

# ADVENTURES WITH WATER CHEMISTRY

## By Keith Nelson



I was discussing orchids with Chuck Acker and said I thought I should be getting more blooms than I do. Chuck asked if I checked my water chemistry and I said yes, well sometimes, well I checked in a few months ago. After I realized that was a lame answer I asked him to tell me more. This led to a serious discussion about water chemistry.

I purchased some pH meters and a TDS meter (total dissolved solids) Fig. 1. One of the pH meters came with two calibration solutions, Fig. 2.



Figure 1. pH meters and a TDS meter



Figure 2. One of the pH meters came with two calibration solutions

The other one has a calibration screw on top which one turns to calibrate the reading. I calibrated the one pH meter with the solutions and then calibrated the other one to match the first one. In scientific terms this is a secondary calibration, Fig 3. Now I am compulsively testing everything before watering, which has added a lot of time, but also another interesting aspect to the hobby.

The results I have found are summarized here. Numbers are the average of several measurements. [See chart below]

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	<b>pH</b>	<b>TDS</b>
Commercial Distilled Water		
Ice Mountain	6.2	1
HyVee	6.4	2
Dehumidifier	4.9	22
RO Water	6.0	41
Well Water	7.3	632
90% RO with 10% well	6.9	129
RO with 1/8 tsp Michigan State Fertilizer for RO Water	6.1	148
RO with 1/4 tsp Michigan State Fertilizer	6.0	295
RO with 1/2 tsp Michigan State Fertilizer	6.0	580
RO with 1 tbsp Green Jungle Fertilizer from Orchids Ltd.	6.1	280



Figure 3.

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A good pH range is 6.5 to 6.8. Closer to 6.8 is better. As bark and moss degrade they become more acidic. I have been using 6.8 to 7.0

A TDS of 250 to 300 is good for Paphs, Phrags, Bulbos, mounted plants, and other sensitive genera. Up to 500 TDS is acceptable for mature Cattis, Phals, Oncidiums, Dendrobiums and other hardy genera. For misting a low TDS is best.

I have a 2 gallon RO system which we use for drinking water. It is small for my orchid needs so I am frequently filling containers and storing them. Small RO systems used for drinking water do not produce the ultra pure water you would have with Larger RO systems used for greenhouses or other commercial purposes. I had been typically been using the 90% RO and 10% well water combination when watering. This has provided a good range for orchids.

I alternate Michigan State Fertilizer and Green Jungle fertilizer from Orchids Ltd. in Plymouth, Minnesota. An AOS webinar recommended several fertilizers as all fertilizers are a little different and rotating fertilizers is a good practice.

MSP recommends 1/2 tsp per gallon and Green Jungle recommends 1 tbsp per gallon. The chart shows these results for several mixtures

I have a basement dehumidifier that runs in the summer. I had assumed this water was similar to commercial distilled water. Measuring the pH now I was shocked to see it was 4.9. Water with that low of a pH could be toxic to orchids. I had been using this mixture with 10% well water on my outside Cattis and they had not been growing well. When I gave them better water they responded with vigorous growth.

I purchased pH UP from Paradigm Fig. 4., to adjust pH. There are no directions for amounts to use as the amount of pH UP needed to raise the pH varies widely depending on the TDS of the water. The commercial distilled water I use for misting has a low pH so I want to raise it to about 6.8 of 7.0. I have found 2-3 drops of pH UP in 1/2 gallon can often shoot the pH up to 9 or 10. The lower the TDS in the water the greater effect the pH UP. All my fertilized water needs the pH raised. Water with about 150 to 200 TDS can take several eye droppers full of pH UP to raise the pH. The higher the TDS the more pH UP is required to raise the pH. One has to add the pH UP solution slowly and then measure the solution several times until you obtain an understanding of how much pH UP is needed for each situation. The pH meters both require a short time to stabilize for an accurate measurement. The TDS meter stabilizes quickly.



Figure 4

Measuring the water chemistry has provided a new dimension to the hobby of growing orchids. If you choose to do so, have fun measuring. I suspect your orchids will grow better and appreciate the effort.

NOTE: Jeff Baylis tested his well water. The well is located in rural Cross Plains. The well is 240 feet deep and water came in at 120 feet. pH = 7.23, TDS = 366