

## Metal ion in Biological systems

Essential and trace metals.  $\text{Na}^+/\text{K}^+$  Pump Role of metal ions in biological Processes Toxicity of heavy metals and their detoxification, Role of selenium in Biological systems with reference to its essentiality and toxicity, mechanism of metal ion induced toxicity. interaction between orally administered drugs and metal ions in gut.

2. Bioenergetics and ATP cycle.

DNA Polymerization, Glucose storage metal complex is in transmission of energy, Chlorophylls, Photosystem - I and Photosystem - II in cleavage of water, Model system

3. Transport and storage of Dioxygen.

Heme Proteins and oxygen uptake, structure and function of Hemoglobin, myoglobin, Hemocyanins and hemerythrin, model synthetic complexes of iron, cobalt and copper.

4. Electron transfer in Biology - Structure and function of metalloproteins in electron transport processes - cytochromes and iron



416(5.1)  
Sulphur proteins, synthetic models

Nitrogenase.

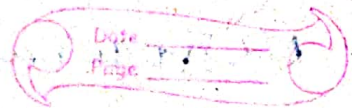
Biological nitrogen fixation, ~~of metalloproteins~~  
in electron transport processes - cytochromes  
~~and iron sulphur proteins, synthetic models~~  
Molybdenum nitrogenase, spectroscopic  
other evidence, other Nitrogenases model  
system.

Unit (V). Metal in Enzymes and Medicine.

The biochemistry of zinc, cobalt and  
molybdenum, Transport of zinc,  
Carbonic anhydrase, carboxypeptidase,  
alcohol dehydrogenase, Adenosyl cobalamine  
as a coenzyme. Ribonucleotide reductase,  
Methyl cobalamine, and cyano cobalamine  
as a co-factor, Ni in urease, Hydro-  
genase, Molybdenum hydroxylase,  
Xanthine oxidase, Sulphite oxidase,  
Nitrate reductase.



essential and trace metals  
,  $\text{Na}^+$   $\text{K}^+$  pump



Essential trace elements - Boron, Cobalt, Copper, Iodine, Iron, Manganese, Molybdenum and Zinc

Essential trace elements - Cr, F, Ni, Selenium and Vanadium

Essential elements comprise about 20-25% of the 92 natural elements.

Trace elements are required by an organism in only minute quantities.

Trace elements are very important for all functions at biological, chemical and molecular levels. These elements are medically vital biochemicals by acting as cofactors for many enzymes, as well as act as centers for stabilizing structure of enzymes and proteins.

There are 13 trace elements have been identified to impact health. Eight of them have been established for their essentiality to human namely iron, Zinc, Iodine, Copper, Selenium, Chromium, Manganese, Molybdenum where as Vanadium, Silicon, Boron, Nickel's necessities are still controversial.



## SODIUM - POTASSIUM EXCHANGE PUMP

Sodium pump is present in plasma membrane. This pump transfers  $\text{Na}^+$  and  $\text{K}^+$  ions against their concentration gradient. This process uses energy from ATP with the help of an enzyme. Sodium and Potassium ions help the pump in controlling water contents of the cells.