

# OKLAHOMA ROCKS! GROUNDWATER

## Lesson 4: Groundwater Quality and Freshwater

By: Dr. Kyle E. Murray, OGS Hydrogeologist

Water sources may contain a variety of bacteria and other microorganisms. If water is abundant in these organisms and consumed by humans it may result in water-borne illness such as cholera or typhoid fever. In many cases, a simple disinfecting treatment (such as chlorination) will oxidize/kill the microbes and make the water safe for drinking. Groundwater is viewed as higher quality water than surface water because groundwater generally has lower microbial counts than surface water. Groundwater also has lower concentrations of suspended solids than surface water because it is “filtered” by the geologic material that it passes through before reaching a groundwater well.

Water quality can also be measured in terms of the amount of dissolved substances such as calcium, magnesium, sodium, chloride, etc. Dissolved substances in a water sample can be collectively reported as a concentration of total dissolved solids (TDS). The concentration might be reported in units of milligrams (mg) per liter (L) of solution (aka mg/L). This can also be conveniently referred to as parts per million (ppm) because one liter of water weighs 1,000,000 mg, so if one mg of “salt” is dissolved into one-liter of water it will be one part salt per million “parts” total (1 ppm).

**Your Assignment:** Read text on water quality, examine the relative scale of “salinity” and answer questions below.

### 1. What influences the TDS of water?

It is a real conundrum!

**TDS of distilled water: 0 ppm**

**TDS of rain water: ~7 ppm**

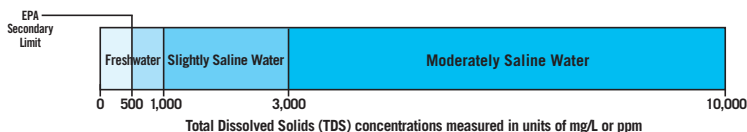
**TDS of seawater: ~35,000 ppm**

The majority of aquifers are made of sedimentary materials that were originally deposited in a marine environment. So, seawater was the original fluid contained within the pore spaces of our present-day aquifers. However, over time, rain water has recharged the aquifers and because it is less dense it will “float” on top of the saline water. The “age” of groundwater (time since water entered the subsurface) may also influence water quality in terms of TDS. Water that has been in contact with rock and sediment for long periods of

time tends to have higher TDS, because soluble minerals have had time to dissolve.

**One teaspoon of table salt weighs 6,200 mg, comprised of about 2,400 mg sodium and 3,800 mg chloride.**

2. If you added one teaspoon of salt to a liter of water, how would the water be categorized in the chart below?
3. How much salt (in teaspoons) could be added to one liter of distilled water to still qualify as freshwater?
4. Look at the label of a sports drink & estimate the TDS. (Assume that the ratio of sodium to chloride is the same as table salt and don't forget to include all other listed elements, such as potassium.)



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