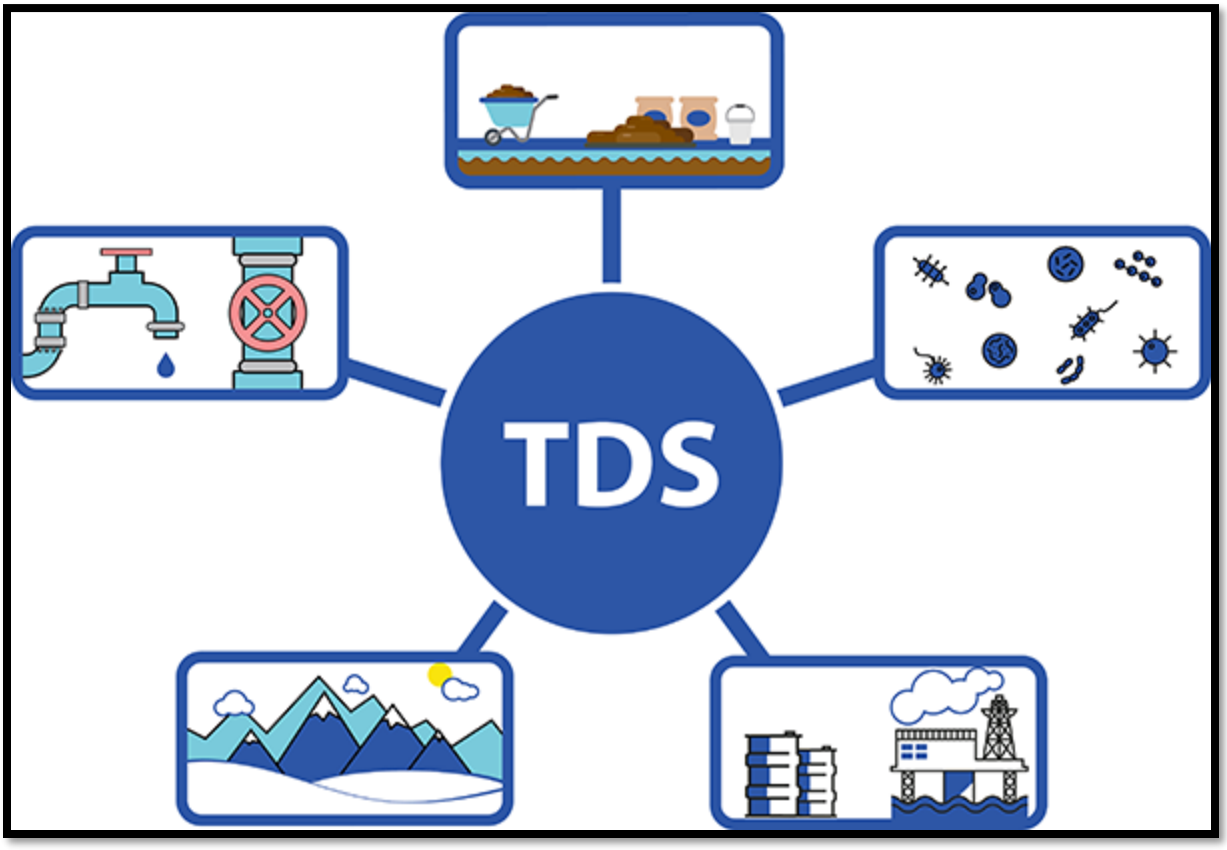
Total Dissolved Solids in Drinking Water

Background Information

Water is a good solvent and picks up impurities easily. **Pure water** -- tasteless, colorless, and odorless -- is often called the **universal solvent**. **Dissolved solids**" refer to any minerals, salts, metals, cations or anions dissolved in water. **Total dissolved solids (TDS)** comprise inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonates, chlorides, and sulfates) and some small amounts of organic matter that are dissolved in water.

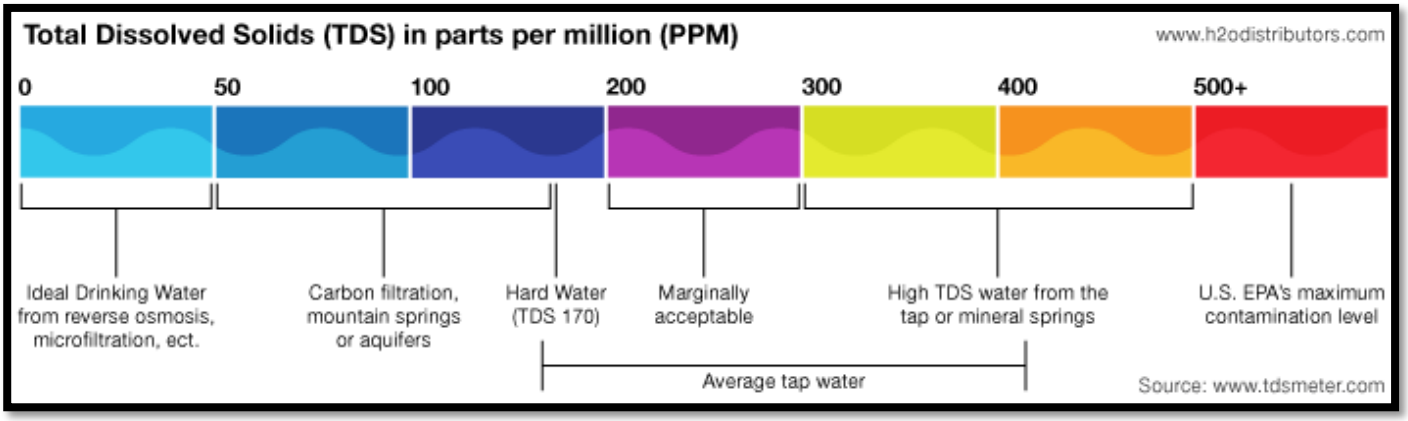
TDS in drinking-water **originate from** natural sources, sewage, urban run-off, industrial wastewater, and chemicals used in the water treatment process, and the nature of the piping or hardware used to convey the water, i.e., the plumbing.



So, the total dissolved solids test is used as an indicator test to determine the general quality of the water. The sources of total dissolved solids can include all of the dissolved cations and anions, but the following table can be used as a generalization of the relationship of TDS to water quality problems.

TDS cations and anions	water quality problems
Cations combined with Carbonates CaCO3, MgCO3 etc	Associated with hardness
Cations combined with Chloride NaCl, KCl	Salty or brackish taste, increase corrosivity

An elevated total dissolved solids (TDS) concentration is not a health hazard. The TDS concentration is a secondary drinking water standard and, therefore, is regulated because it is more of an aesthetic rather than a health hazard. An elevated in TDS concentration of the dissolved ions may cause the water to be corrosive, salty or brackish taste, result in scale formation, and interfere and decrease efficiency of hot water heaters.



Measuring Total Dissolved Solids Using an Electrical Conductivity Meter

1. Before attempting to measure the TDS of your sample, make sure to prepare a clean, clear space with the appropriate instruments and tools for the task. You will need the following:
   - A clean, properly sterilized beaker that is free of dust or other particles
   - A sample of the water you want to analyze, collected into the sterilized beaker. Ideally, the sample should be at 25° C (or 77° F) at the time of analysis.
   - An electrical conductivity meter — a device used to measure a solution's ability to conduct electricity.
2. Make sure your beaker with the water sample in it is placed on a flat, stable surface. Turn on the electrical conductivity meter, then insert the measuring lead into the sample. Wait for the reading on the conductivity meter to become stable before noting the result.
   - You may have to wait a few seconds before the reading stabilizes, but it's important that you wait until the number on the display stops changing.
   - The measurement displayed on the electrical conductivity meter is the purity of the water, measured in μS (micro-Siemens). The lower the μS value, the purer the water, with 0 μS being pure, unpolluted H_20.
3. The basic formula for calculating total dissolved solids looks like the below illustration. In the formula, TDS is measured in mg/L, EC is the conductivity of your sample (the reading from your electrical conductivity meter), and KE is the correlation factor. The correlation factor depends on the liquid being used as the

sample, and it may also vary according to atmospheric conditions. It varies between 0.55 and 0.8.

- In the example above, say the correlation factor at the current temperature and in the current pressure conditions is 0.67. Plug your values into the formula. The TDS for your sample is therefore 288.1 mg/L.
- Water with a TDS of less than 500 mg/L meets the Environmental Protection Agency's standards for drinking water. [1]
- A high TDS does not necessarily mean that water is unsafe for consumption; it may just suggest that the water will have unpleasant aesthetic qualities in terms of color, taste, smell, etc. If you are concerned about the safety of your drinking water, you should have your water professionally tested.