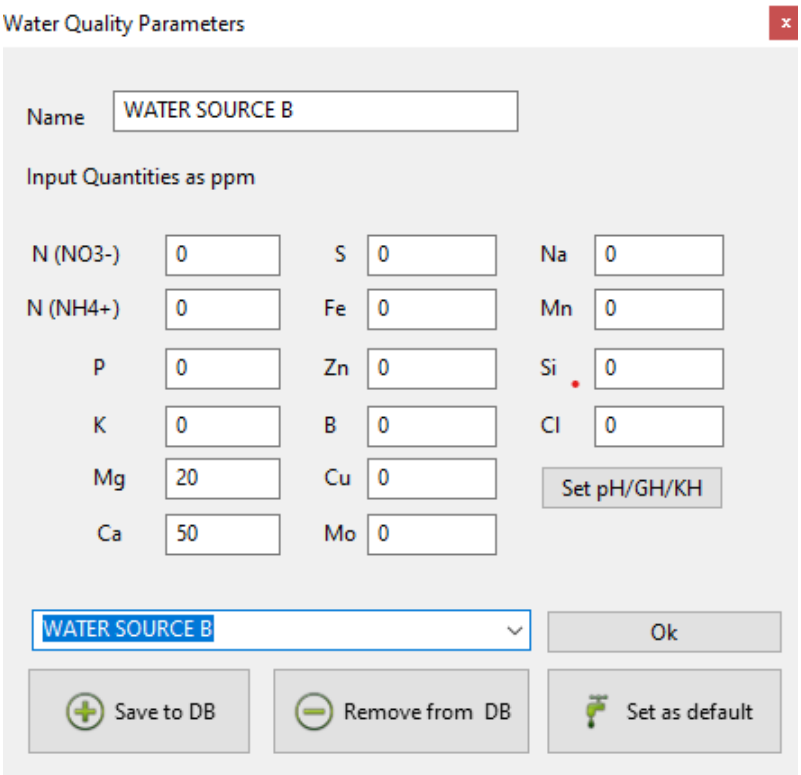
How tap water affects your hydroponic nutrient formulation

Tap water is often the most reliable source of water for hydroponic growers. However, especially in the North America and Europe, tap water can contain a significant amount of dissolved solids. These substances can fundamentally affect the properties of the water and require adjusting the nutrient formulation in order to achieve proper nutrient concentrations in the final nutrient solutions. In this post I'm going to walk you through some of the most important considerations when dealing with tap water and how you should adjust your nutrient formulations to make sure that the final nutrient concentrations are adequate for plant growth.



Hydrobuddy allows you to set water quality parameters to ensure they are taken into account within your calculations

There are four important factors to consider when adjusting a nutrient formulation to your tap water.

Dissolved nutrients. Tap water often contains nutrients that are used by plants. The most common ones are Calcium, Magnesium and Iron. It is often fundamental to adjust your nutrient formulation to account for their presence. If you are using HydroBuddy to prepare your nutrient formulations you can use the “Set Water Quality Parameters” dialogue to introduce the ppm concentrations of these nutrients so that they are properly added when considering your nutrient targets. This will mean that less Ca, Mg and Fe will be added from salts, because the program will assume some will come from the water. An important fact to consider is also that the Ca, Mg and Fe concentrations in the water will tend to change with the seasons, as hotter temperatures means that underground limestone/dolomite deposits will dissolve more and therefore lead to more Ca/Mg rich water. Usually I will advice people to get two analysis – one in August, one in February – so that they can know the two extremes their formulation will be at and adjust accordingly through the year depending on the temperature of the incoming water.

Alkalinity. Your water will also contain a substantial amount of carbonates and will tend to be basic due to this reason. It is often easiest to take the amount of moles of Ca plus the moles of Mg in the water and discount this by the moles of Sulfur, then calculate how much moles of acid you will need to neutralize this amount. This makes the assumption that all Mg and Ca in the water are carbonates, except for the amount that are present as sulfates. Knowing how much moles of acid are needed to neutralize this you can now calculate how much ppm of S, N or P – depending on the acid you are going to be using – will take to neutralize the water and set this into the “Set Water Quality Parameters” box in HydroBuddy. This will account for the acid addition that will be needed to remove all alkalinity from the water when you prepare the nutrient solution. Note that although HydroBuddy contains fields to set pH/gH/kH within the program, it actually does not take into account any of these values when calculating compensations

(these are just there to store for reference).

Dissolved non-nutrient minerals. There can be a lot of minerals dissolved in the water that are not nutrients, which is why a complete chemical panel of the water is required if the water source to be used hasn't been evaluated before. In particular Na, Cl and heavy metals are the most important things to look for, as these can very negatively affect your plants. High presence of these substances will often make the water completely unusable for hydroponics, unless some specific pretreatment steps are taken to fix the issue. Make sure that the ppm of Cl are below 50 ppm, Na is below 100 ppm and all heavy metals are within quantities considered safe for human use.

Some typical soft/hard water concentrations of Ca+Mg

Dissolved organics. Perhaps one of the least evaluated aspects of tap water, dissolved organics can be particularly important when considering a tap water source. Substances like chloramines and herbicides can be fundamentally damaging to plant roots. While it is easy to test for oxidative substances like chloramines, normally it is hard to get a lab test for most specific organic substances, reason why the best solution for this problem is adequate pretreatment. Always make sure your tap water runs through both media – sand, ceramic – and activated carbon filters before it is used in your hydroponic crop. An adequate sterilization treatment, UV, ozone, etc, can also help reduce the risk of getting organic molecule contamination.

As you can see, tap water is a complex beast. Not only do we need to account for the nutrients and non-nutrients it can contribute, but we also need to account for its alkalinity and the ways in which these three things might change through the seasons. These complications are the main reason why so many growers end up deciding to use RO water instead – higher

reproducibility, less problems – but they are certainly not insurmountable. Creating a hydroponic formulation and infrastructure that accounts for these problems can lead to great cost savings, as you can save both on fertilizers – because the tap water already contains some minerals – and energy.