

Nitrate/Nitrite

Nitrate and nitrite are naturally occurring inorganic chemicals that make up part of the nitrogen cycle. The nitrogen cycle is the movement of nitrogen, in different chemical forms, from the environment to organisms and then back to the environment. As part of the nitrogen cycle, bacteria convert nitrogen gas from the atmosphere into nitrate and nitrite and then back again as the cycle continues. Nitrate is the more stable of the two chemicals and is therefore more abundant in soils.

CAUSES:

Common sources of nitrate include application of fertilizers, use of septic systems, concentration of animal waste, and decomposition of plant residues. Since nitrate and nitrite occur naturally in the environment, small amounts might be present in water. Nevertheless, human activities can significantly influence these levels. Municipal and industrial wastewater and animal feed lots are major point sources for nitrate and nitrite in water. Concentrated use of septic tanks along with runoff or leachate from the use of fertilizer are some of the main nonpoint sources. Once in the soil, nitrate/nitrite is very mobile. It is water soluble and moves easily through the soil at virtually the same speed as water.

Food, rather than water, accounts for the major human intake of nitrate and nitrite. Both are found in many foods, especially leafy vegetables such as spinach and lettuce. The next largest source of dietary nitrate and nitrite comes from cured meats.

EFFECTS:

The Environmental Protection Agency (EPA) and State of South Carolina have set a maximum contaminant level (MCL) of 10.0 mg/L. High levels of nitrate in drinking water are a health concern primarily because of the potential for the nitrate to be converted to nitrite. Nitrite interferes with the ability of your blood to carry oxygen. It does this by converting blood hemoglobin into methemoglobin. Unlike hemoglobin, methemoglobin does not function as an oxygen carrier to the tissue. The resulting condition is known as methemoglobinemia and causes severe oxygen deficiency and can lead to death. **The sensitive populations are infants, individuals with reduced gastric acidity, individuals with a hereditary lack of methemoglobin reductase, and women who are pregnant.** Methemoglobinemia is usually found in infants rather than adults, especially infants less than six months of age. It is characterized by shortness of breath and blueness of skin. As a result, it is often called the “blue baby syndrome.” Healthy adults can consume large quantities of nitrate in drinking water with relatively little, if any, adverse effects. Please contact a physician for more information on the effects.

TREATMENT:

There is no simple way to remove nitrate from water in the home. Nitrate does not evaporate the way chlorine does. Boiling, freezing, or letting water stand does not reduce the nitrate level. Home water treatment units are generally a limited option. A properly operating distillation system will remove nitrate. Reverse osmosis and anion exchange units are other options. These methods are both discussed in other sections of this book.