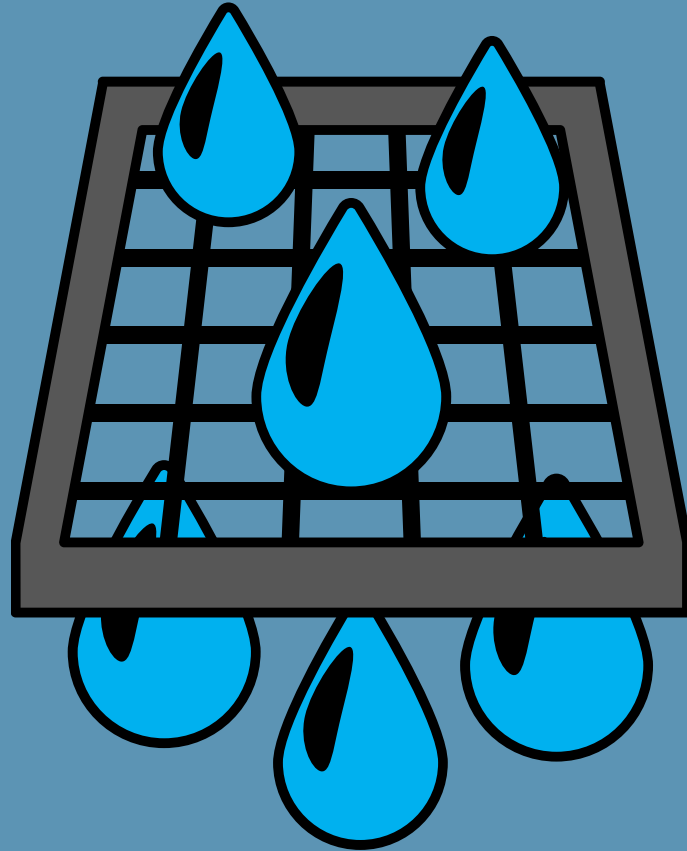


WATER FILTRATION SYSTEMS



Whether you drink from the tap or your own well, even the water that we believe to be clean can actually be contaminated with dangerous elements. Filtering is an important step to limit the consumption of bacteria, chemicals, heavy metals, and other dangerous impurities.

In the next pages, we will go through different levels of efficiency. The goal is to give you as much information as possible to help you make your own educated choice.

Before making radical changes to your home, test your water to identify the specific contaminants, or at least look for the data for your area. If you can't find the necessary information yourself don't hesitate to get help from a professional.

Which filtering system should you get?

The answer is going to depend on a few things:

- **How much work can be done? Are you renting, or are you the owner?**

Countertops, faucets and under sinks are the easiest and least invasive to set up. They require the least construction, while house filtering tends to require more structural adjustments and/or help from professionals.

- **How much can you invest right away and can you deal with maintenance?**

Some solutions are more expensive when you buy them but cheaper over time, some are going to need regular or intensive maintenance while others won't.

- **How much do you care about plastic, water waste, and other ecological matters?**

The plastic pitcher is always going to be cheaper than the glass one but the glass one isn't going to leach PFAs in your water. Reverse osmosis is great, but you might live in an area where water is scarce and expensive.

- **How much do you care about your general use of water?**

Chlorine passes through the skin and into the lungs, as during a shower, heavy minerals can be responsible for dry skin and hair.

If you care about the quality of the water during everyday use, like watering your plants or cooking, then Full House is the solution.

What needs to be filtered out?

Chlorine & chloramine	Chlorine and monochloramine are the main disinfectants used in public water systems to kill bacteria and micro-organisms since 1910. For both chemicals, the safe concentration level is of 1mg/L to 4mg/L. • These chemicals are linked to bladder, rectal and breast cancer. • The main problem with these is the reaction with the organic compounds present in water, the most toxic of these byproducts are trihalomethanes (THMs). They are <u>linked</u> to very serious health complications such as stillbirth, congenital disabilities, increased risk of kidney and liver cancer and issues with the central nervous system and heart. On a digestive standpoint, chlorine (being a bacteria killing medium) also impacts on the “useful” bacteria in our guts. • And if that wasn't enough, inhalation and absorption through the skin (through showers and dishwashing) are way worse than actually drinking it.
Fluoride	<u>Fluoride</u> is also a natural element, it is present in the earth crust and released both in air and water, it is also an important component of bone and tooth health. You can find it in tea, milk, salt, seafood, supplements and fluoridated toothpastes but also tap water. Fluoridation of water started in 1945 to control teeth decay and is still in place in many countries despite the growing evidence of its toxicity. • Overconsumption can lead to gastrointestinal issues (nausea, vomiting, pain...), discolouration and damage to the teeth, tissue calcification, skeletal fluorosis (dense but fragile bones), bone outgrowth and in severe cases can lead to renal and cardiac dysfunction, coma and death.
Pharmaceuticals	Aside from industrial pollution, pharmaceutical drugs are released through toilet wastewater. Some of them (like paracetamol and ibuprofen) are not fully metabolised in the human body, these leftovers concentrate in urine and finish in the sewers. • Long term exposure can have <u>effects</u> on the respiratory and reproductive systems, breast and testicular cancers, chronic depression, and congenital problems. • Contaminated waters are toxic for fish and other animals, who also suffer from health defects leading to death.
Nitrates	<u>Nitrates</u> and organic nitrogen are two of the main causes of water pollution in Europe. These come from fertilisers, manure, and domestic wastewater, as a result agricultural areas have the highest rates of nitrate concentration in their water. In Europe, the max level of concentration is 50mg/L. Nitrates are used to preserve foods such as cured meat, and they are also naturally found in leafy green veggies (where they are risk-free and potentially anti-carcinogenic). • While a moderate amount of nitrogen is crucial for plant development, an excess can cause algae to overgrow and deplete the oxygen in the water, killing all life that needs it. • Nitrate contaminated water and food are linked to thyroid malfunction, stomach, bladder, colon and oesophagus cancer and digestive issues.
Pesticides	The term “pesticides” refers to “pest control products” (herbicides, insecticides, rodenticides, fungicides etc.). This contamination is <u>directly</u> linked to large scale agricultural and industrial production. In use since 1970, these chemicals accumulate in soil, surface and groundwater, and aquatic organisms. People living near agricultural or viticultural areas have higher risks of chronic exposure. Dermal contact and ingestion are the two main ways of contamination. • Chronic health problems include Parkinson disease, reduced attention span, memory disturbance, disrupted infant development, and birth defect. • Acute health effects include reduced vision, headache and cognitive function issues, salivation, diarrhoea, nausea, vomiting, coma and even death. Moderate poisoning leads to mimic intrinsic asthma, bronchitis, and gastroenteritis.
Micro-plastics	<u>Microplastics</u> (MPs) are pieces of plastic that are less than 5mm in length and bigger than 1micron. When these particules are less than 1micron they are called nanoplastics. These particules have been found everywhere, including in animal and human bodies (including the bloodstream, placenta, and heart tissue), entering through the air and ingestion. • MPs, their additives and the pollutants that they absorb are the cause of chronic inflammation, liver diseases, pulmonary disorders, endocrine disruption, and cancer.

PFAs	<u>Per- and Polyfluoroalkyl substances</u> (or PFAs and PFOs) are part of the fluorinated chemicals family, originating from Teflon cookware. They are present in all the tools and equipment that are “waterproof,” “non-stick,” or “stain-repellent”. They are known as “forever chemicals” because while they leak into water, soil or food before being ingested by people or animals, and then pass into the bloodstream, they do not break down, neither in the environment nor in our bodies. Several studies have found contamination of PFAs in drinking water at levels higher than what the legislation allows. Because they are not excreted by the body, PFAs accumulate. This accumulation is linked to testicular, kidney, liver, and pancreatic cancer, reproductive problems, weakened childhood immunity, birth defects, endocrine (: hormonal) disruption, increased cholesterol, and weight gain.
Lead	<u>Lead</u> is a heavy metal that can enter drinking water through service lines and plumbing but can still be found in paint and dust from old buildings, soil, and auto parts such as batteries. - Children and infants are the most exposed to lead toxicity; it causes neurodevelopment issues, learning disabilities, hyperactivity and nervous system dysfunction even at low levels. - In adults, lead can result in reproductive, kidney, and heart issues. Poisoning symptoms are high blood pressure, joint pain, abdominal pain, mood disorders, headache, and miscarriages.
Mercury	<u>Mercury</u> is a heavy metal naturally present in organic matter, air and water and can also be found in some fish (like teal fish, swordfish, shark, king mackerel, halibut and tuna), seafood and jewellery. Pollution from mercury comes from industrial facilities, mining and fossil fuel combustion. Once contaminated, certain micro-organisms will turn mercury into its (highly) toxic form methylmercury which tends to build up in fish, shellfish and their predators. - It is a neurotoxin that can cause loss of vision, lack of coordination, impairment of speech, hearing and walking and muscle weakness and kidney damage. - Pregnant, breastfeeding people and children are told to be extra careful with high mercury foods as they can lead to birth defects and brain and nervous system development issues.
Cadmium	<u>Cadmium</u> is a heavy metal common in water due to its use in batteries, galvanised metal plates and pipes, and machines. It can also be found in some phosphate fertilisers, in the air of metallurgical areas, and foods such as animal kidneys and livers where the cadmium concentrates (like in humans). Cadmium acts on cell proliferation and DNA repair mechanisms. Short-term exposure can lead to digestive issues but as cadmium isn't much excreted, it accumulates in the kidney and liver causing damage and cancer, osteoporosis, and reproductive and developmental problems.
Hard minerals	<u>Hard minerals</u> are minerals naturally present in water but at a high concentration. There's a difference between temporary hardness (: sodium and potassium) that can be dissolved by boiling water and permanent hardness (: calcium and magnesium) that can't. It's important to know as the type of filtering will defer. Hard minerals will create deposits (like limestone) in pipes which can over time clog and damage the water system and equipment. - The health concerns are quite low, calcium can interact with other minerals in the intestine and reduce their absorption, renal issues can lead to a concentration of minerals in the organs, too much magnesium and/or sulphates have a laxative effect. - Magnesium and calcium both have protective effects on cerebrovascular diseases and cancer, and magnesium could help prevent preterm labour and eclampsia.
Micro-organisms	<u>Waterborne micro-organisms</u> that can cause illness include: bacteria (like cholera, typhoid, dysentery, etc.), viruses (gastroenteritis, hepatitis E, polio), protozoan parasites (giardia, cryptosporidium) and cyanobacteria (also called blue-green algae). Most of these contaminations come from sewer overflow, manufacturing operations, and concentrated animal farming. These pathogens can be found in food, inhaled and caused by hand to hand contact (<i>so do wash your damn hands regularly</i>). Micro-organisms do not grow in water but in the gastro intestinal tract of their host, which can lead to some serious outbreaks. Micro-organisms are various, and they all have their own effects. Many of them tend to lead to serious digestive and immunity issues as well as life threatening situations.

COUNTER TOP SYSTEMS

1/ Activated charcoal purifier stick (close to useless)



I struggled to find “science backed information” on this one so take what I say with a big pinch of salt. It looks like it’s basically just a trend from Goop with no real explanations behind.

If you have material to share, please do, I’d be interested to read more about it.

Activated charcoal is an “alternative” medicine used for centuries to absorb toxins in the air, water and the digestive system.

Originally, Bintochan charcoal is used to purify (and not filter) water. It is a Japanese charcoal made from oak, burnt for days at 400°C before being activated through combustion at 1200°C and it is traditionally used for cooking. Bamboo charcoal, or Takesumi, became the most used alternative as it is a little more sustainable.

It is combustion and exposition to oxygen and steam that empties the pores of the wood from tar. Those very small pores then suck in things like chlorine smell and taste, Bintochan charcoal is supposed to release calcium, magnesium and iron as it purifies water, bamboo doesn’t.

Note that Bintochan charcoals are easily counterfeited, also the origins and making of both charcoals are not always clear or established on packaging.

Use:

- It has to be plunged in water for 8 hours (more is best) to be efficient at catching smells and tastes.
- At the rate of one stick for one bottle a day, Bintochan sticks should be sterilised every 3 months and changed every 6 months (2 cleanings).
- For bamboo, it is recommended to use 2-3 sticks at once, sterilise them every week, and change them after 1-2 month (5-10 cleanings).
- To sterilise, boil the stick for 10 mins and let it dry (ideally in the sun).
- Once used, they can still catch bad odours (good for cat litters, garbage cans, and shoes) or be used as fertiliser and composted.

Price:

- Bintochan: from 30€ for 6 sticks = 10€/year
- Takesumi: from 20€ for 6 sticks = 40€/year

2/ Brita pitcher filters *(not worth much)*



Brita filters have been commonly used for decades. The filters (faucets, bottles, and pitchers) use an activated carbon membrane or granules from coconut and an ion exchange resin.

The lid has an electronic indicator to let you know when to change the filter. It works by counting the number of times the pitcher has been tipped to pour water or the lid has been opened. It can't take into account how much dirt had to be filtered from the water, so you might need to change the filter faster than indicated.

Note that Brita is subject to health concerns, their filter traps organic matter but doesn't treat them; this tends to promote bacteria proliferation in water. Also, plastic pitchers can leak plastics in the water and while they claim to reduce fluoride, they actually don't.

Use:

- Quite simply, put the filter in the pitcher and let the water go through the filter before drinking.
- The filter can't be cleaned or reused and lasts for about 4 months or about 454 litres.

Price:

30€ for the classic plastic pitcher and 60€ for the glass one.

From 53€ for 6 filters to 100€ for 12 filters = 56€ to 86€/year

3/ Clearly filtered pitchers



This is one of the pitchers (*that I found*) that filters the most out of the water, including fluoride. The filtration system has been third party tested and has higher certification standards than Brita and similar.

This big pitcher is made of plastic, and the filter is meant to last for about 450L or 100ish days (for 2 fillings/day) depending on the quality of the water. The filter is made of 3 stages, a steel mesh screen, loose granulated coconut carbon, and 7 filtration materials.

The company also offers under-sink, fridge and bottle filtrations systems but the pitcher has the best results. You can also opt for a recurring filter delivery.

Use:

- Prime the filter, place it in the pitcher, and wait for the water to filter before drinking.
- The filter can't be cleaned; replace it every 3-4 month depending on how often you use it and how much has to be filtered from the water.

Price:

78€ for the pitcher (+1 filter), 215€ if bought with the 3 filter pack, 48€/filter.
First year = 215€, then between 135€ and 270€.

4/ Berkey, Alexapure, British Berkefeld & similar systems (great alternatives)



All three systems are gravity-based countertop systems: the water is poured in the top chamber, goes through the filters, finishes at the bottom, and is extracted through a spigot. All are made of stainless steel and the spigot of plastic (which can be upgraded to a metal one).

Where they differ:

Sizing:

- Alexapure Pro comes in 10L
- Berkey from 4,5L to 27L
- British Berkefeld from 6L to 16L

Filters & lifespan:

- Alexapure Pro is made of coconut shell carbon block with an hybrid ceramic outer layer, their filter lasts for 910L or 3-6month.
- The Berkey black filters are made of 6 different media, including coconut shell carbon material, and ion exchange resin compacted into a microporous matrix, but the company doesn't disclose the other components. Their filters last for up to 20 000L or 2-5 years.
- British Berkefeld uses a ceramic candle filter with an outer shell made of ceramic micro-filter media, granular activated carbon and heavy metals removal media. Their filter last for up to 1800L or 6 month.

Efficiency:

- Alexapure and Berkey both reduce over 200 types of contaminants with extra efficiency. Neither has certified their components.
- British Berkefeld reduces less than 40 but acts on micro-organisms and fluoride.
- All 3 are meant to also be used for "raw water", in the wild.

Note that Berkey offers a separate fluoride filter that leaches aluminium in water (not great at all), the regular black filter doesn't pose that risk. Berkey has also been subject to controversy and prosecution because the company refuses to share the filters' components, so far, the pursuits have been dismissed.

Use:

Attach the knob to the lid, prime the filters (= push water inside the filters until it runs out or soaks for 2 hours), connect the filters to the upper chamber, attach the spigot, and place the upper chamber on top of the other. Alexapure offers a pre-primed filter that makes the whole process way faster.

- Alexapure filters: monthly cleaning and change after 3-6 months,
- Berkey system: cleaning every 6 months and change after 2-5 years,
- British Berkefeld: monthly cleaning and replacement after 6 months.

Price:

- Alexapure Pro: from 270€, 110€/filter = from 380€ to 490€ the first year, 220-440€ the next years.
- Berkey: from 320€ for 4,5L, 150€/2filters = 320€ the first year, 0€ for 2-5 years.
- British Berkefeld: from 289€ for classic 6L, 50€/filter = 399€ the first year, 220€ the next years.

Other brands:

For Belgium and Germany, I've heard some very good things about Maunawai, but it seems to be more difficult to get them from the internet than from stores.

For Belgium (and probably around), I've also heard some good things about Longevie, a company from Tournai, that sells fluoride filters.

Here are some tested comparisons: Berkey vs. Alexapure / Berkey vs. BB

Personal note:

Our filtration adventure started with Brussels' water and a Brita pitcher, until 2021 when we finally bought the travel Berkey. The first sips of filtered water were amazing, we eventually started drinking more and using filtered water for cooking.

When we came to Lyon and started drinking unfiltered water again, we could feel the hard minerals and chlorine and how "not so great" it was for our digestive system. While our Berkey has its limits, we're very happy we invested.

Obviously, this isn't because Berkey is a magical brand, a friend recently invested in a reverse osmosis system, and she had the same feelings.

You don't realise how much you need a proper filter until you actually get one.

SUMMARY - COUNTER TOPS

Harmful substances	Activated charcoal stick	Brita "extra pro"	Clearly filtered pitcher	Berkey & similar	British Berkefeld
Chlorine / chloramine	✓	✓	✓	✓	✓
Fluoride			✓	✓	✓
Pharmaceuticals		✓	✓	✓	✓
Nitrates					
Pesticides		✓	✓	✓	✓
Micro-plastics			✓		✓
PFAs			✓	✓	✓
Lead	✓	✓	✓	✓	✓
Mercury	✓	✓	✓	✓	✓
Cadmium		✓	✓	✓	✓
Hard minerals		✓	✓	✓	
Micro-organisms					✓

✓ depends on the model

✓ filtered by every model

FAUCET, UNDER SINK & HOUSE FILTRATION

1/ Sediment filtration



Sediment filtration is the first step in filtration when you need to remove dirt, sand, and such from the water before filtering it through smaller or more sensitive media.

If you drink from the city network, there is little chance that you need this type of filter. If your water comes from a well, source or areas where the water is not (well) treated, yes.

Because not all sediments are the same, a preliminary test of the water needs to be done. That way you'll know exactly what size filter(s) you need.

You'll also need to know the level of water pressure, too much can damage the filter, and too little can affect the flow of water.

From there, you'd either get a spin down or cartridge filter and install it on your main water line.

Under-sink filters exist, but that means that dirt will travel all the way to the kitchen faucet. This can be an issue for the pipes longevity.

Spin down:

- The water goes into a centrifugal motion from top to bottom.
- It traps larger sediments with fewer risks of clogging and comes with a flush valve to easily remove the dirt; some are automated.
- They are easy to install, low maintenance, and don't affect water pressure.

Cartridge (like the picture):

- Can be paired with other filtering systems.
- It has smaller pores and filters smaller particles.
- There are two main types: spun and pleated cartridge filters.

Use:

The lifespan of the filters will depend on the sediments that have to be filtered out, going from 6 to 9 months. The flow of water will slow down as the filter gets old and cramped.

Price:

- Depending on the type and size: from 50€ to 500€, then 10-50€ for each filter.

2/ Water softener systems



These systems reduce the hard minerals present in water (calcium, magnesium, iron, etc.) which helps prevent limescale deposits and deterioration of the pipes and equipment. They do not filter anything else, but they can be paired with other filtration systems. They are also available to mount on faucets and under-sinks.

Water softeners come in 3 variations:

- Salt-based ion exchange softeners:

Water comes into one tank and passes through an ionic exchange resin, the minerals are trapped and replaced by sodium from the salt. A second tank contains brine, a salt solution, (that has to be added periodically) that regenerates the resin when its sodium levels are low.

Note that this system increases the amount of salt in the water.

Here's a little demo [video](#).

- Salt free conditioners:

This system isn't a "softener" but a "conditioner", it doesn't remove the minerals but changes their structure so they don't stick to surfaces.

Calcium and magnesium are present, and it's better for those who need to watch their salt intake.

Here's a [video](#) comparing both systems.

- Electronic or magnetic descalers:

This system is made of a magnet or a coil of wire placed around the main water pipe and works by producing electromagnetic impulses that change the composition of hard water and prevent it from forming scale.

This system seems a little less reliant than the others and isn't recommended for areas with very hard water.

Use:

Plug in and enjoy your water.

Add salt when needed (4-6 weeks), cleaning the brine tank once a year and resin tank every 2-5 years

Price:

- Salt-based softeners: from 1200€
- Conditioners: from 800€
- Descalers: from 100€

3/ UV light purifiers



UV light systems do not filter; they purify. The process is natural, chemical-free, and environmentally friendly.

It is the safest and most efficient in terms of microbiological treatment, as it prevents “up to 99,99%” of bacteria, viruses, and protozoans from spreading.

Note that UV treatments don’t act on pesticides, hard minerals, chlorine taste or heavy metals, and the water isn’t stored. This kind of system can be paired with others (like sediment filters, RO, softeners...).

This system is installed at the point of entrance of the water line or under-sink; as you turn the faucet on, the water goes into a chamber where a lamp emits ultraviolet light and exits ready to use.

UV light doesn’t physically remove pathogens, instead, the light penetrates their cells and prevents reproduction.

It is important to say that if the exit pipes are dirty and/or made of old metal, the water can be contaminated again.

This is actually one of the reasons why large scale UV light treatment plans are difficult to set up: the whole water system should be renewed and cleaned. That being said, it’s in use in cities such as Rotterdam (Nederland), St. Petersburg (Russia), Styrum (Germany), Méry-sur-Oise (France), and is slowly expanding to North America.

Use:

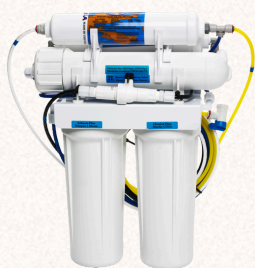
Install and enjoy.

- The bulb should be replaced after +/- a year, the efficiency changes as the mercury in the lamp dissipates.
- The UV sleeve needs to be cleaned at least every 6 months and changed every 2-3 years as recommended by the manufacturer.

Price:

Depending on the type of system, prices range from < 100€ to 1000€

4/ Reverse osmosis (one of the best systems)



Reverse osmosis (or RO) is a complex and very efficient system that filters anything bigger than 0.0001 micron (=everything).

There can be 5 to 7 stages.

- 1: A sediment cartridge removes dirt, rust, and large particles,
- 2: A pre-filter carbon block or granular activated carbon cartridge eliminates elements such as chlorine,
- 3: A second carbon block doubles the effects of the first,
- 4: A reverse osmosis membrane that has very tiny pores filters difficult chemicals (such as lead, arsenic, nitrates)
- 5: One more carbon post-filter to “polish” the water.
- After all that slow filtering, the water is stored for later use.

If you opt for the full 7-stage filtering, the system includes an alkaline remineralization filter to restore essential minerals to the water (as n5) and a UV light filter to remove micro-organisms (as n6).

Here's a quick explanatory [video](#) of the system.

There are two downsides to RO:

- 1/ There can be a lot of water waste as flushing keeps the membrane from clogging. The efficiency ratio depends on the product and how up to date the system is.
- 2/ Essential minerals are all suppressed, you'll either need to supplement or have a remineralisation filter.

Use:

Install (or have installed) and enjoy.

The filters need to be changed every 6-12month depending on the brand and water quality.

Price:

- There are different types of installations: countertops, under-sink and whole house so the prices will defer, but basically from 150€ to 5000€.

MyWater installs and rents undersink systems for 30€/month, from what I know they are available in Belgium, France and potentially in the neighbouring countries. I've heard some very good things about them, they include a remineralisation filter and the system has an “ok” efficiency ratio of 1:1 (1L used for 1L wasted).

5/ Ultra- and nanofiltration systems *(the other best)*



Ultra- and nanofiltration systems that use multiple membranes with gradually smaller pores in which water particules (and what's in them) go through. They are quite similar to reverse osmosis except that there's no sediment or activated carbon cartridge, but while they are less thorough than RO, they are still more efficient than many other systems.

As you open the faucet, the water is pushed through the membranes and filtered, ready to use. There is no storage, no use of chemicals or waste and both systems can be used to desalinate sea water.

Ultrafiltration:

- Targets contaminants to 0.01 micron.
- Used to filter bacteria, some viruses, pesticides, heavy metals, chloride and a small percentage of natural salts and minerals.
- Essential minerals like calcium, magnesium, and sodium are not removed.
- Uses less energy than RO and nanofiltration.
- Easier to instal than a RO.
- Can be installed under the sink or at the point of entry (whole house)

Nanofiltration:

- Targets contaminants to 0.001 micron.
- Used to filter bacteria, most viruses, pesticides, chloride, benzene, nitrates, heavy metals, salt and hard minerals.
- Essential minerals are filtered out.
- Requires more energy than ultrafiltration and is more costly.
- Can only be installed under the sink.

Use:

Instal (or have installed) and enjoy.

The filtering membranes should be cleaned and replaced as often as recommended (after 6-12 month) by manufacturer.

Price:

- Ultrafiltration: from 200€ to 3000€, filters from 50€
- Nanofiltration : from 1000€ to 4000€, filters from 100€

If you're like me and struggle to visualise how small a micron and organic matter can be, here's a [table](#) to help.

SUMMARY - UNDER THE SINK & HOUSE FILTRATION

Harmful substances	Sediment filtration	Water softener	UV light purifiers	Reverse osmosis	Ultra- & nanofiltration
Chlorine / chloramine		✓		✓	✓
Fluoride				✓	✓
Pharmaceuticals				✓	✓
Nitrates				✓	✓
Pesticides				✓	✓
Micro-plastics				✓	✓
PFAs				✓	✓
Lead				✓	✓
Mercury				✓	✓
Cadmium				✓	✓
Hard minerals	✓	✓		✓	✓
Micro-organisms			✓	✓	✓

FILTERING IN THE WILD

For those of us who like to stroll in the wilderness, finding clean water can sometimes be a challenge, and not all streams or springs are safe to tap into.

The portable filtration systems available are basically the same as for house filtering; here are the most common ones:

1/ Portable water filters



- **Straw filters such as Lifestraw and Sawyer:**

These are also labelled “survival tools” as they are very small, lightweight, and allow to drink directly from the stream.

They are microfiltration systems (0.2 and 0.1 microns), work like the ultrafiltration systems cited above and filter bacteria, parasites, microplastics, and dirt.



- **Filtered water bottles:**

These are simple bottles with a filter that's often made of activated carbon and ion exchange media, microfilters, nanofilters or UV light.

As an alternative, Öko and Grayl use electroabsorption and powdered activated carbon to filter basically everything out of the water, and both have received good reviews.



- **Gravity filters**

Just as with counter-top systems, the water is added from the top and filtered to the bottom. While you could take your Berkey/British Berkefeld for a trip, other brands offer lighter weight alternatives with microfiltration systems that get rid of pathogens as well as other bigger contaminants like Katadyn and Platypus.

Personal note: We bought the Katadyn 6L years ago. It is definitely big for 2 people, and because the filtration tubes are so small, they clogged the first time as I made the mistake of cleaning them with tap water (thanks limestone). Other than that, the use is simple, fast, and it seems efficient.



- **Pump filters**

Bigger and less convenient for treks but quite interesting for camping trips, hand pump filters use the strength of your arms to pull the water through the ultrafiltration membranes. The Guardian from MSR has strong reviews.

2/ Chemical disinfection



Chemical treatment involves adding a chemical solution to your water source to kill harmful microorganisms (except parasites). The most common types are iodine and chlorine dioxide tablets or drops. These treatments do not make the water immediately potable. One of the most popular products to do so are Aqua Mira (chlorine) and Potable Aqua (iodine).

3/ Solar Disinfection (SODIS)



Solar disinfection is an alternative to UV treatment that removes harmful pathogens. The technique is simple: place the water in a clear bottle and expose it to the sun for at least 48 hours, depending on the intensity of the sun and the concentration of pathogens in the water.

The big downsides: it's very long, uncertain, and harmful elements (such as PFAs) from the bottle can leach into the water.

There are a few things to make sure of before filling your bottle:

- Look for running water (streams, rivers, springs, etc.), they tend to be clearer and safer than still waters (lakes and ponds). Good alternatives include rainwater, dew, ice, and snow.
- Locate the source and check the surroundings for eventual traces of contaminants or pollution (human, industrial, and/or animal).
- If the water is muddy or contains debris and large particules you might need to pre-filter the water. To filter large components, you can use a clean cloth, a bandana, a bucket etc.
- Once this is done, filter the water with the system at hand.

If you're in a situation where you don't have a specific filtration system you can go old school:

- Boiling the water for a minimum of 1 minute will kill bacteria and viruses. Drink it as soon as it's cooled to prevent recontamination.
- Make your own sediment filter from murky water: place the water in any kind of container for at least 30 minutes. The heavier particules will fall to the bottom and you'll be able to scoop the clear water from the top. After that, boil the water to remove pathogens, wait for it to cool down and enjoy!

Last word on filtration systems

I've only scratched the surface of what water filtration can be and chose to display the big common ones (although I haven't listed chemical filtration systems because... well, chemicals), some of the recommendations that I gave could be product specific and for some of the full house system, you might find that there's more to know.

I haven't listed all the compounds that can and should be filtered/purified from water, for example, cadmium, mercury and lead are only 3 of the most common heavy metals present in water (we are missing copper, nickel, chromium, zinc, manganese, and arsenic) but most of the time if a system filters one heavy metal, it will also filter the others.

The market seems to evolve fast, and I think that we can all benefit from being extra curious and cautious on these matters. Don't hesitate to get the help of a professional.

If you end up getting (or have) a system that works for you that isn't listed, I'd be happy to hear about it and update this document.

In the mean time, let's see how we can improve the quality and quantity of the water that we consume.

Got a question?
Want to know more?
Let me know!

Website

<https://www.sarah-boulegroun.com>

Email

sboulegroun@outlook.com

Instagram

[@sarah.boulegroun](https://www.instagram.com/sarah.boulegroun)

Youtube

[Sarah Boulegroun](https://www.youtube.com/SarahBoulegroun)

