Can humans drink desalinated water?

Desalination · https://www.elementalwatermakers.com/knowledge-base/desalination/can-humans-drink-desalinated-water/

Yes, humans can drink desalinated water — and millions of people around the world already do every day. When produced correctly, desalinated seawater meets the same safety standards as conventional drinking water, including WHO drinking water standards. The questions below unpack exactly what that process involves, what it means for your health, and who stands to benefit most from this growing freshwater source.

Is desalinated water safe for long-term consumption?

Desalinated water is safe for long-term human consumption when it is properly produced and, where necessary, remineralized. Regulatory bodies and health organizations, including the World Health Organization, have assessed desalinated water and confirmed that systems meeting their guidelines produce water suitable for regular drinking. The key is ensuring the desalination process is well-managed and that the output consistently meets established quality parameters.

The desalination process itself — most commonly reverse osmosis — is highly effective at removing contaminants, pathogens, and dissolved solids from seawater. What remains is essentially very pure water. In some contexts, a small amount of mineral content is reintroduced after treatment to bring the water in line with recommended guidelines, since extremely low mineral concentrations can affect taste and, over time, may influence the body's mineral balance.

Long-term studies and decades of real-world use in countries like Israel, the UAE, and across the Pacific islands consistently support the safety of desalinated drinking water. As with any water source, the quality of the infrastructure, maintenance standards, and local oversight matter enormously. A well-designed, properly maintained system is the foundation of reliable, safe output over the long run.

What does desalination actually remove from seawater?

Desalination removes salt, dissolved minerals, bacteria, viruses, microplastics, heavy metals, and most other contaminants from seawater, leaving behind clean, fresh water. In a reverse osmosis system, seawater is pushed at high pressure through semi-permeable membranes with pores so small that only water molecules pass through — virtually everything else is rejected and discharged.

The list of what gets filtered out is extensive:

- **Sodium chloride** (common salt) and other dissolved salts
- **Heavy metals** such as lead, arsenic, and mercury
- **Bacteria and viruses** including waterborne pathogens
- **Microplastics** increasingly found in ocean water
- **Sediment and suspended particles**
- **Organic compounds** and chemical pollutants

This thoroughness is one of desalination's great strengths. Unlike surface water treatment, which often battles seasonal contamination and variable source quality, seawater desalination starts with a consistent feedwater and produces a predictable, high-purity output. The result is water that, chemically speaking, is among the cleanest available — though as noted, very pure water may need light remineralization before it is distributed for drinking.

Does desalinated water lack important minerals?

Desalinated water does contain very low levels of naturally occurring minerals after processing, because the reverse osmosis membranes remove nearly everything dissolved in the source water, including beneficial minerals like calcium and magnesium. Whether this is a meaningful health concern depends on diet, overall mineral intake, and whether the water is remineralized before distribution.

For most people in developed settings, drinking water is not the primary source of dietary minerals — food contributes far more. However, in communities where dietary mineral intake is already limited, or where desalinated water is the sole drinking source, remineralization becomes a more important consideration. Many desalination systems include a post-treatment step that adds a controlled amount of calcium and magnesium back into the water to meet WHO guideline levels and improve

taste.

It is also worth noting that very low mineral content (known as low total dissolved solids, or TDS) can make water taste flat or slightly sharp. Remineralization addresses both the health consideration and the palatability of the finished product. When this step is included in the treatment chain, desalinated water is nutritionally comparable to most conventional drinking water sources.

How does desalinated water compare to tap or bottled water?

Desalinated water that meets WHO drinking water standards is comparable in safety to quality tap water and is often purer than many bottled water products. The main differences lie in mineral content, taste, and the environmental and economic footprint of production rather than in any fundamental health distinction.

Compared to tap water

Municipal tap water varies widely depending on its source and local treatment infrastructure. In many coastal or island regions, tap water may be drawn from groundwater sources that carry naturally occurring contaminants, or it may be trucked in and stored in ways that introduce quality risks. Desalinated water produced on-site avoids these variables entirely, offering a consistent, locally controlled supply.

Compared to bottled water

Bottled water often originates from spring or municipal sources and is subject to varying standards depending on the country of production. From an environmental standpoint, single-use plastic bottles carry a significant footprint. On-site solar desalination eliminates the need for bottled water imports entirely, reducing both plastic waste and the logistical costs of transporting water to remote locations. In many island and coastal communities, this comparison is not academic — it directly affects cost, reliability, and sustainability.

Who benefits most from desalinated drinking water?

Desalinated drinking water benefits communities and operations that lack reliable access to freshwater from conventional sources — particularly those in coastal, island, or arid regions where rainfall is scarce, groundwater is limited or saline, and importing bottled or trucked water is costly

and unreliable.

The groups that gain the most from desalination include:

- **Remote island and coastal communities** where freshwater infrastructure does not exist or cannot be economically extended
- **Resorts and hospitality operations** that require a consistent, high-quality water supply independent of local grid or utility limitations
- **NGOs and humanitarian organizations** delivering water access to underserved populations in water-scarce regions
- **Industrial and commercial facilities** in coastal areas where freshwater demand is high and supply is expensive
- **Private villas and eco-developments** seeking self-sufficient, sustainable water independence

What unites these groups is a combination of proximity to seawater and distance from affordable freshwater alternatives. For them, desalination is not a luxury — it is a practical, often essential solution. The falling cost of solar energy and advances in energy recovery technology have made small-scale desalination increasingly accessible, bringing this technology within reach of communities and businesses across the Caribbean, Pacific islands, Africa, and beyond.

How Elemental Water Makers helps with desalinated drinking water

We design and deliver small-scale desalination systems that turn seawater into fresh drinking water meeting WHO drinking water standards — without chemicals, without grid dependency, and without the ongoing cost of imported bottled water. Whether you need water for a remote community, a resort, or a coastal facility, we have a solution built for your context.



Here is what working with us looks like in practice:

- **Off-grid solar systems** for locations without reliable electricity, producing between 5,000 and 100,000 liters of freshwater per day
- **Grid-connected efficient systems** for commercial applications where energy is available but costs need to be reduced
- **Plug-and-play, modular design** that allows rapid deployment — small systems typically take a few days to install, while larger systems may require several weeks
- **Up to 70% energy savings** compared to conventional desalination, thanks to advanced energy recovery technology
- **Chemical-free operation** for safer handling and reduced environmental impact
- **Remote monitoring** and low-maintenance design for reliable long-term performance in harsh coastal conditions
- **Compact footprint** with typical small solar desalination systems requiring around 25 to 50 square meters of total space
- **Project investment** ranging from €40,000 to €400,000 depending on system size and site requirements

We also support customers through the permitting process. Elemental Water Makers can help with submitting the technical data that may be required to apply for permits locally. If you are ready to explore what a desalination system could look like for your location, get in touch with our team and we will help you find the right fit.

Frequently Asked Questions

How do I know if a desalination system is the right solution for my location?

The best candidates for desalination are locations with reliable access to seawater or brackish water and limited affordable alternatives for freshwater supply — such as remote islands, coastal resorts, or arid-region communities. A site assessment typically looks at your daily water demand, available energy sources, proximity to the sea, and local permitting requirements. If you are unsure, reaching out to a specialist like Elemental Water Makers for an initial consultation is the most practical first step — they can evaluate your specific context and recommend the right system size and configuration.

What maintenance does a small-scale desalination system require?

Most modern small-scale reverse osmosis systems are designed for low maintenance, but routine upkeep is still essential for long-term performance. This typically includes periodic membrane cleaning or replacement, filter cartridge changes, inspection of pumps and pressure vessels, and monitoring of water quality output. Systems with remote monitoring capabilities — like those offered by Elemental Water Makers — can flag performance issues early, reducing the risk of unexpected downtime and making maintenance planning more predictable, even in remote locations.

Can desalinated water be used for cooking and food preparation, not just drinking?

Yes, desalinated water that meets WHO drinking water standards is fully suitable for cooking, food preparation, and all other domestic uses. Because it is produced to the same quality benchmarks as safe drinking water, there are no restrictions on its use in the kitchen. In fact, its low contaminant

load makes it a particularly clean input for food and beverage applications, which is one reason why resorts and hospitality operations often favor on-site desalination over relying on local supply networks.

What happens to the saltwater that is rejected during the desalination process?

The concentrated brine that is separated during reverse osmosis — known as reject water or brine discharge — is typically returned to the sea. When discharged responsibly, with adequate dilution and at appropriate locations, the environmental impact is manageable; however, poor discharge practices can create localized salinity increases that affect marine ecosystems. Responsible system design accounts for this by selecting discharge points with good water circulation and, in some cases, using energy recovery devices that also help manage brine flow. Regulatory requirements for brine discharge vary by country, and a reputable provider will help you navigate local permitting obligations.

How long does it take to get a desalination system up and running from the point of ordering?

Lead times vary depending on system size, site complexity, and local permitting requirements, but modular plug-and-play systems are among the fastest to deploy. Smaller solar desalination units can often be installed within a few days once on-site, while larger or more complex installations may take several weeks. The longest part of the process is frequently not installation itself but rather site preparation, logistics to remote locations, and obtaining the necessary permits — which is why engaging with your provider early and starting the permitting process in parallel with system procurement is strongly recommended.

Is solar-powered desalination reliable enough to be a community's sole water source?

Solar-powered desalination systems have proven reliable as primary water sources in many island and coastal communities, provided they are correctly sized and include adequate water storage capacity to bridge periods of low solar irradiance. A well-designed system accounts for seasonal variation in sunlight, daily consumption peaks, and buffer storage — typically holding at least one to

several days' worth of supply. Pairing solar desalination with a properly sized storage tank effectively decouples water availability from moment-to-moment energy generation, making it a dependable standalone solution rather than a supplementary one.

Are there any water quality certifications or standards I should look for when evaluating a desalination system?

The most widely recognized benchmark for drinking water quality from desalination is the WHO Guidelines for Drinking-water Quality, which set limits for microbial, chemical, and physical parameters. In addition to WHO standards, look for systems whose components — membranes, filters, and materials in contact with water — carry certifications such as NSF/ANSI standards, which verify that materials do not leach harmful substances into the treated water. A reputable provider should be transparent about the water quality data their systems produce and able to supply test results demonstrating compliance with the relevant standards for your region.