Quick reference guidelines

Hard Water

Characteristics

EC > 0.5
dKH of 10+
dGH of 10+
High bi-carbonate level.
Very high mineral level, mostly calcium and magnesium.

Common Problems

pH continually rising. The high bi-carbonates continually react over time raising the pH in your reservoir, pipelines and substrate. Causing deficiency via too high a pH level. Mineral imbalance can be caused by elements being at the wrong ratios(excessive) in the final nutrient solution, and/or substrate.

Reacts with concentrated nutrients. Particularly when applying a concentrated nutrient, the excessive calcium in the water can react with the concentrated phosphor, forming gypsum in the solution and rendering it useless.

Typical Correction

Mix with R.O (Reverse Osmosis) water until the EC is reduced to 0.4, then carry on as normal.

Bad/hard water

Characteristics

EC > 0.5
dKH of 10+
dGH of < 8
High bi-carbonate level
High mineral level but wrong minerals! Mostly sodium and chloride.

Common Problems

pH continually rising. In a similar way to description for hard water. High bi-carbonates can also interfere with and slow nutrient uptake in an organic substrate.

Incorrect/damaging minerals. Rather than calcium and magnesium, sodium and chloride make up the majority of the content, posing risk to your plants, quickly causing toxicity issues in re-circulating system or substrates with a high CEC.

Typical Correction

Mix with R.O water until the EC is reduced to 0.2, then add CANNA CALMAG AGENT up to an EC of 0.4. Useful elements (calcium and magnesium) are partially re-introduced and bi-carbonates are brought to within a more beneficial level. Although now marginalised, be aware of small remaining levels of sodium and chloride.

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Thé solution for growth and bloom

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How to perform the test

1 Test the EC of your sample.

1. Ensure you have a clean and fully working EC pen to give you as accurate a measurement as possible.
2. Calibration of the pen prior to conducting the test is advised.
3. Test EC of sample and record data on results sheet.

2 Test the carbonate hardness

1. Ensure the test tube is clean.
2. Measure 5 ml of the water sample in to the test tube.
3. Add one drop of KH reagent to the test tube and mix. The water sample should turn pale blue.
4. Keep adding drops, one by one (remember to count the drops), mixing between drops, until the blue colour turns to yellow. The number of drops, including the first drop, needed to bring about the colour change is equal to the KH value in dKH. Should the first drop of reagent turn the sample yellow then the KH value is below 1 dKH.
5. Write down the number of drops on the results sheet.

3 Test the general hardness

1. Ensure the test tube is clean.
2. Measure 5 ml of the water sample in to the test tube.
3. Add two drops of GH-A reagent to the test tube and mix. The sample should turn dark pink.
4. Add one drop of GH-B reagent to the test tube and mix. Keep adding drops, one by one (remember to count the drops), mixing between drops, until the pink colour turns to blue.
5. The number of drops needed to bring about the colour change is equal to the GH value in dGH. Should the first drop of GH B reagent turn the sample blue then the GH value is below 1 dGH and indicates very soft water.
6. Write down the number of drops on the results sheet.

Why are bi-carbonates(KH) important?

$$H^+ + HCO_3^- \rightleftharpoons H_2CO_3 \rightleftharpoons H_2O + CO_2$$

(acid) (bi-carbonate) (carbonic acid) (water) (carbon dioxide)

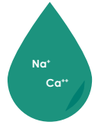
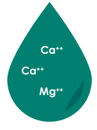
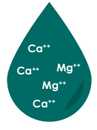
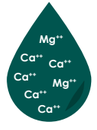
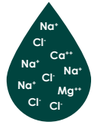
By converting acid into water and carbon dioxide, the pH of a solution is more stable, ensuring the maximum availability of nutrient. This acid could come from either a concentrated nutrient (when you add CANNA base nutrients or additives), or from normal root-zone activity. Acidification of the root zone can be more pronounced in the generative phase when the plant takes up relatively more nutrients such as potassium. Bi-carbonates play an important, pH stabilising role at this time in a plants life.

Low (or no) bi-carbonate levels results in unstable pH conditions in your reservoir AND substrate. A high level of bi-carbonates can cause pH levels to rise too much as relatively more acid is neutralised over time.

´Normal´ water contains an ideal amount of bi-carbonates and other general ionic elements. The ´Goldilocks´ zone of water for nutrients and plant growth; helping keep pH levels within a desired range and providing the correct background level of minerals.

Check your minerals

The background mineral content contributes to the overall hardness (and EC reading) and can be varied in its make up. Generalising for a growers perspective, these minerals will chiefly be made up of calcium and magnesium (good) or sodium and chloride (bad). If they are sodium and chloride in nature, it can quickly cause toxicity issues with your plants. Assess your water by comparing the dGH result with the dKH and EC values, to determine the best course of action when preparing your nutrient tank.

Extreme Soft	Soft	Normal	Hard	Hard/Bad
EC < 0.1	EC 0.1-0.3	EC 0.4-0.5	EC > 0.5	EC > 0.5
				
Almost zero minerals and bi-carbonates.	Low to medium minerals and bi-carbonates.	Goldilocks Zone. Ideal starting water.	High bi-carbonate levels. High minerals, mostly calcium and magnesium.	High bi-carbonate levels. High bad minerals: mostly sodium and chloride.

Quick reference guidelines

Extreme soft water

Characteristics
EC of <0.1
dKH of 0-2
dGH of 0-2
Very low mineral level
Very low bi-carbonate level

Common Problems
Drastic swings in pH fluctuation. Either on application of (acidic) nutrients, over time in a reservoir or from changes in plant nutrient uptake within the substrate during growth.

Mineral deficiencies. Very low starting level of important minerals, Calcium and Magnesium. Especially bad combined with high humidity/low air movement (common in propagating stage).

Typical Correction
Increase EC to 0.4 with CANNA CALMAG AGENT. Watch out for pH swings.

Soft water

Characteristics
EC between 0.1-0.3
dKH of 2-6
dGH of 2-6
Low mineral level
Low bi-carbonate level

Common Problems
Minor pH fluctuation. Similar as described for extreme soft water, but not as extreme (depending on actual level).

Minor Deficiencies. Again, similar to description in Extreme soft water, but not as extreme (depending on the level.)

Typical Correction
Increase EC to 0.4 with CANNA CALMAG AGENT. Watch out for minor pH swings.

Normal water

Characteristics
EC between 0.4 and 0.5
dKH of 6-10
dGH of 6-10
Most nutrients are formulated with this type of water in mind (excluding soft/hard specific versions).
Expected mineral levels, mostly Calcium and Magnesium.
Expected bicarbonate level, aiding pH stability.

Common Problems
Minimal. usually brought on by environmental mismanagement (grower error).

Typical Correction
None! The ideal or ´Goldilocks zone´ of water to start with.