Role of Chromium (Cr) and Vanadium (V) in biological system:

In our biological system Both Chromium and Vanadium are present in very small amount.

The biological role at large extent is till unknown. Here are discussing a role that takes place in our biological system.

Chromium imbalance affects sugar metabolism and has been associated with the glucose tolerance factor in animals as Cr (III).

But little is known about the structure of the factor or any other specific Chromium complexes from plant, animal and bacteria.

The next Vanadium is required for normal health and could act in the form of metal Cation or as a Phosphate analogue, depending on the Oxidation state V (4) or V (5), respectively.

Vanadium is a sea Squirt, a Primitive Vertebrate, which is concentrated in "blood" cells apparantly as a major Cellular transition metal, but whether it participates in the transport of dioxygen is not known.

In proteins Vanadium is a Cofactor in an algal bromoperoxidase and in certain Prokaryotic Nitrogenases.

Lead Poisoning:- Now a days the battery industry is the largest single user of Lead. But leaded petrol accounts for more than 20% of total lead consumed per year and 90% of lead realeased to atmosphere in the form of galoline exhaust.

The triethyl lead Cation $(C_2H_5)_3Pb^+$ is formed from tetraethyl lead by the dissociation of Carbanion. Toxicity of this Oganometallic Cation results from the permeability of membranes, including the very discrimination blood-brain barrier. Causing several disorders of central and peripheral nervous system (Paralysis, Cramps, loss of Coordination) One of the characteristic symptoms of lead poisoning is Anemia also.

Reason for Toxicity:-

Like Hg (II) and Cd (II), lead inhibit SH-enzyme but less stoongly, Major Cause of toxicity of Pb is its interference with heme Synthesis by inhibiting several key enzymes involved in the Overall process of heme Synthesis.

—x—

Toxic Effects of Mercury

The main source of Mercury pollution are Industrial Waste, mining, Pesticides, Coal & lignite.

Mercury is well known toxic metal, which come to lime light after the incidence of **Minamata disease** in Japan (1953-60).

Minamata disease is Caused by eating sea fish Contaminated with Hg from the fish of Minamata Bay. The sea fish were found to be containing 27-102 ppm of Hg in the form of methyl mercury & the mercury source was the effluent from a Vinyl chloride Plant (Minamata Chemical Company) releasing in the bay.

Next case of mercury poisoning was found from Iraq in 1972, they were affected by eating Wheat, which had been dusted with mercury containing Pesticides.

Mercury can be toxic by Ingestion or Inhalation, but the toxicity depends upon its chemical form.

The soluble Inorganic mercury salts are highly toxic, excess $HgCl_2$ causes corrosion of Intestinal tract, Kidney failure ... etc.

Reason :-

Toxicity of Mercury is based on the strong affinity for the deprotonated forms of thiol Ligands such as Cysteine.

Hg (II) binds strongly with thiol groups of Protein and enzymes and this binding changes the conformation of the Protein about the active site

Mercury is a soft acid and -S of -SH group is a soft base so strong interaction between mercury and -SH gr. it can be explained on the basis of stronger soft-soft binding.

—x—