Water Chemistry Testing

Water quality can vary from place to place, depending on the condition of the source water it comes from and the treatment it receives. The U.S. water supplies are considered among the safest in the world, and yet water contamination can still occur. This is why water testing is so important.

In this activity, you're going to test several different samples of water to find out what's really in them.

What You'll Need:

- ***10 pack water test strips***
- ***Test strip color chart***
- ***8 (16x150mm) polystyrene test tubes with caps***
- ***Access to several different water samples***

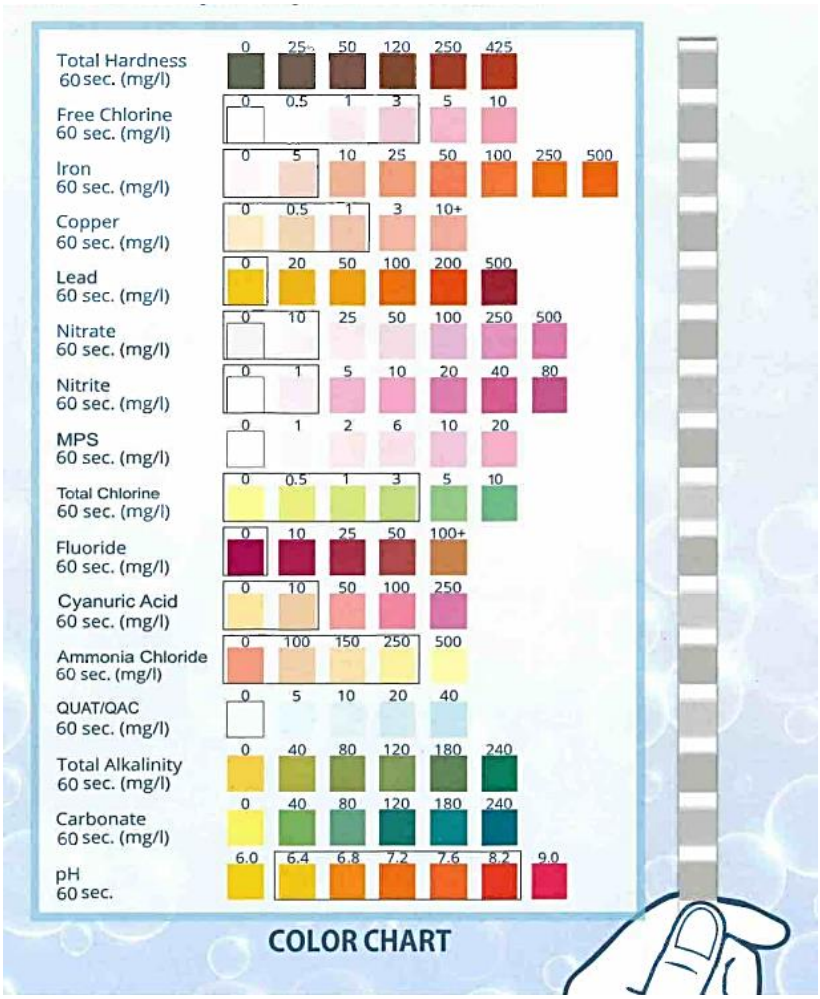
What To Do:

Collect your water samples.

- *The test tubes you're using make it easy to get enough water to test and be able to fully submerge the testing strip. You can also use any container that the testing strip will fit fully into.*
- *Try to get water from different places to compare. For example, it could be interesting to compare water from your city's public supply to water from a well. If you know where your city's water is sourced from, it would also be interesting to compare water taken directly from the source to water from the tap that has undergone treatment.*
- *Rinse each test tube at the source before you collect the sample. To rinse your test tube, fill your container with the source water, swirl it around, and then discard the water away from where you're collecting your sample three times. This makes sure any residue in your container won't contaminate your sample.*
- *Next you can fill your container, label it with the water source, and head back to your testing area.*

Test your water samples.

- *Line your water samples up and dedicate a space on the table for each one so that your testing strips don't get mixed up.*
- *For each sample, take one strip and submerge it in the water for two seconds, then hold it horizontally for thirty seconds while you wait for the water it soaked up to interact thoroughly with the testing chemicals on the strip.*
- *Compare the final colors to the provided chart within a minute of submersion for the most accurate results.*
- *Repeat the process with a second strip for each sample. This will demonstrate repeatability of the results so that you know your readings are accurate. Make sure to record your results in a table.*



What are you looking for?

Single-use strips change color to indicate the concentration of a specific chemical. Comparing the test strip color with the color chart will show the concentration of each chemical. These kits are extremely simple, but they are less accurate than other methods.

The following chemicals tests are often found on basic water testing strips:

Total Hardness *0-425PPM*	Water hardness is determined by the amount of minerals in the water, particularly calcium and magnesium. Calcium is necessary for proper fish egg and native insect development. At home, calcium reacts with soap and leaves residue behind. It can also leave solid deposits behind on shower heads and water heaters. It reduces the efficiency of water heaters and builds up in pipes slowing the flow.

Total Alkalinity *0-240PPM*	Alkalinity indicates the water's capacity to resist changes in pH. Good buffering capacity can limit dangerous pH swings caused by the introduction of highly acidic or basic substances..
Iron *0-500PPM*	Iron – When concentrations exceed 0.1 mg/L, iron precipitates on exposure to air, decreasing pond clarity, potentially clogging irrigation pipes, and encouraging iron bacteria. This affects the flavor of fish and water. Levels greater than 0.3 mg/L can cause staining on buildings and sidewalks when the water is used for irrigation.
Copper *0-10PPM*	Copper exists naturally in water, soil, plants and animals, but too much can be harmful to us. It can get into the water from mining, farming or other industrial facilities. High levels of copper often come from well water or copper pipes. It can cause issues with the liver and lungs. It is particularly dangerous to children.
Lead *0-500PPM*	Lead is a toxic chemical that can damage the brain, nervous system, kidneys, red blood cells and reproductive system. It is a greater threat to children and infants. It typically ends up in water supplies through corrosion of older plumbing systems or from natural deposits.
Nitrates *0-500PPM* ***Nitrites*** *0-80PPM*	Nitrate and Nitrite Nitrogen- This can be found naturally in low levels. The reason it is important to test for nitrates is because they can be increased due to pesticides used in farming. Excessive amounts can be dangerous for infants and pregnant women. Nitrite is important to test when coming from wells and groundwater. The danger of having too many nitrates or nitrites in the water is with the blood flow in our bodies. Nitrates change hemoglobin into methemoglobin, which reduces the blood's ability to transfer oxygen throughout the body causing people to become oxygen starved!
MPS *0-20PPM*	MonoPeroxySulfate (MPS) is a non-chlorine oxidizer (Non-Chlorine Shock) used in pools/spas to react with organic contaminants and maintain or restore water clarity.
Total Chlorine *0-10PPM*	Water treatment centers add chlorine to water to reduce contaminants. The addition of chlorine has helped reduce illnesses due to unclean water. However, if the levels get too high, that causes other problems! Too much chlorine over an extended period of time causes different types of cancer. It is a toxic chemical and reacts to other in the water creating more toxins.
Fluoride *0-100PPM*	Fluoride concentrations of 0.7 to 1.2 mg/l in drinking water will protect against dental cavities. However, excessive levels (more than 1.5 mg/l) may cause discoloration, or mottling of the teeth. This occurs only in developing teeth before they push through. Elevated fluoride levels also may cause skeletal damage and bone disease. Because low levels of

	fluoride are common in groundwater, most municipalities add fluoride to the water.
Cyanuric Acid *0-250PPM*	Cyanuric acid (CYA), also called stabilizer or conditioner, is used in pools and spas exposed to the sun to reduce the rate of decomposition of available chlorine by ultraviolet rays in sunlight.
Ammonia Chloride *0-500PPM*	Ammonia can be toxic to fish and other animals. The level of toxicity, however, is based on the total ammonia concentration, pH, and temperature. Higher levels usually mean that a lake or pond is being exposed to unusual discharges, while lower levels help limit plant and algae growth.
QAC *0-40PPM*	Quaternary Ammonium Compounds (QAC) are a class of molecule often used as disinfectants and biocides in cleaning and personal-care products. Their positive change and shape causes them to rip apart bacterial cell walls and membranes. These compounds are known to be quite stable and therefore can remain active in wastewater systems for some time. Due to their effectiveness as a disinfectant, these compounds are often thought to cause toxicity issues in wastewater systems. Because of incomplete removal during wastewater treatment, QACs are present in wastewater effluents, with which they are discharged into natural waters, where they accumulate in sediments.
Carbonate *0-240PPM*	This test is useful in aquarium water maintenance a carbonate levels help regulate the pH of seawater.
pH *Range from 6-9*	pH is a measure of how acidic or basic the water is. The pH is a logarithmic scale based on a measure of the free hydrogen ions in the water. The scale runs from 0 to 14, where 7 is considered neutral, 0 to 7 is acidic and 7 to 14 is alkaline. Because pH can be affected by dissolved minerals and chemicals, it is an important indicator of the change in water chemistry. Natural waters generally range from pH 6.5 to pH 8.5 but can vary. Water with long-term low or high pH readings can be corrosive, causing potential problems with irrigation equipment or structures. Aquatic animals are greatly affected by changes in pH.
Chloride/Salinity	The Chloride ion is one of the major inorganic anions in water and wastewater. Although chloride is essential to plants in very low amounts, it can cause toxicity to sensitive crops at high concentrations. Water with high salinity is toxic to plants and may become hazardous to the ecosystem. High levels of Chloride or Salinity may be caused by the proximity of the lake to the ocean or low water levels, which cause salts to become more concentrated within the waterbody.

OKLAHOMA MUSEUM NETWORK
FUNDED BY THE DONALD W. REYNOLDS FOUNDATION