



Nitrates ( $\text{NO}_3^-$ ) and nitrites ( $\text{NO}_2^-$ ) are chemical compounds that consist of nitrogen and oxygen. These compounds readily dissolve in water and have no taste or odour. Nitrate compounds are commonly used in fertilizers, food preservatives and chemical oxidants. A small portion of nitrate compounds are generated naturally in the soil by bacteria and by lightning discharge in the atmosphere.

Nitrates are more chemically stable than nitrites. However, under certain conditions nitrates can be reduced to nitrites. While nitrates are considered relatively non-toxic, nitrites have toxic effects, especially in infants under six months old. Nitrates can be converted into nitrites in the body and cause *methaemoglobinaemia* in infants, a condition commonly known as “blue-baby syndrome”, which reduces the ability of blood to carry oxygen. Pregnant women may also be at risk from elevated levels of nitrate in water.

Although nitrate compounds are necessary for healthy plant growth, excessive amounts of nitrates can wash out of the soil and end up in lakes and seas. This can lead to indirect toxic effects and result in algal “blooms” and reduction in natural oxygen levels in water. Excess nitrates can also disturb the normal growth and reproductive behaviour of aquatic organisms such as fish and amphibians.

The maximum acceptable concentration of nitrate compounds in drinking water is 45 mg/L according to the Canadian Drinking Water Quality Guidelines. The levels of nitrates in

drinking water across Canada are generally less than 5 mg/L.

Groundwater usually contains higher concentrations of nitrates on average than surface water. Groundwater can have higher concentration of nitrates due to leaching of fertilizers from nearby farmlands, decaying vegetation or contamination by livestock manure and septic systems. Because nitrate compounds are very soluble, they can easily travel in the soil and get carried away by groundwater.

### [Intensive application of inorganic fertilizers can increase nitrate loading into groundwater](#)

Nitrates can be removed from water using distillation, ion exchange or reverse osmosis treatment. Boiling or filtering by activated carbon, sediment cartridge filters or ultrafiltration membranes does not remove nitrates. Well owners, especially households with pregnant women and infants under six months old, are advised to test their water quality annually for a variety of parameters including nitrates.

It is highly recommended that the systems installed to treat high levels of nitrate in drinking water be certified to NSF Standard 58 for reverse osmosis or NSF Standard 62 for distillation systems. The installed systems must also be properly designed and installed.