

WATER QUALITY

• Fact Sheet
Number 10

WATER CONDITIONING AND TREATMENT OF NITRATES*

Health Information

Maximum Contaminant Level (MCL)

10 milligram per liter (mg/l) as nitrate-nitrogen (NO₃-N)

45 milligram per liter (mg/l) as nitrate (NO₃)

Note: 1 mg/l and 1 ppm (part per million) are equal.

Method of Contaminant Removal

Reverse osmosis

Ion exchange, distillation

Water Analysis Information Needed

Nitrate-nitrogen water test

Total dissolved solids (TDS)

Water Analysis Interpretation

NO₃-N (NO₃) Suggested Action Level
in mg/l

0-3 (0-15) None required.

5-10 (25-45) Satisfactory but it is advisable to try to find out why the water is at this nitrate concentration. Look for possible sources of water contamination, i.e., on-site sewage disposal problems, excessive lawn fertilization, or nearby agricultural operations. The Cooperative Extension System may be able to offer assistance.

Greater than 10 (45) Contact your local health officer or sanitarian for assistance in determining the cause of the problem and how it might be corrected.

Water Conditioning/Treatment Information

Nitrate removal is needed only for the water used for drinking and cooking. Non-water conditioning/

treatment approaches are to purchase bottled water or obtain another water source. The latter might be a solution if a dug (shallow) well is replaced by a deep (drilled) well. However, water mineral problems, e.g., iron or manganese, can be encountered with a deep well installation. It is also possible over an extended time period and, depending upon site geology, for the nitrates to eventually migrate into the deep well. A correction of the nitrate source problem or by taking a remedial action along with the drilling of the well, might help to avoid this situation.

Reverse Osmosis (RO)

The RO unit is installed in the cold water line near the point of water use (POU). If there is room, the unit can be placed under the kitchen sink or beneath a kitchen cabinet. The usual RO installation consists of a sediment filter, the RO membrane, a storage tank for the treated water, a pressure relief valve and a separate water tap for the conditioned water. An activated carbon post filter is added if there are taste or odor problems. A minimal water system operational pressure of 40 pounds per square inch gage (psig) is recommended for an in-house POU, e.g., under sink installation RO unit.

Common RO membrane materials are either cellulosic fiber designated as CA (cellulosic acetate), CTA (cellulosic tri-acetate) or PFC (polyamide thin film composite). The PFC membrane is used in a non-chlorinated drinking water application. It is the most expensive membrane of the three types indicated. Cellulosic fibers can be subject to bacterial deterioration.

Check on whether the RO treated water storage tank has been presterilized or whether a comparable action is required by the equipment installer prior to the tank installation.

Reverse osmosis will require a monitoring of the system contaminant rejection rate efficiency. System

*The above information represents a compilation of the best available knowledge (BAK) for this practice arrived at through a series of meetings and discussions with invited representatives from the water conditioning/treatment industry and water testing laboratories, state and federal officials, and academia. The BAK takes into consideration subject matter literature, industry product knowledge, field experiences, and regulatory concerns.

performance evaluation involves an RO efficiency calculation based upon a measurement of the TDS of the source water and the final product water leaving the RO unit.

The instructions provided with RO equipment should be read and followed carefully. After a replacement membrane is installed, follow the supplier's recommendation for the suggested minimum operating pressure across the membrane and for the flushing procedure.

Ion Exchange

The resin used in the ion exchange process takes up nitrate in exchange for chloride. System maintenance requires backwashing with a brine (potassium, K, or sodium chloride, NaCl) solution and provisions made for handling the resulting discharge.

Distillation

Home distillation units range in size from 3 to 12 gallons per day with a heating element size of 500 to 1500 watts. The cost of the electrical energy and of unit maintenance are to be considered along with the initial cost of the distillation unit.

Distillation equipment requires periodic cleaning. Acetic acid can be used for this purpose. Follow the equipment manufacturer's recommendation on the frequency and procedure of cleaning.

By **John J. Kolega**, Extension Specialist, Soil, Water and Waste Management.

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