

WATER QUALITY

Water that you use for drinking, cooking, and household purposes needs to be clean and free from **contamination**. Contaminants in drinking water may include:

- microbial contaminants, such as viruses and bacteria, which may come from wildlife or septic systems
- inorganic contaminants, such as salts and metals, which can occur naturally or result from urban storm water runoff, industrial or domestic waste water discharges or farming
- pesticides and herbicides, which may come from a variety of sources such as farming, urban storm water runoff, and home or business use
- organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes, and can also come from gas stations, urban storm water runoff, and septic systems
- radioactive contaminants, which can occur naturally

From the 1999 Water Quality Report, City of Portland, Oregon, Bureau of Water Works.

Water for your home may go directly to you or it may go through a filter and it may be treated chemically. Water in Corbett goes through a sand filter and is then chlorinated. Water from the Bull Run Watershed is chlorinated and then ammonia is added to extend the life of the chlorine for disinfecting purposes. Then sodium hydroxide (NaOH) is added to increase the pH to prevent corrosion in water pipes.

The United States Environmental Protection Agency (EPA) has regulations which limit the amount of certain contaminants in water provided by public water systems. Public water systems are tested throughout the year and throughout the system. Reports are also sent to the Oregon Health Division that is the state agency that oversees drinking water systems.

The measurement of acidity or alkalinity of a substance is known as **pH**. This is another test of water quality. If the pH of your water is not the correct balance, it may cause corrosion to form within your pipes. If the pH is too acidic or alkaline, you can add chemicals to adjust the pH up or down.

Did you know that your body can affect the pH of water? You may have seen signs at swimming pools asking you to take a shower before getting into the pool. You are asked to take a shower because contaminants off your body can lower the pH of the pool water.

Below is a link to a pH chart with common sources and where they fall on the chart. Take a look at the chart and discuss how pH may affect you and those around you.

<https://science7acidbase.wikispaces.com/file/view/ph-chart.jpg/30396242/ph-chart.jpg>

Below is a link to a resource discussing how pH affects fish and their development.

<http://freshaquarium.about.com/cs/waterchemsitry/a/waterph.htm>

Just as water quality is important for public water systems, water quality is also important in the environment. The health of a stream, river, pond, or lake can be evaluated by looking at the plant life, animal life and other things found in the area. For example, there are certain animals that are called **indicator species** that will tell you if your stream is healthy. If you can find caddisfly larva, stonefly larva, and mayfly larva in good supply it would suggest you have good water quality. These insect larvae are sensitive to pollution.

Caddisfly larvae image

<http://tolweb.org/tree/ToLimages/CaddisLarva.jpg>

Stonefly larvae image

<http://clean-water.uwex.edu/pubs/clipart/images/CRITTER/large/StoneflyLarvae.jpg>

Mayfly nymph

<http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/mayfly/assets/ms1996-3.jpg>

Midge larva, aquatic worms and leeches are animals that are generally tolerant of pollution. Finding a population of these animals would suggest poor water quality.

Midge larva

http://www.bugsurvey.nsw.gov.au/html/popups/images/lge_mi-la_col.jpg

Aquatic worms

http://fairfieldsfifth.wikispaces.com/file/view/water_worms.jpg/34240725/water_worms.jpg

Leech

<http://makdleech.files.wordpress.com/2008/09/leech1.jpg>

When you attend Outdoor School, you will be looking at the water quality of the pond, river, or stream at the site. You will get a chance to look for some of the water animals pictured above. You will also do some chemical tests on the water.

Mixed in with the water molecules (H_2O) are molecules of oxygen (O_2). This oxygen is called **dissolved oxygen** (dO_2) and it is the oxygen that water animals need. The oxygen atom in the water molecule is bonded too tightly to the hydrogen atoms and cannot be used by water animals.

Two ways that dissolved oxygen gets mixed into the water are water movement and photosynthesis from plants in and near the water. Waves on a lake or ocean and rapids on a river or stream are good examples of water movement. Green plants, including **aquatic** plants, produce oxygen when they are making food through the process of photosynthesis. Aquatic plants release the oxygen into the water where it is available to aquatic animals.

RESOURCES:

Information resource on dissolved oxygen

http://nationalzoo.si.edu/Education/CommunityOutreach/ColumbiaHeights/Water_Quality/Tests/dissolved_oxygen.cfm

Information resource on pH

<http://www.ionizers.org/howitworks.html>

Information resource on water quality

<http://ga.water.usgs.gov/edu/waterquality.html>