

Nitrate in Drinking Water: Frequently Asked Questions

What is nitrate?

Nitrate (NO₃) is a compound that is formed when nitrogen combines with oxygen. The main adult intake of nitrate is from food rather than water; but sometimes high amounts of nitrate get into drinking water.

Where does nitrate come from?

Typical sources of nitrate include; fertilisers, animal wastes, particularly in areas of intensified farming, unreticulated sewage disposal systems, industrial waste and food processing waste. Nitrate is highly soluble in water, making it readily transported through the soil to groundwater.

Who is at risk?

High levels of nitrate can pose a risk to babies less than six months who are formula fed and the unborn foetus of pregnant women. Adults with specific rare metabolic disorders (deficiency of glucose-6-phosphate dehydrogenase or methaemoglobin reductase) may also be at risk.

What are the health effects?

Nitrate is converted into nitrite by bacteria in the gut. This nitrite combines with foetal haemoglobin in the foetus or infant less than 6 months old preventing oxygen from binding and being distributed around the body. Symptoms include blueness around the mouth, hands and feet, hence the name 'blue baby' syndrome and in severe cases can affect breathing and be life-threatening.

By 6 months of age infants have only mature haemoglobin which does not bind to nitrite. This allows oxygen to freely bind to haemoglobin and 'blue baby' syndrome does not occur. Fully breastfed infants are not affected as nitrites do not enter the breastmilk. Very few cases of 'blue baby' syndrome have been reported in New Zealand, though nitrates in groundwater have been rising in the last twenty years.

How do I know if my water has high nitrate levels?

Council water supplies in Canterbury currently have safe nitrate levels.

Many rural drinking water bores in Canterbury are at risk of elevated nitrate levels, with some private bores exceeding the recommended safe level of nitrates. Environment Canterbury (ECan) has produced maps identifying where nitrate levels in drinking water may be a concern. [These are available via the Community and Public Health website.](#)

The maps identify green, yellow and red areas.

- Green areas are where nitrate concentrations in groundwater are always below the MAV and the water is therefore safe to drink.
- Red areas are where nitrate concentrations in groundwater are above the MAV most or all of the time and therefore alternative water sources should be used for drinking.

- Yellow areas are areas where it is not known if a sample collected from a well will have nitrate concentrations exceeding the MAV and testing is recommended.

The drinking water consumed by pregnant women, or formula fed babies under 6 months that comes from a private bore in a medium to high risk area should be tested for nitrates.

Testing is the only way to detect nitrate as it is tasteless, odourless and colourless. There are several laboratories that are able to test for nitrate. [Some of these labs are listed on the Community and Public Health website.](#)

What is a safe nitrate level in drinking water?

Drinking Water Standards for New Zealand set a Maximum Acceptable Level (MAV) of 50mg/L for nitrate, which is equivalent to 11.3mg/l nitrate-nitrogen. Some laboratories report nitrate levels whereas other report nitrate-nitrogen, ensure that you are aware which they are reporting if you are getting your water tested.

What do I do if my water has high nitrate levels?

If tests show that nitrate levels are above or close to the MAV pregnant women and formula-fed infants less than 6 months should use an alternative water source for drinking or making up formula.

If tests reveal that nitrate levels are above half the MAV the water is safe to drink but water should be tested monthly to ensure that it does not increase over the MAV.

Can I filter or treat my water to get rid of the nitrate?

Nitrate is difficult to remove from water. Common household cartridge or carbon filters, boiling water and chemical treatments (e.g. chlorine) will not remove nitrate.

There are three methods that do remove nitrate from drinking water: distillation, reverse osmosis and anion exchange. These processes are expensive and potentially unreliable.

Will the amount of nitrate in my well be constant or will it change?

Nitrate levels do vary over the year. Often we find results are highest in spring (following rain and snow melt). Also in areas where there is extensive irrigation high nitrate levels have been found in late summer.

If I make my well deeper will I get find water with lower/safe nitrate levels?

Sometimes, but not always, accessing a deeper aquifer will find water with less nitrate contamination. This might mean going several tens of meters deeper. We would recommend checking nitrate monitoring information available for other close by wells and getting some expert advice before undertaking this expensive step.