

Nitrate (NO₃⁻) and Nitrite (NO₂⁻)

What are Nitrate and Nitrite?

Nitrogen exists naturally in soils, typically bound to organic matter and mineral soil material. Available forms of nitrogen, including nitrate and nitrite, are present in soils, water, air, plants, and meat products. In nature, nitrate and nitrite can be found in igneous and volcanic rocks. Nitrate and nitrite salts completely dissolve in water. Bacteria in soil and plants use oxygen to change nitrite into more stable nitrate, which can be converted back to nitrite by other bacteria when oxygen is lacking. Animal wastes and nitrogen-containing fertilizers increase concentrations of nitrate in the environment.

Do Nitrate and Nitrite have any additional names?

Nitrate Nitrogen, Nitrite Nitrogen

What are the known health effects?

Nitrate in drinking water can be responsible for a temporary blood disorder in infants called methemoglobinemia (blue baby syndrome). In infants less than six months old, a condition exists in their digestive systems which allows for the chemical reduction of nitrate to nitrite. The nitrite absorbs oxygen through the stomach and reacts with hemoglobin to form methemoglobin, which does not have the oxygen carrying capacity of hemoglobin. Thus, the oxygen deficiency in the infant's blood results in the "blue baby" syndrome. When the nitrate-containing source is removed, the effects are reversible. Although extreme levels of nitrate can be associated with central nervous disorders in adults, nitrates and nitrites are rarely a problem in drinking water for humans older than six months of age.

How does exposure occur?

Nitrate and nitrite are found in diets through vegetables (especially celery, lettuce, and spinach), fruits, cured meats, fish, dairy products, beers, and cereals. Some meats and meat products contain sodium nitrate and/or sodium nitrite as preservatives. You can be exposed by drinking water containing nitrate from sources such as animal waste or/ or fertilizer runoff. Release of nitrate and/or nitrite to soil and water at waste disposal sites could result in contamination of drinking water sources and increased uptake by plants you eat.

Is this contaminant regulated?

Yes, and water supplied by Mount Laurel MUA is in compliance with USEPA and NJDEP requirements. The maximum concentration of nitrate permitted in drinking water is 10 ppm; water supplied by the MLTMUA system has a maximum detection of 3.97 ppm. Nitrate is more stable than nitrite, and most nitrogen-containing compounds in natural waters, including nitrite, tend to be converted to nitrate. Thus, nitrite levels in water are generally negligible and consequently there is no established limit for nitrite in drinking water.

How can I reduce exposure?

You can reduce exposure to nitrate and nitrite by eating less of the foods that contain high levels of nitrate or nitrite. There are several ways to remove nitrate and nitrite from drinking water - ion exchange, distillation, and reverse osmosis being the three most practical and economically feasible for at home use.

Additional information regarding nitrate and nitrite, including the information referenced, can be found at:

<https://www.atsdr.cdc.gov/toxfaqs/tfacts204.pdf>

https://www.who.int/water_sanitation_health/dwq/chemicals/nitratenitrite2ndadd.pdf