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JOHN'S CORNER:

MINERALS - The Elements and What They Do (Part 14)

by John Ferguson

22) Titanium (T) - Is a silver metal and the ninth most abundant element in the earth's crust. It is found in igneous rocks at 5,700 ppm, shale at 4,600 ppm, sandstone at 1,500 ppm, soils at 5,000 ppm, and in land plants at 1 ppm. Titanium oxide (TiO_2) occurs in many minerals and in the crystal form we call "rutile" that is found in the granite outcrops near the town of Llano, Texas.

Minerals with titanium in them are very resistant to weathering so they are often found in soils, as they are not decomposed.

Titanium is used in artificial hips and joints and other medical items. It is used to make white pigments for paper, paints, plastics, etc. Titanium sulfide (TiS_2) is used in some types of batteries, used to treat skin disorders and as an additive to toothpaste. If titanium occurs as the compound titanium chloride ($TiCl_4$) it is highly irritating to skin, eyes, and mucus membranes of humans.

Titanium nitride coatings are extremely hard and used on items like drill bits to jet planes. This compound is used to make knives for scuba divers and it is used to make jewelry.

Titanium is found in humans throughout the body with a total of only 700 mg for an average person. Titanium does not play a significant role in bodily functions, it is relatively non-toxic, and does not accumulate.

As a result, it is used in surgical implants as mentioned above since it is well tolerated by tissue. However, titanium in the form of titanium oxide dust is possibly carcinogenic to humans and it is used as a whitener in the manufacture of several cheeses.

Gardening and Landscaping Problems Associated with Titanium (Ti)

Not a lot is known about the role titanium plays in soils and plants compared to other elements. Some studies have found that it plays a role in nitrogen fixation by microbes. It may also play a role in the photo-oxidation of nitrogen compounds in higher plants and there is some evidence that it increases yields of some crops.

Only one report on bush beans found it causes necrotic and chlorotic spots on the leaves at levels of 200 ppm.

Titanium is not very soluble in water, hence, it does not move much and is considered relatively unavailable to plants. Most plants have 0.1-7 ppm of titanium. Some plants like horsetail and nettle may accumulate titanium up to 80 ppm.

Other studies have found that titanium stimulates the production of carbohydrates so there may be some biological role since it helps plants grow larger and stronger. However the mechanism is yet unidentified
Titanium has been found to stimulate the growth of rhizobium bacteria, and diatoms have been found to have levels of titanium up to 1,500 ppm.

A recent study found that a chelated form of titanium (titanium ascorbate) can have beneficial effects on plants, animals and man.

Sources: granite sand, greensand, basalt sand.