Reverse Osmosis: Clean, Pure Water for Aquarium Use

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how do REVERSE OSMOSIS units work?

Water quality is the single most important factor in aquarium success. Without clean water, aquarium inhabitants are exposed to a variety of stressful chemical pollutants. In extreme cases, these pollutants can kill. Most source water is appropriate for use in conventional aquarium setups, once treated with aquarium water conditioners. However, depending on the quality of the source water and the sensitivity of the aquarium inhabitants, a water purification system like a reverse osmosis unit may be necessary.

→ Osmosis and reverse osmosis

Normal osmosis is the movement of a solvent (like water) through a semi-permeable membrane. The solvent with low solute concentration will move into the solution of higher concentration. As the solvent moves through the membrane it tends to equalize the concentration on both sides.

In reverse osmosis, pressure is applied to the concentrated solution and then it is forced through the membrane. This membrane is fine enough to allow certain molecules to pass through (like pure water), but not larger molecules like minerals and other dissolved contaminants. The water with low solute concentration (pure water) is, in essence, extracted from water of higher solute concentration and kept separate from one another.

Q: I'm diligent about my water changes, but I can't seem to lower nitrate levels. What's going on?

A: It is possible that nitrate may be in your source water. Contact your local water department to request a water analysis. If the results are positive, it may be prudent to invest in a water purification system like a reverse osmosis unit.

→ How does a reverse osmosis unit work?

A reverse osmosis, or RO, unit is a pressurized system that installs to your faucet or sink. Water pressure from the tap forces water through a series of membranes that remove organic and inorganic impurities from water. The ideal operating pressure for an RO unit is 65 psi (pounds per square inch). The use of an RO pressure gauge is important to monitor ideal operating pressure. If the operating pressure is too low, an RO pump can be installed to increase the pressure.

Pure, or product, water is separated from water of higher solute concentration (waste water) and diverted into a collection container. Depending on the membrane type and filtration stages, up to 99% of impurities are removed from tap water. The result is water that is almost completely free of minerals and other contaminants.

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→ Membrane types

There are several RO membrane types for different applications. Depending on the quality of the source water, one membrane type is preferable over another. The use of a particular RO membrane type is determined on whether or not your tap water contains chlorine as well as the total amount of dissolved solids present in the source water. The three fundamental types of RO membranes are Cellulose Tri-Acetate (CTA) membranes, Thin Film Composite (TFC) membranes, and High Removal (Hi) membranes.

CTA Cellulose Tri-Acetate Membranes are organic and have a slightly lower removal rate of 88% to 94%. They are commonly used with systems with chlorinated water (water from a municipal source) to keep the membrane clean and free of damaging mold and bacteria. Since they do not filter out chlorine, it is important to allow the chlorine to dissipate from the product water or to treat it with a chlorine remover before aquarium use.

TFC Thin Film Composite Membranes are synthetic and have a 94% to 98% removal rate. RO units with TFC membranes will have a carbon pre-filter to protect the membrane from chlorine damage. RO units with TFC membranes are versatile and can be used with source water with or without chlorine.

Hi High Removal Membranes are synthetic membranes with much higher removal rate. They remove 97.5% to 99% of tap water impurities and are especially adept at removing silicate. RO units that utilize High Removal Membranes will also have a carbon pre-filter to protect it from chlorine damage. Just like TFC RO units, Hi RO units can be used for source water with or without chlorine.

→ Using RO water

RO water can be thought of as a blank canvas. It is empty and waiting to accept specific water conditioners to create the ideal environment for aquarium inhabitants. Because RO water is so pure, it should not be used without proper conditioning. Pure RO water can affect healthy growth by reducing or limiting the availability of desirable trace elements, minerals, and other important nutrients. For freshwater aquariums, use an RO conditioner to replace these minerals and help ensure aquarium health.

The purity of RO water makes it the ideal choice for saltwater aquarium hobbyists. Synthetic salt mixes are formulated to contain all of the necessary minerals and trace elements required by marine fish, corals, and invertebrates. Depending on source water quality, the existing concentration of minerals and impurities can skew the balance of the saltwater mix. This can lead to potential problems with pH levels as well as introducing unwanted levels of nitrate, silicate, phosphate and other pollutants. RO water allows the production of "clean" saltwater for aquarium use.

We Recommend

Coralife Pure-Flo II RO Units

Aquatec RO Pump

RO Reclaim Treatments

Synthetic Sea Salt

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