

Study Notes on Bioinorganic Chemistry

Bioinorganic chemistry

Introduction

Biological reactions are those reactions that involve metal ions. These metals are considered as essential elements. The study of bioinorganic chemistry helps to determine the function of metals in biological system.

There are various factors involved in this chemistry. These are:

1. It helps to study the naturally occurring inorganic elements.
2. Determines structure and function of biomolecules.
3. Determines toxicity of inorganic species.

Role of metal ions in various biological processes:

1. Fe and Cu acts as an electron carrier.

Fe: cytochrome; Cu: blue copper protein

2. Fe and Zn act as a metal storage compound.

Fe: Transferrin, ferritin; Zn: metallothionein

3. Fe and Cu act as an oxygen transportation agent.

Fe: haemoglobin, myoglobin; Cu: hemocyanin

4. Mg is an important part in photosynthesis.

5. Zn and Mg in hydrolase.

Zn: carboxypeptidase; Mg: aminopeptidase

6. Fe and Mo in oxidoreductase.

Fe: oxygenase, hydrogenase; Mo: nitrogenase

7. Fe and Co in isomerase.

Fe: aconitase; Co: B₁₂ coenzyme

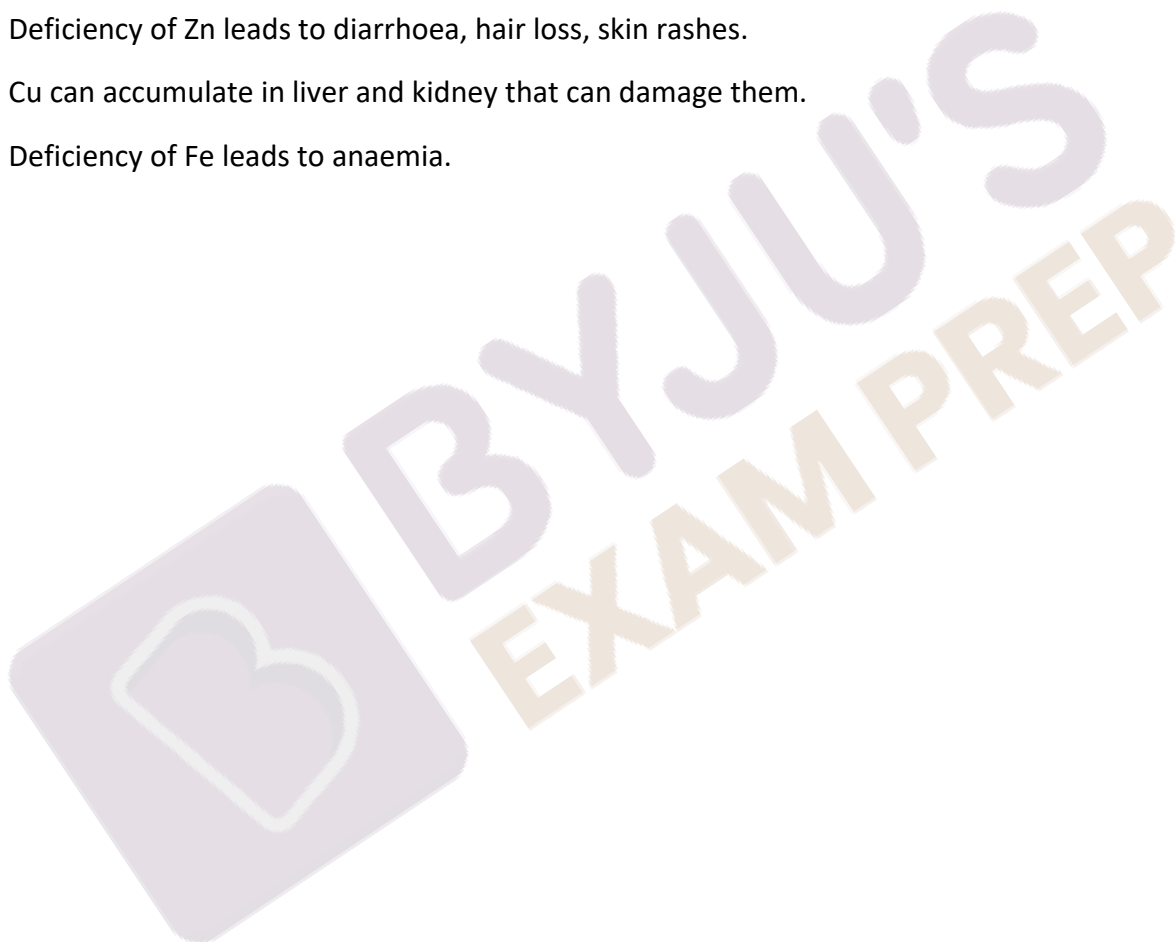
Essential elements:

These are classified into two categories:

1. Bulk elements: These are required by living organisms in larger quantity. Ex- H, N, P, S, Mg, Ca, Cl.
2. Trace elements: These are required by living organisms in minor quantity. Ex- Co, Cr, V, Ni, As, Fe, Cu.

Toxicity of some elements:

1. Cr is a highly toxic in +6 oxidation state. It is carcinogenic.
2. Deficiency of iodine can cause goitre.
3. Deficiency of Co in soil affects the grazing animals very badly.
4. Excess of Ca leads to hardening of arteries and cataract in eyes.
5. Excess intake of Na leads to hypertension.
6. Deficiency of Zn leads to diarrhoea, hair loss, skin rashes.
7. Cu can accumulate in liver and kidney that can damage them.
8. Deficiency of Fe leads to anaemia.



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