

Chemistry Connections Water Quality Lab

This lab will address issues of water quality. There are many types of measurements that may be used to evaluate water quality. Some of the measurements are chemical analyses of the water and other measurements are qualities that are associated with fresh and potable water. The city of Georgetown distributes to all of their water customers a water quality report each year.

We will not be determining the chemical composition of water in this laboratory exercise. Instead, we will be determining other measures of water quality that relate to the suitability of water for human or animal use.

There are many measures of water quality. In this lab, you will check the pH, dissolved oxygen content, conductivity and turbidity of a water sample. Several water samples will be available for the tests.

The pH measurement of water is a measure of the acidity of the water. Water that has a pH less than seven is considered acidic and water with a pH greater than seven is considered basic. Rainfall with a pH of less than about 5.6 is considered “acid rain”. Your instructor will demonstrate how to measure the pH of your water sample with the pH probe. What is the pH of your water sample?

The dissolved oxygen content is a measure of the dissolved oxygen in water. The amount of dissolved oxygen in air-saturated distilled water at 25° C and 760 mm of Hg is 8.36 mg/L. Water samples have different amounts of dissolved oxygen depending upon the temperature, pressure and source of the water. Biological systems place different demands upon dissolved oxygen in streams, ponds, lakes and oceans. For example, trout need higher dissolved oxygen content than carp. Your instructor will demonstrate how to measure the dissolved oxygen content of your water sample. What is the dissolved oxygen content?

The conductivity of a water sample is a measure of the amount of dissolved ions in water and is not specific to a particular ion or ions. A higher concentration of ions will result in higher conductivity and a lower concentration of ions will result in lower conductivity. What you will be measuring is the conductance of a solution. Since we are interested in the conductivity of a water sample, the conductivity is the product of the measured conductance and the cell constant. The cell constant for our instrument is 1.0 cm/1.0 cm² and therefore, the conductance is a measure of the conductivity. Your instructor will demonstrate how to measure the conductivity of your water sample. What is the conductivity of your sample?

The turbidity of a water sample is a measure of the water clarity and is an indicator of water quality. Water that is cloudy has high turbidity and water that is clear has low turbidity. The United States Geological Survey, USGS, suggests that surface water

usually has a turbidity of between 0 and 50 nephelometric turbidity units, NTU. Turbidity may be a result of increased or uncontrolled run-off into a water source. Your instructor will demonstrate how to measure the turbidity of your water sample. What is the turbidity of your sample in NTUs?

Questions:

1. What kind of geological formation gives rise to ponds that have a low pH? What could be done if a pond has water with a low pH?
2. If you were a trout, what kind of water supply would you be most apt to live, a still pond or a flowing stream. Why? What factors might be involved?
3. Would you expect “hard” water or “soft” water to have a higher conductivity? Why? How would distilled water compare to the “hard” or “soft” water?
4. Suggest two ways by which you could decrease the NTUs of a sample of water. Which way would be more economical?