

Nutrients in Drinking Water

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(View expressed in this article are extremely personal)

I recall a event of about 10 years back, when I approached the dealer of small windmill for generation of domestic electricity. I was told that the expert team shall visit the house and if feasible shall sell the product, I was little annoyed and told that whatever efficiency it may be it is my requirement to install the windmill, even though the dealer was firm to his decision.

Another incident I was in need of installation of RO plant , the dealer did not ask any question about the present source of water and quality, he readily installed the product, after few years of utilization my wife started suffering from deficiency of B12, this gave me some indications about the utility of RO plant. TDS of water were about 1200 which were reduced to about 100, I got the RO water tested in the laboratory and found that PH was reduced to 5.5, this was alarming I shared it with my friends and one of my friend also got the water tested and found that on reduction of TDS below 25 the PH value was 4.5.

In domestic treated water with reverse osmosis plants, Calcium and Magnesium are reduced to very low limit and are almost eliminated.

There was a discussion with the one developer of desalination plant, and I asked their technical team that is it possible that if we librelize the condition of 500 TDS to 1000 TDS, then we may get sufficient Calcium and Magnesium in the treated water, it was stated that specially calcium is having higher scaling value, hence it is delebrately eliminated.

These membrans are initially designed specially for industrial purpose, time has come that we must think of designing the membrans exclusively for drinking water supply so that important minerals are not eliminated. Otherwise we are losing the important minerals which are having nutrient value in water.

I starting referring the reports of WHO and I would like to share some findings

- **Calcium** – important in bone health and possibly cardiovascular health .Calcium is the most abundant mineral in the body (1.5 – 2.0% of the total body weight). In addition to its major function as a primary structural constituent of the skeleton, calcium is also important for the regulation of multiple enzymes and hormonal responses, blood clotting,

nerve transmission, muscle contraction/relaxation (including normal heart rhythm), vascular contraction and vasodilation, and glandular secretion .

- **Magnesium** – important in bone and cardiovascular health . This element is the second most abundant intracellular cation. Adult body content is 20-28 g, 60-65% of which is found in the skeleton and 1% in extracellular fluid. Magnesium is involved in the function of enzymes of carbohydrate, lipid, protein, and nucleic acid metabolisms. It is essential for the mineralization and development of the skeleton, and also plays a role in cellular permeability and neuromuscular excitability
- **Fluoride** – effective in preventing dental caries. The optimal drinking water concentration of fluoride for dental health is generally between 0.5 to 1.0 mg/litre and depends upon the volume of drinking water consumed and the uptake and exposure from other sources
- **Sodium** – an important extracellular electrolyte, lost under conditions of excess sweat
- **Copper** – important in antioxidant function, iron utilization and cardiovascular health, it is also responsible for structural and catalytic properties of multiple enzymes necessary for normal body functions
- **Selenium** – important in general antioxidant function and in the immune system
- **Potassium** -is important for a variety of biochemical effects but it is usually not found in natural drinking waters at significant levels.
- **Iron** – It participates in numerous processes necessary for normal body functions: oxygen transport, oxidative phosphorylation, metabolism of neurotransmitters, and DNA synthesis require iron
- **Zinc** – It is required for growth, normal development, DNA synthesis, immunity, and sensory functions
- **Iodine**- It is a critical component of thyroid hormones
- **Phosphorus** - as calcium phosphate is a structural component of bones it is found in a 1:2 mass ratio relative to calcium This element plays an important role as a structural component of cell membrane phospholipids; it is essential for energy production and storage, phosphorylation of numerous enzymes, hormones and cell signalling molecules, and to maintain a normal acid-base equilibrium
- **Sodium, Potassium and Chloride**:- Sodium is the principal cation in the extracellular fluid, while potassium is predominantly an intracellular cation, and chloride is the main extracellular anion These electrolytes have important physiological roles in the maintenance of extracellular fluid volume, extra- and

intracellular osmolarity, regulation of acid – base balance, generation of trans-membrane electrochemical gradients, transmission of nerve impulses, and muscle contractions. In addition to its functions as an electrolyte, chloride is indispensable for gastric hydrochloric acid production

- It has also been suggested that hard water can reduce the losses of calcium, magnesium and other essential minerals from food during cooking

As freshwater resources become scarce, the world will become increasingly reliant on desalination or demineralization to provide potable water. The process of desalination, either by flash evaporation or reverse osmosis, depletes the source water of its mineral contents. This has increased the interest in the role that drinking water minerals play in human nutrition.