

Water Purity Testing Concerns – A letter

Whilst drafting a paper on water testing at the request of a publisher, I checked out the electro-physics concepts of Conductance and Conductivity. From that information I began to realise that nothing about Conductivity Meters, Total Dissolved Solids and Siemens readings are scientifically and technically correct. In addition they are unrealistic and pure nonsense.

Just to keep it simple for the moment, until further discussion, consider some of my arguments below:

1. Chemists have borrowed the concepts of electrical Conductance, Conductivity, Resistivity and Siemen **(that belong in the realm of Physics, electromagnetism, solid conductors and Ohm's Law)**, as if it can also be used for the use of measuring current flow in water. Water however is a dielectric and an insulator that opposes the flow of current. Water is not a conductor in the same way as a solid electrical conductor as only ions and hydrated electrons in the water are.
2. As if that was not enough misuse of electrical concepts, they have also tried to mimic aspects of Ohm's Law by only using the inverse properties of current (I), Ohmic resistance (R) as conductivity and resistivity respectively, but conveniently forgetting voltage potential (V) as not being part of this threesome equation.
3. They claim to be using Conductivity meters for the purpose of water purity testing and in particular on a concept of Total Dissolved Solids (TDS) but actually meaning the measurement of conducting ions (charge carriers). This begs the question, why not call it Total Dissolved Ions (TDI)? It is my view that material in any ionic state (incomplete or over-complete atoms) cannot possibly be dissolved and be a solid at the same time.
4. It can even be questioned what it actually is, that Conductivity meters actually measure, as an ion does not present itself as a form of conductance either. Conductance is a description of a physical entity and Conductivity is an electrical property.
5. The unsubstantiated claim of a maximum limit of around 18 MOhm that is supposed to occur at a pH of 7 and my question "what does pH have to do with Ohmic resistance' as it is a measure voltage instead.
6. The use of alternating current to measure the reciprocals of Mho and Resistivity instead of using direct current as the more appropriate method. Most likely a too high a voltage and too low an input resistance was used that would then polarise the water, using such an unrealistic DC component.
7. My inability to locate any reference to how all this, in particular Resistance and how this is measured and what instruments were used, failed. A Conductivity meter operating on alternating current could not possibly measure Resistivity that way, as it is a Direct Current phenomena. If the meters in question were digital multimeters, the flawed answers would speak for themselves. And whilst on the subject of determining water purity, what about the total undissolved (immersed) solids consisting of possibly harmful organic and inorganic substances that cannot be measured that way except by physical observation?

Conclusion.

With ions and counter ions flowing in two different directions, what are Conductivity meters actually measuring and what about the undissolved immersed organic and inorganic solids without an electrical charge that also contaminate the water? I hope you can see the problem here. Many will not like such revelations. Any comments?

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