NATURE'S WAY RESOURCES
an organically based service company

www.natureswayresources.com

JOHN'S CORNER:

MINERALS - The Elements and What They Do (Part 34)

by John Ferguson

See the October 21, 2016 Newsletter for list of references and the Periodic Table.

54) Xenon (Xe)

Xenon is the fifth member of the inert gases that we call "noble gases" as they do not react with anything, and is located in the far right column of the periodic table. However, in 1962 xenon was found to react with fluorine to form various compounds.

Xenon is used in incandescent light bulbs as it lets them burn hotter and brighter. It is used in arc lighting to make special hi-intensity light like those used in projectors at I-max theaters and in flash bulbs for cameras. Most recently, xenon is being used in thin film technology. Xenon is also being used to make ion propulsion systems for spacecraft.

Xenon is believed to have no biological role and the amount found in the human body is from dissolved xenon from the air. However, researchers found that Xenon does bind to mammalian hemoglobin and myoglobin producing an anesthetic affect.

Most of the xenon on Earth is found in our atmosphere and it is the 85th most abundant element on earth (i.e. vary rare) even though we have 2 billion tons of it in the atmosphere.
The amount of xenon in rocks, soils, or water is extremely small.

Gardening and Landscaping Problems Associated with Xenon (Xe)

Xenon does not affect plants good or bad. Many herbs contain small amounts of xenon with Egyptian onions having some of the highest levels.

Sources: atmosphere

55) Cesium (Cs) -

Cesium is found in igneous rocks at 1 ppm, shale's at 5 ppm, coal at 1 ppm, but only 0.5 ppm in sandstones and limestone's. Very little cesium is found in fresh or seawater. Cesium in soils can range from 0.3 to 25 ppm. There is less than 1 ppm in land or marine plants. Land animals may have 0.064 ppm in their muscles.

Cesium is a shiny gold colored metal that reacts with oxygen. Cesium is the most reactive of all the alkali metals. If one drops a piece of cesium into a bowl of water, it will explode. Cesium most commonly occurs with a +1 electrical or valence state. Cesium is strongly sorbed to mica or clay minerals in the soil.

All elements have a natural vibration or frequency that can be used to measure time. Cesium is used in atomic clocks to calculate and provide a global time reference. Powdered cesium formate is used in oil well drilling.

There is some evidence that cesium helps mammalian immune systems.

Cesium tends to accumulate in the organic horizon in soils.

Gardening and Landscaping Problems Associated with Cesium (Ce)

Cesium is not required by plants thus it has not been studied. However, roots take up cesium, as it is in the same column on the periodic table as potassium, hence has similar chemical properties.

Members of the Amaranthus and Helianthus species tend to hyper-accumulate cesium and can be used for phytoremediation of polluted sites.

Sources: radioactive fallout, coal ash.

56) Barium (Ba)

Barium is a soft silvery-white metal found all over the earth. In igneous rocks, it may range from 0.5-1,200 ppm with an average of 425 ppm and in sedimentary rock 50-800 ppm, thus barium is common in soils from 100-3,000 ppm. Barium gets its name from the Greek *barys,* which means heavy. This derives from the barium minerals, which are heavy.

Barium in soils average 500 ppm where it is in mobile forms. However, it easily precipitates as sulfates and carbonates and will be absorbed by clays, oxides, and hydroxides. Coals may have 75-330 ppm of barium.
Barium is an alkali metal in group 2 of the periodic table of elements, it reacts quickly with oxygen in the air, making it useless for many applications. In vacuum tubes, a piece of barium was included to react with any trace amounts of leftover oxygen, nitrogen, or water to prevent these from interfering with the function of the tube.

One of the benefits of barium is the density of slurries containing barium compounds. An example is the drilling mud (barium sulfate, $BaSO_4$) which is used in oil well drilling (90% of all usage of barium). Barium is also used in the manufacture of ceramics, bricks, tile, and glasses. A compound of barium composed of barium, yttrium, carbon and oxygen is a superconductor. Barium nitrate is used to produce a green color in fireworks. The rare mineral below, which is a barium-titanium-silicate ($BaTiSi_3O_9$) that has a translucent blue color, which can be cut and turned into a gemstone.

Barium is found concentrated in phosphate bearing rocks, thus artificial fertilizers often have high barium levels. Barium most often occurs with a +2 electrical or valence state. Its common minerals are barium sulfate or Barite ($BaSO_4$), barium carbonate or Witherite ($BaCO_3$), and Hollandite ($Ba_2Mn_8O_{16}$).

Until recently, barium was considered to have no biological role, but today, it is considered essential.

Barium is mainly found in the bones and teeth of humans. One report stated that the AIDs virus loves barium and an excess may help it reproduce. Barium sulfate due to its density is often ingested, to enhance medical imaging of soft tissue in our stomachs and intestines.

One use for barium is in animal studies, researchers found that mother orangutans transfer barium from their own skeletons to their babies while they are nursing. This forms layers in the babies teeth that can identify how many years the babies have nursed (orangutans often do not wean until 8 years of age). Science News, June 2017

Gardening and Landscaping Problems Associated with Barium (Ba)

It is generally believed that barium plays no role in the metabolism of plants. However, plants, especially in acidic soils, easily absorb barium with greater absorption at lower pH levels. Most plants have 2-14 ppm of barium in their tissues with higher levels found in dryer climates. Wheat has 3.2 ppm, cereal grains 5.5 ppm, carrots 13 ppm, lettuce 9 ppm, beans 8 ppm, tomatoes 2.1 ppm, and apples at 1.5 ppm. Barium is found in all food groups with the highest levels in nuts. Blueberries with very high levels of barium have been reported.

Levels of barium at 2,000 ppm inhibit the growth of some plants. However, if compounds of sulfur (S) and calcium (Ca) are in the soil then toxicity effects of barium are reduced.
The leaves of some nut trees have barium levels above 10,000 ppm! Some Brazil nuts have also been reported with 10,000 ppm of barium.

Some species of yeast have a high affinity for barium where it accumulates on their surface.
Sources: coal and coal ash, artificial fertilizers made from phosphate rocks