fe^{+3}, Co^{+2}, Co^{+3}, Mn^{+2}, Cu^{+2}, Zn^{+2} and Mo^{+6}.

The general roles of the following elements in biological system is given below:

Na – Nerve impulse transmission through electrical potential gradient across cell membrane, and maintain the osmotic pressure, acid-base equilibria of the cell.

Mg – It helps muscle contraction and nerve regulation. It also maintain the osmotic pressure and acid-base equilibria of the cell. It present in chlorophyll as prosthetic group, physiological activator of enzymes which utilize ATP.

Cu – ~~It is the oxygen~~ Some protein contains Cu element and perform their different activities; namely
Oxygen transport protein: hemocyanin;
Copper storage protein: ceruloplasmin;
enzyme: cytochrome c oxidase, ascorbic acid oxidase; amine oxidase, pso prostaglandin synthetase.

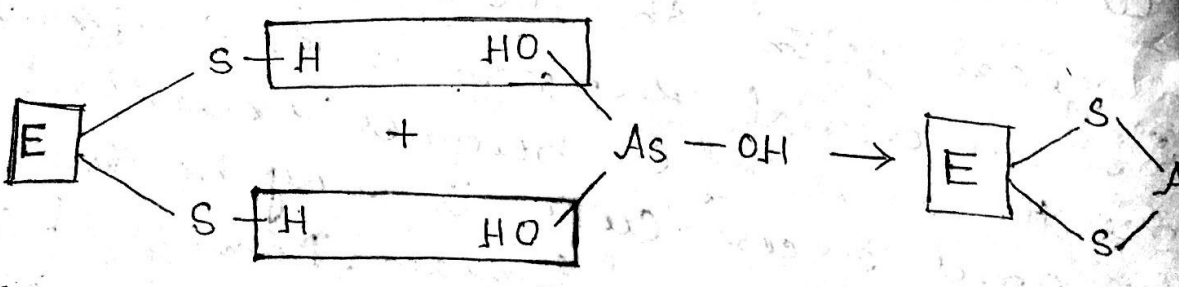
Zn – Some enzymes contains Zn element which help the enzymatic actions; namely
Enzymes: carbonic anhydrase, carboxypepti-dases, alkaline phosphatase, various dehydro-genases; enzyme activator: enolase; peptidase, histidine deaminase, arginase.

4. Give the biochemical effects of As and Hg on human health. Name two antidotes for ~~toxicity~~ toxicity due to these metals.

Ans

Arsenic – Arsenic is not an essential element for human physiology. It is found in tissues in very small quantities. It caus serious problem to our biological system. As is an accumulative, potent, protoplasmic poison. Its salts are absorbed readily through the gastrointestinal tract. Chronic poisoning by Arsenic compounds leads to loss of appetite and weight, diarrhoea alternating with constipation, gastrointe problems, peripheral neuritis, conjuncti dermatitis and sometimes skin cance It is carcinogenic in mouth, esophag larynx and bladder.

Also AsO_4^{3-} inhibits ATP synthes and it blocks the thiol (–SH) functions o the enzymes and binds to tissue protei In general, the toxic action of As in li cells is believed to be due to its bindi to some essential thiol derivatives prese in protoplasm.



Enzyme. Arsenious acid. $+ 2H_2O$

Two antidotes are used for toxicity due to As present —

i). Lewisite

The three majore biochemical actions of As is —

i). Coagulation of proteins

ii). Complexation with coenzymes

iii). uncoupling of phosphorylation.

Mercury :- Mercury is toxic in allofits forms, e.g. Hg, Hg^{+}, Hg^{2+}. Most of the mercury are absorbed in the form of methyl mercury. Methyl mercury compounds are much more toxic than all other forms of mercury. Methyl mercury can enter into food chains through their uptake by aquatic plants and fishes. It causes serious problem to human physiological systems. It is diposited in tissues as mercurous ion. This mercurous ion in tissues is oxidised to highly toxic mercuric ions. Mercury diffuses through skin and is retained by liver, Kidney, brain, heart, lung and muscle tissues. It binds to protein thiol grs. (-SH) and inhibits δ-amino levulinic acid dehydratase and cholin esterase activities. Mercury is a protoplasmic poison, it damages central nervous system.

The name of two axidotes used for toxicity due to these metals are —

i). British Anti Lewisite (BAL).

ii). Unithiol (Sodium salt of 2,3-dimercapto-1-sulphoxic acid).