



## What is Nitrate / Nitrite?

- 💧 Nitrate ( $\text{NO}_3$ ) is formed when Ammonia ( $\text{NH}_4$ ) and Nitrite ( $\text{NO}_2$ ) are oxidised.
- 💧 Nitrate and nitrite can be easily converted from the one to the other.
- 💧 Nitrate is an important plant nutrient.
- 💧 Nitrate is produced during the decaying process of plants as well as animal and human wastes.

## Nitrate / Nitrite in water

- 💧 The nitrate concentration of fresh, unpolluted water is normally less than 2 mg/l.
- 💧 The concentration of nitrates in ground water can be as high as 20 mg/l.
- 💧 Higher concentrations of nitrate can be indicative of pollution from e.g. agricultural land use activities.

## What problems can Nitrate / Nitrite cause?

- 💧 Nitrate can be the reason for **chronic fatigue** and failure to thrive in humans.
- 💧 Bottle fed babies under the age of one year can suffer from **cyanosis** (blue discoloration of skin and mucous membranes due to inadequate oxygenation of the blood) and experience difficulty in breathing. This situation occurs when nitrate is reduced to nitrite. The nitrite then forms a complex with the red blood pigment, haemoglobin, forming methaemoglobin, when the intestinal flora is abnormal. This is usually the case with malnourished babies who have iron anaemia deficiency and a vitamin C deficiency.

## How can Nitrate / Nitrite in water be treated?

- 💧 Processes used to remove nitrates from water are ion-exchange, reverse osmosis, denitrification (biological reduction with carbon).
- 💧 All of the above processes are used for large volumes of water, but they are difficult to maintain and optimise and require advanced and intensive supervision.
- 💧 Nitrate is difficult to remove from water and since it stimulates algal growth, secondary treatment processes may be necessary.
- 💧 Home treatment kits, using **ion-exchange processes** are expensive and treat only small volumes of water.



Reference: DWAF (1998). Quality of domestic water supplies. Vol. 1: Assessment Guide. WRC No. TT 101/98, pp. 21.