“ROLE OF ESSENTIAL MINERALS IN LIVING BEING”

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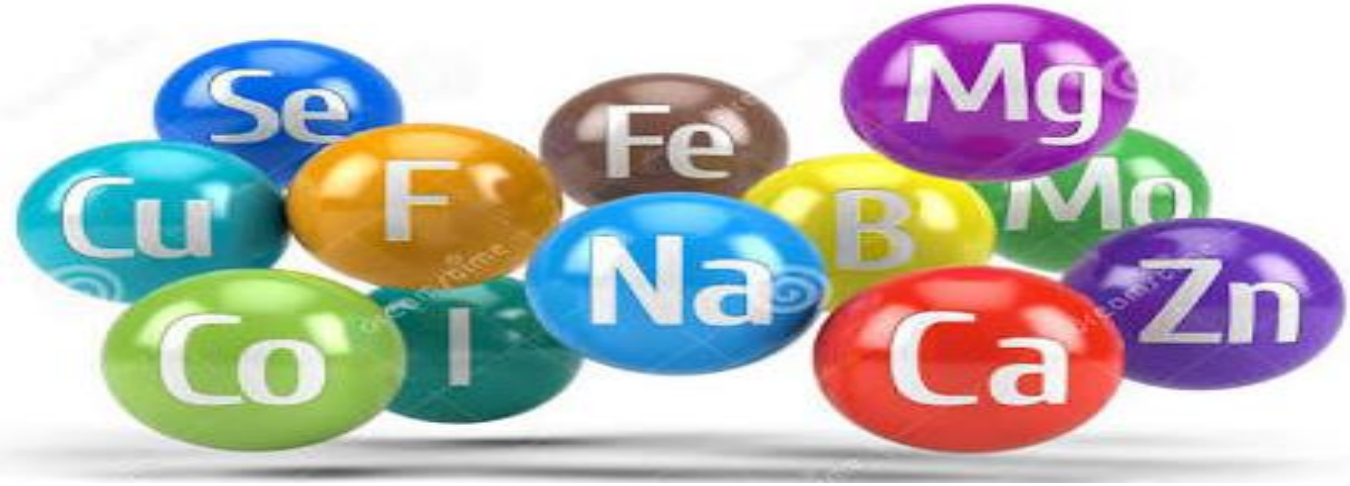
INTRODUCTION

MICROELEMENTS

- Group of inorganic ions in elemental form.
- Constitute small proportion of body weight.
- Only 7% composition of human body.
- Perform vital functions.
- Required amount less than 100mg/day.



❑ IRON

- Distribution:- adult body 3-5g iron content. occurs in erythrocytes (hemoglobin), myoglobin and heme enzymes.
- Sources:- organ meats(liver, heart, kidney),leafy vegetables, pulses, cereals, dried fruits.
- Deficiency disease:- hypochromic, microcytic anemia.
- Dietary require:- 10-15mg/day
- Functions:- transport O_2 and CO_2 , ETC and oxidative phosphorylation.

❑ COPPER

- Distribution:- adult body 100mg Cu content found in muscle bones, liver, brain ,heart and kidney.
- Sources:- organ meats, cereals, leafy vegetables, nuts.
- Deficiency disease:- anemia, menke's disease.
- Dietary require:- 2-3mg/day
- Functions:- constituent of enzymes(C oxidase, catalase etc.), hemoglobin synthesis, Fe transport, development of bone and nervous system(myelin).

❑ IODINE

- Distribution:- adult body 20mg I content. Occurs in thyroid gland, muscle, salivary glands and ovaries.
- Sources:- seafoods, iodized salt, vegetables, drinking water.
- Deficiency disease:- cretinism, goiter, myxedema.
- Dietary require:- 150-200µg/day.
- Functions:- synthesis of thyroid hormones (thyroxine , triiodothyronine), biochemical functions.

❑ MANGANESE

- Distribution:- adult body content 15mg. Liver and kidney rich in Mn.
- Sources:- cereals, nuts, leafy vegetables, fruits and tea.
- Deficiency disease:- retarded growth, bone deformities, fat accumulation in liver.
- Dietary require:- 2-9mg/day.
- Functions:- cofactor for enzymes(arginase, pyruvate carboxylase etc.), bone formation, glycoprotein synthesis, cholesterol biosynthesis.

❑ ZINC

- Distribution:- adult body 2g Zn contents. Occurs in prostate gland(100mg/g), skin, bones and teeth.
- Sources:- meat, fish, eggs, milk, beans and nuts.
- Deficiency disease:- growth retardation, poor wound healing, and hypogonadism.
- Dietary require:- 10-15mg/day.
- Functions:- cofactor for enzymes(carbonic anhydrase, alcohol dehydrogenase), antioxidant, promotes synthesis of retinol binding protein, wound healing.

❑ MOLYBDENUM

- Distribution:- low conc. in animal tissues. Liver and kidney contain highest Mo conc.
- Sources:- pulses, cereal grains and some green leafy vegetables.
- Deficiency disease:- molybdenosis, growth impairment, diarrhea and anemia.
- Dietary require:- 75-250µg/day.
- Functions:- constituent of enzymes (xanthine oxidase, aldehyde oxidase and sulfite oxidase).

❑ COBALT

- Distribution:- adult body is 1.1mg Co content of which distributed in liver, kidney and bones.
- Sources:- cyanocobalamin (vitamin B_{12}).
- Deficiency disease:- pernicious anemia.
- Dietary require:- 5-8µg/day.
- Functions:- constituent of vit. B_{12} ,formation of erythrocytes.

❑ FLUORINE

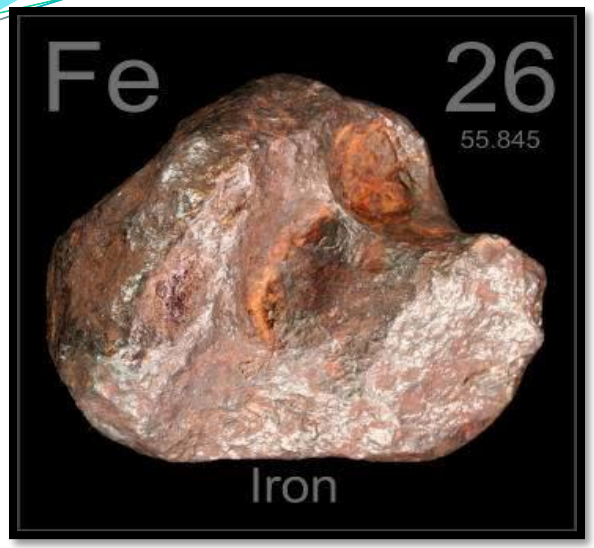
- Distribution:- active element of halogen group. Not found in free state. 95% F found in bones and teeth.
- Sources:- drinking water.
- Deficiency disease:- dental caries, fluorosis.
- Dietary require:- 2-4mg/day.
- Functions:- proper formation of bones and teeth.

❑ SELENIUM

- Distribution:- highest conc. in renal cortex, pancreas, pituitary and liver.
- Sources:- organ meats and sea foods.
- Deficiency disease:- muscular degeneration, pancreatic fibrosis, reproductive disorders and cardiomyopathy.
- Dietary require:- 50-200µg/day.
- Functions:- antioxidant function along with vit.E, contituents of glutathione peroxidase and selenocysteine.

❑ CHROMIUM

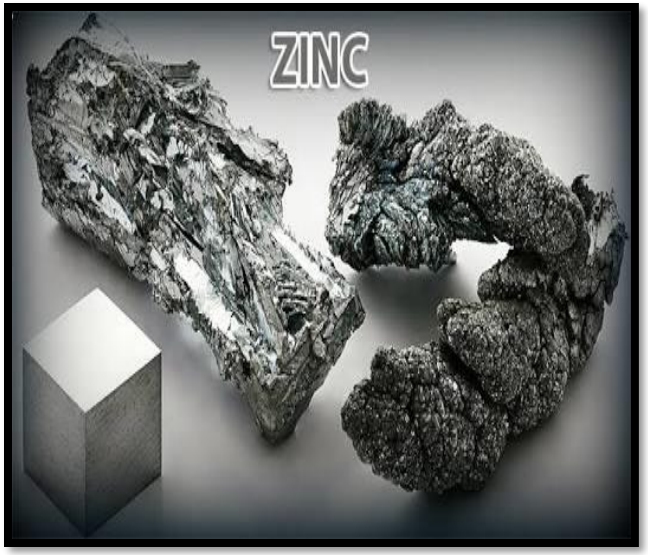
- Distribution:- human body contain 6mg.In adult tissues 0.02-0.04ppm on dry basis and in blood 0.009-0.055ppm of Cr present.
- Sources:- brewer's yeast, meat, cereals, cheese,whole grains.
- Deficiency disease:- impaired glucose tolerance.
- Dietary require:- 10-100µg/day.
- Functions:- promotes insulin function, lowers total serum cholesterol level, lipoprotein metabolism.

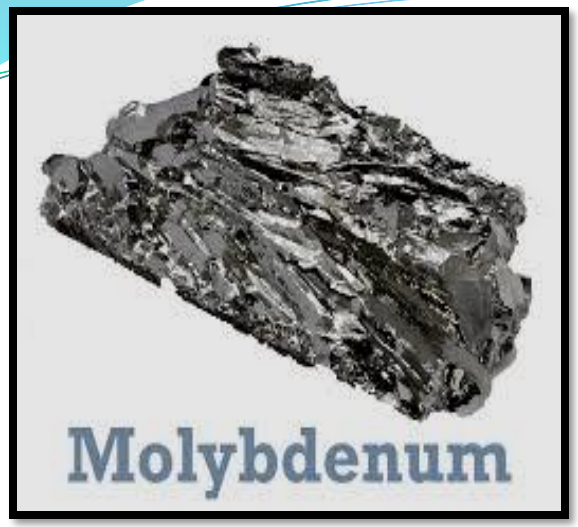

Fe
26
55.845
Iron


Copper
Cu


IODINE

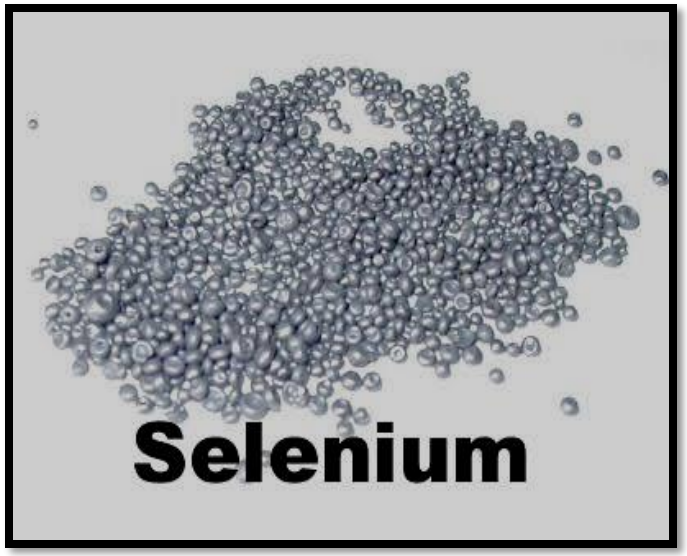

MANGANESE


ZINC


Molybdenum


Co
27
58.933
Cobalt


FLUORINE


Selenium

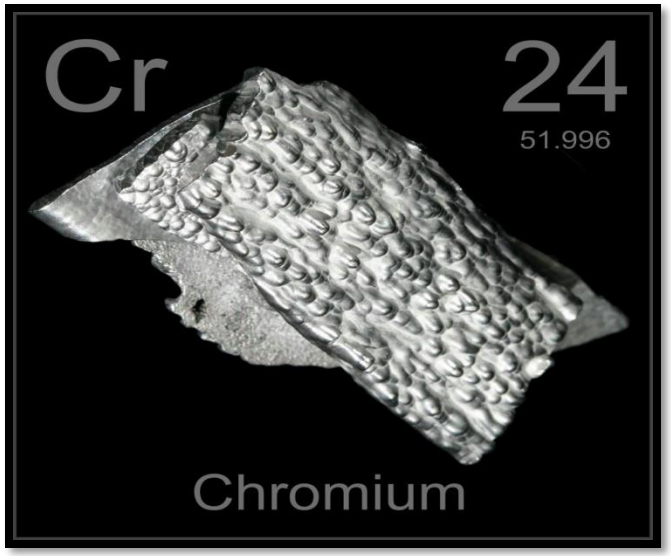

Cr
24
51.996
Chromium

TABLE 18.2 A summary of the major characteristics of trace elements (microelements)

Element	*Major functions*	*Deficiency disease/symptoms*	*Recommended dietary allowance*	*Major sources*
Iron	Constituent of heme e.g. hemoglobin, myoglobin, cytochromes; involved in O_2 transport and biological oxidation.	Hypochromic, microcytic anemia	10–15 mg/d	Organ meats (liver, heart), leafy vegetables, iron cookware
Copper	Constituent of enzymes e.g. cytochrome C oxidase, catalase, tyrosinase; in iron transport.	Anemia, Menke's disease	2–3 mg/d	Organ meats cereals, leafy vegetables
Iodine	Constituent of thyroxine and triiodothyronine	Cretinism, goiter, myxedema	150–200 μg/d	Iodized salt, sea foods
Manganese	Cofactor for enzymes e.g. arginase, pyruvate carboxylase; glycoprotein synthesis.	Almost unknown	2–9 mg/d	Cereals, leafy vegetables
Zinc	Cofactor for enzymes e.g. alcohol dehydrogenase, carbonic anhydrase, lactate dehydrogenase.	Growth retardation, poor wound healing, hypogonadism	10–15 mg/d	Meat, fish, milk
Molybdenum	Constituent of enzymes e.g. xanthine oxidase	Almost unknown	75–250 μg/d	Vegetables
Cobalt	Constituent of vitamin B_{12}, required for the formation of erythrocytes	Pernicious anemia (as in vitamin B_{12} deficiency)	5–8 μg/d	Foods of animal origin
Fluorine	Helps in the proper formation of bones and teeth	Dental caries, osteoporosis	2–4 mg/d	Drinking water
Selenium	Involved in antioxidant function along with vitamin E; constituent of glutathione peroxidase and selenocysteine	Muscular degeneration, cardiomyopathy	50–200 μg/d	Organ meats, sea foods
Chromium	Promotes insulin function (as glucose tolerance factor)	Impaired glucose tolerance	10–100 μg/d	Brewer's yeast, meat, whole grains

THANK YOU