**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Teacher:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Virtual Lab: When Is Water Safe To Drink?**

Suppose you were hiking along a stream or lake and became very thirsty. Do you think it would be safe to drink the water? In many cases, it wouldn't. Each source of fresh water on or beneath Earth's surface is affected by contaminants. Though the sources of these contaminants are varied, all can make water unfit to drink if they are allowed to increase beyond safe limits.

**Objectives:**

* Define types of water contaminants.
* Determine common contaminants in lake water, city water, well water, rural water and mountain water.
* Identify treatments that remove contaminants from drinking water.

**Go to the website:**

**http://www.glencoe.com/sites/common\_assets/science/virtual\_labs/CT04/CT04.html**

In this Virtual Lab, you will test a variety of water samples. Then you will determine how to treat the water samples to make them safe to drink

**READ** the notes about the most common types of water contaminants on the back page of the handout. (Page 4) Describe what they are and how they might affect water quality.

|  |  |
| --- | --- |
| **Contaminate** | **Description / Effect on Water Quality** |
| **Acidity** |  |
| **Bacteria** |  |
| **Metals** |  |
| **Pesticides** |  |
| **Nitrates** |  |

Follow the instructions on the screen to the left to test all of the water samples from the different locations, and then enter the contaminant and treatment information in the data table on the next page.

**Data Table:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Sample | Acidity (pH) | Metals (mg/L) | Coliform Bacteria (ml) | Pesticides/Herbicides (mg/L) | Nitrates(mg/L) | Type of Contamination | Treatment Performed |
| Safe Range |   |   |  |   |   |   |   |
| City |   |   |   |   |   |   |  |
| Lake |   |   |   |   |   |   |   |
| Mountain |   |   |   |   |   |   |   |
| Rural |  |   |   |   |   |   |   |
| Well |   |   |   |   |   |   |   |

**Analysis:**

When you have tested and treated all the water samples, use your completed table to complete the analysis questions.

1. What contaminants were found in the surface water samples and in the groundwater samples?
2. Why might groundwater and surface water have different contaminants?
3. Generally, farmers do not farm on the sides of mountains or in remote areas. Industries also do not build factories in these areas. These areas are usually not highly populated by people. What might explain the high nitrate level in the mountain water in this activity?
4. What is pH level, and how does it contribute to pollution? What chemicals are used in treating low pH levels?

 **Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Teacher:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 **Group Members:**

**Critical Thinking: When Is Water Safe To Drink?**

**Please read this carefully!**

Water in an old building tested recently, showed high copper and iron content, and low pH levels. A water reading taken 20 years before, showed low pH levels and only minimal traces of copper and iron.

* If none of the new buildings on the same street showed signs of metallic contaminants, but all reported lower than normal pH readings, how might these readings be explained?

* Propose a method of water treatment to maintain metal contaminate levels within a safe range.

**Common Water Contaminates**

The most common water contaminants are:

**Acidity:**

The pH scale is a measure of acidity in water and other substances.

Water with a pH reading of zero to six, or acidic water, is unsafe to drink and can corrode metal pipes. The most significant environmental impact of a high or low pH level is that it can magnify the effect of other contaminants.

**Bacteria:**

Coliform bacteria and other microorganisms are found in the faecal matter of warm blooded animals and humans. This bacteria is most commonly found in lakes, rivers, and ponds, but can seep into groundwater supplies.

When coliform bacteria are present in your drinking water, your risk of contracting a water-borne illness is increased.

**Metals:**

Copper and iron are two of the more common metal contaminants found in water supplies.

An overabundance of copper and iron can cause water to be discoloured and foul-tasting. Liver damage can also be traced to unsafe levels of metallic contaminants in water.

Most copper and iron contaminants enter the water supply through rusty and corroded pipes. However, metallic contaminants can also enter groundwater through erosion as the water travels through layers of rock and minerals.

**Pesticides:**

Pesticides and herbicides are manufactured chemicals that are used to kill weeds, moulds, and insects. Carbofuran and alachlor are examples of common herbicides used in agriculture.

Surface runoff can introduce pesticides and herbicides into the water supply. In concentrated amounts, these substances can cause a number of health problems, including anaemia, and liver and kidney disorders.

**Nitrates:**

Nitrates are a form of nitrogen found in animal wastes, chemical fertilizers, and food preservatives.

Found in both surface water and groundwater, nitrates enter the water supply through surface runoff from farms and from leaking household septic tanks. Nitrates pose little threat to humans, but an overabundance of nitrates can kill fish and other aquatic creatures.