

Weird Science: What's In Water?

Water is important for life on Earth—we can't survive without it! But have you ever stopped to wonder where your water comes from and what's in it? Let's find out!

You'll Need:

- ◆ Water samples from various places
- ◆ Water test strips
- ◆ Comparison worksheet

From Home:

- ◆ Cups
- ◆ Markers or crayons
- ◆ Magnifying glass (optional)

Where does our water come from?

If you wanted a glass of water right now where would you go? Probably to your sink or refrigerator! Here in Windsor it's easy to get clean water right out of our faucets. But have you ever stopped to think about where that water came from *first*? How does water get from the sky to our sinks? Take a guess! Where do you think the water in your faucet started? What path did it take?

If you said rain or snow you're right! Here in Colorado 70-90% of our water starts as snow! That snow falls high in the mountains. In the springtime it melts and runs into our rivers. Here in Windsor, our river is the Cache la Poudre River.

Of course we don't drink the water straight out of the river (that would probably make you sick), it goes to a water treatment plant first. But it's still important that our rivers have clean water!

Why does clean water matter?

Why is it important that our rivers, lakes, & ponds are clean?

Why is it important that our drinking water is clean?

Take a minute to think about these questions, then, turn the page.

Here are some reasons clean water matters!

- Dirty (or “contaminated”) drinking water can make us sick.
- Contaminated water can spread disease.

Here are some reasons clean rivers, lakes, and ponds matter!

- They’re the source of the water we drink. Yes, we clean it, but there are some things (bacteria, metals, toxins, etc.) that can’t be cleaned out or make it difficult to clean!
- They’re the source of food and water for many animals! (The deserve clean water too)!
- They’re the home for many animals and plants!
- We swim, play, and recreate in and on them!

How do we know if our water is clean?

You can’t always tell just by looking at it if water is clean! Thankfully we have scientists who study water in rivers, lakes, ponds, and marshes to see how clean it is. Scientists who study water quality are called **Hydrologists**. **Aquatic Biologists** and **Ecologists** may also study water and the health of water ecosystems! **Chemists** and **Water Quality Experts** help to clean and test our drinking water to make sure it is safe for humans.



How is water tested?

Some water tests are done right near the water source, other tests are done in a lab.

Scientists test water temperature, dissolved oxygen, and turbidity (or water clarity) at the water source

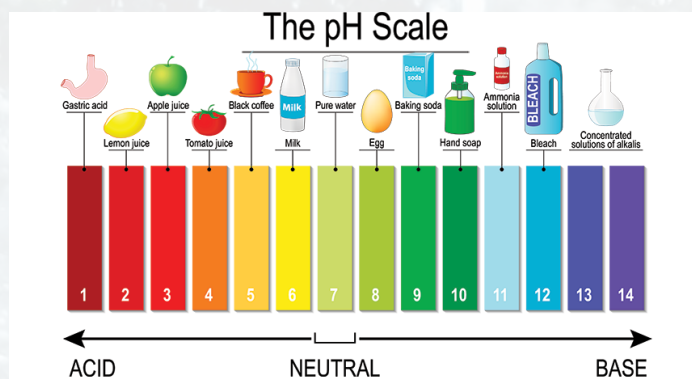
Temperature is an important test! Living organisms and animals prefer colder water, bacteria and algae prefer to grow in warmer water. Generally colder water is cleaner, but not always! Did you know water contains oxygen? Testing dissolved oxygen using special meters can help scientists understand how clean it is. Generally the more oxygen in water



the more living organisms can survive there! Scientists also look at water turbidity (how clear the water is). If water isn't very clear that means there is a lot of pollution, organisms, or dirt suspended in the water....it usually isn't very clean or safe to drink! Often, water scientists will take water samples back to their labs to check them for contamination and measure the pH levels and amount of metals, nutrients, pollution, and pesticides in the water. Today we're going to examine several different water samples and do some simple tests!

Let's Experiment

1. Take out the water samples from the bag and add your own water sample from your kitchen sink. These were all collected from different spots around Windsor. (You'll find out where they came from later).
2. First, let's observe. Take a close look at all the water samples. How clean do they *look*? Do you see any pollution or particles floating in the water? Would you boat on the water? Swim in that water? Drink that water? If you have a magnifying glass you can get it out to observe even closer.
3. Now we're going to do some testing for substances we can't see with our eyes! If you haven't done it already, pour each water sample into it's own cup.



First Test: pH & Chlorine

Our first test is a measure of pH. pH measures how acidic or alkaline a substance is. Different substances naturally lean one way or another (e.g. vinegar is an acid but soap is an alkaline). Generally humans can drink a wide range of pH levels, but different pH levels can damage pipes or cause funny tastes. Animals, especially fish, are VERY sensitive to pH levels so measuring it can help scientists know the health of an ecosystem. Scientists use pH meters to test water pH, but we'll be using simple test strips. Our test strips will also test to see if there is chlorine in our water and if so how much. Chlorine is added to drinking water to kill harmful bacteria



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and viruses.

Second Test: Water Hardness

Water hardness measures the amount of dissolved minerals—calcium and magnesium—in water. The “harder” the water the more minerals are in the water. You might have noticed this if you wash your hands in hard water and still feel like there’s soap or a film on your hands. Water that is too hard can damage equipment, but water that is too soft will leave us deficient (getting not enough) minerals (which our body needs to stay healthy!). Minerals get into our water through the rocks that water runs over! Here in Colorado we tend to have pretty “hard” water.

We’ll be using test strips to test our water.

1. Dip your test strip into the water for a few seconds.
2. Shake it off.
3. Use the enclosed chart to see how “hard” your water is. The higher the number the more minerals in your water and the “harder” it is!

Third Test: Nitrites & Nitrates

Nitrates & Nitrites are forms of nitrogen that leak into our water and are bad for human health. Nitrogen is a chemical element that you cannot see, taste, or smell so testing is the only way to see if it is in our water. Nitrates can get into water through fertilizer in farm fields, septic system failures, or compost piles too close to water sources.

We’ll be using test strips to test our water for nitrites & nitrates:

1. Dip your test strip into the water for a few seconds.
2. Shake it off.
3. Use the enclosed chart to see what level of nitrates/nitrites are in your water.

Think:

What was the same or different between your water samples?

Did anything surprise you?

Which water samples do you think are safe to drink? Why?

What further testing would you do?

