



# Treatment Technologies for Removing Nitrates in Drinking Water

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**Nitrate is essential for plant growth and is often added to soil to improve productivity. Nitrate is very soluble and does not bind to soils; therefore, water moving down through soil after rainfall or irrigation carries dissolved nitrate with it to ground water. In this way, nitrate enters the water supplies of many homeowners who use wells, ponds or springs potentially posing serious health risks to those using drinking the water, especially infants and pregnant women.**

Nitrate levels are checked by the Local Health Districts when samples are being collected during the permit process for newly constructed or altered private water systems. Local health districts begin by performing a nitrate pre-test which determines if levels are high enough to collect a sample for evaluation by a laboratory (lab). Levels of 5 mg/l or above will prompt the health district to collect a lab sample to be tested for nitrates. If the lab sample results are 10 mg/l or greater of nitrates, the local health district is required to provide information on the health risks of nitrates and options for treatment of the private water system to reduce the nitrates to an acceptable level.

If nitrate concentrations are detected in your drinking water at or above 10 mg/l, contact a reputable water treatment dealer to discuss treatment options for the removal or reduction of nitrates. There are three cost-effective methods for removing nitrates from drinking water.

1. **Reverse Osmosis (RO)**
2. **Anion Exchange**
3. **Distillation**

## **Reverse Osmosis**

Reverse osmosis systems are typically used at the tap as a point of use (POU) treatment device. RO works by forcing water under pressure through a semi-permeable membrane that removes many chemicals at the molecular level. RO units that are used for removing nitrates should have a thin film composite membrane (TFC). RO units using TFC membranes can reduce nitrate concentration by 60 to 95 percent. When nitrate levels exceed 30 mg/l RO becomes less effective and other alternative treatment systems should be considered. Do not use RO units that use cellulose acetate membranes for nitrate removal for drinking water.

## **Anion Exchange**

These devices are used for whole-house treatment. They work much the same way a water softener does. Use an anion exchange resin that has a preferential affinity for nitrates to exchange chloride for nitrates. Note that when an anion exchange treatment system is used for nitrate reduction the total combined concentration of nitrates and sulfates in the water must be known. The resins used in nitrate removal systems have a preferential affinity for sulfate. This means that nitrates that have already been removed from the water will be re-released back into the drinking water in favor of sulfates when the resin has reached capacity. Also, in order to ensure the most efficient reduction of nitrates, a water softener should precede the anion exchange system to reduce the potential for fouling the nitrate anion exchange resin.

## **Distillation**

Distillation works through the evaporation of water. Condensed water vapors are collected as drinking water leaving behind non-volatile chemicals such as nitrates and lead. This type of treatment is not

economical for whole-house treatment but can be used to treat small amounts of drinking water. One potential problem associated with distillation however, is that volatile compounds, if present, might be carried along with the evaporated water and would remain in the treated water.

### **Testing**

Test your water for nitrates periodically because nitrates have no detectable taste or odor. Nitrate levels may fluctuate seasonally; therefore conduct additional periodic testing if there is a history of nitrate levels close to or above 10 mg/l.

### **Where can I get more information?**

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