



# Nitrogen in the Environment: What is Nitrogen?

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Nitrogen is extremely important to living material. Plants, animals and humans could not live without it. The major source of nitrogen is the atmosphere. It exists as a colorless, odorless, nontoxic gas and makes up about 78 percent of the atmosphere. Nitrogen is also found in the Earth's crust as part of organic matter and humus.

## Nitrogen and plants

The nitrogen gas in our atmosphere exists as a molecule composed of two atoms of nitrogen. Plants cannot directly use this form of nitrogen. Nitrogen must be converted into other forms before it can be used by plants. Plant uptake of nitrogen is largely in the form of nitrate ( $\text{NO}_3^-$ ), and to a lesser degree ammonium ( $\text{NH}_4^+$ ).

## The nitrogen gas molecule

The nitrogen gas molecule in the atmosphere (Figure 1) is made up of two nitrogen atoms. The nitrogen atoms are held together by a very strong triple bond. Plants cannot use this form of nitrogen.

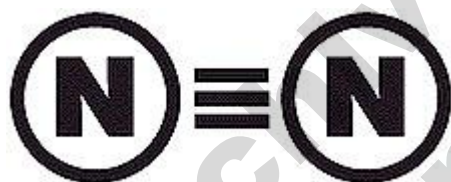


Figure 1

## Nitrogen in our daily lives

Nitrogen is used to manufacture many products that we use in our daily lives.

## Impact on water quality

Nitrogen becomes a concern to water quality when nitrogen in the soil is converted to the nitrate ( $\text{NO}_3^-$ ) form.

This is because nitrate is very mobile and easily moves with water. The concern of nitrates and water quality is generally directed at groundwater.

However, nitrates can also enter surface waters such as ponds, streams and rivers. Nitrates in the soil result from natural biological processes associated with the decomposition of plant residues and organic matter. Nitrates can also come from animal manure and nitrogen fertilizers.

Whether nitrates actually enter groundwater depends on underlying soil and/or bedrock conditions, as well as depth to groundwater. If depth to groundwater is shallow and the underlying soil is sandy, the potential for nitrates to enter groundwater is relatively high. However, if depth to groundwater is deep and the underlying soil is heavy clay, groundwater contamination from nitrates is not likely.

Once nitrates get into the groundwater, the greatest concerns are for infants less than one year old and for young or pregnant animals. High levels of nitrates can be toxic to newborns, causing **anoxia**, or internal suffocation. Seek alternative water sources if nitrate levels exceed the health standard of 10 ppm nitrate-N. Do **not** boil water to eliminate nitrates. It **increases** nitrate levels rather than decreasing them. The most common symptom of nitrate poisoning in babies is a bluish color to the skin, particularly around the baby's eyes and mouth. These symptoms of nitrate toxicity are commonly referred to as the "blue-baby" syndrome.

**The initial draft of this publication was written by Karen DeFelice, former associate extension agronomist; Nyle Wollenhaupt, former state extension agronomist; and Daryl Buchholz, state extension agronomist. This material is based upon work supported by the United States Department of Agriculture, Extension Service, under special project number 89-EWQI-1-9203.**

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