ALABAMA COOPERATIVE Extension SYSTEM

ALABAMA A&M AND AUBURN UNIVERSITIES

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Possible Treatments
Reverse Osmosis

Reverse osmosis (RO) is a relatively new water treatment process available to the householder. Although the technique is not new, the systems have become widely available only in the past few years.

How Reverse Osmosis Works

In RO systems, water is forced through a small-pore membrane. Only water and other extremely small molecules fit through the holes in the membrane. Contaminants are caught on the face of the membrane.

The simplest home RO system consists of a membrane, a storage container for the treated water, and a flow regulator for the reject water. The membranes must be chemical and bacteria resistant and are usually made of cellulose acetate or nylon. The pressure for RO is usually supplied by the line pressure of the water system in the home. Some RO systems use a pump to force water through at high pressure. These systems are usually more effective than systems which use only the line pressure of the water system in the home.

Since membranes are subject to degrading by chlorine, iron, manganese, and hydrogen sulfide and to bacterial attack, a sediment prefilter and an activated carbon prefilter or postfilter might be included. The prefilter removes sand, silt, and sediments while the activated carbon removes the organic materials and dissolved gases not treated by the RO membrane. Water softeners are used in advance of the RO system when household water is excessively hard.

Home RO units are often small, cylindrical devices approximately 5 inches in diameter and 10- to 25-inches long, excluding any pre- or post-filtration apparatus. Often, the unit is placed beneath the kitchen sink to treat water used for cooking and drinking.

Contaminants That Reverse Osmosis Treats

Unlike other filtration methods, RO can reduce the concentrations of most of the major classes of common contaminants found in water. RO successfully treats water with dissolved minerals such as aluminum, arsenic, barium, cadmium, chloride, chromium, copper, fluoride, magnesium, iron, lead, manganese, mercury, nitrate, selenium, silver, sulfate, and zinc. RO is also effective with asbestos, some taste, color and odor-producing chemicals, particulates, total dissolved solids, turbidity, and radium.

Reverse osmosis is not, however, an effective treatment for dissolved gases and certain organic chemicals, including some pesticides and solvents. It will not remove chloroform. RO is recommended for bacteriologically safe water only.

Factors To Consider Before Buying A Reverse Osmosis System

Maintenance. Because the membrane must be flushed frequently to dispose of removed contaminants, some RO systems waste a lot of water. Some RO systems require as much as 12 gallons of input and flush water for each gallon of treated water. Also pre-treatment filters and membranes require periodic replacement.

Cost. The cost of the RO system is high and needs to be weighed against the type and the quantity of contaminants in the water, the concern for safety, and the cost of other alternatives such as bottled water.

Water Produced. Reverse osmosis is quite slow. Usually only 5 to 15 gallons of water per day can be processed. It is not practical to treat all water entering a residence with RO since small devices do not produce enough water to meet household needs.

Reverse Osmosis At A Glance

How RO Works: Pressure forces water through membrane extracting impurities.

Pros/Cons: Varies in removal of nitrates and bacteria. Water with iron and manganese plugs membrane. Takes at least 2 gallons to produce 1 gallon of purified water. Needs at least 40 pounds per square inch of water pressure.

Maintenance: Replace pre-treatment filters and membrane regularly.

References

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