

Nitrates In Drinking Water

What are Nitrates?

Nitrates are a nitrogen/oxygen compound that naturally occur in low concentrations in ground water. Under normal circumstances, only a small percentage of the total nitrates consumed by adults come from drinking water. The maximum recommended limit, established by the EPA for nitrate-nitrogen in drinking water is 10 milligrams per liter.

Sources of Nitrates

Nitrates are derived from nitrogen (an element which occurs naturally in many different forms in the environment). When nitrogen enters the soil, it is converted to Nitrates by microorganisms. Plants use some of these nitrates, but any excess is carried down through the soil into the groundwater. This process is known as "leaching."

At times, far more nitrogen enters the soil than plants can use or take up, leading to dangerously high levels in ground water. There are several ways this can occur:

- Animal and human waste contains nitrogen in the form of ammonia.
- A concentrated source of waste (for instance, a leaking septic system) can lead to a high level of nitrates in groundwater.
- Runoff from agricultural land
- Decomposing of plant and animal material

Health Risks

High nitrate levels are a cause of concern for several reasons. They are often associated with *methemoglobinemia*, commonly known as "blue baby syndrome." In infants under six months of age, nitrate levels higher than 10 mg/L can have toxic effects. This occurs because the Nitrates (NO₃) convert to Nitrites (NO₂) in an infant's stomach. Nitrites enter the bloodstream and bind to hemoglobin, changing it to methemoglobin. This interferes with the blood's ability to carry oxygen to bodily tissues. The body's tissue will literally starve for oxygen, making the skin turn a bluish color.

There is also a potential for prenatal *methemoglobinemia* or birth defects associated with high nitrate levels.