

Residual Free Chlorine Analysis (Community)

Purpose: To determine if your water meets Canadian Drinking Water Guidelines for Residual Free Chlorine by doing a test strip method. No Guideline Limit sample will be included as we cannot guarantee accuracy with transportation.

Materials:

- 5 - Test strip packets with color chart printed on
- 5 - Drink glasses
- 3 - 250 mL bottles to collect samples from three points in the community

Method:

1. Collect samples in 3 bottles that are provided, we suggest you take samples from a tap with very little demand, such as a home with one elderly person. Also take a sample from the furthest point from the treatment centre. Fill up the bottles to the top. Before filling the bottles let the water run from the tap at least one minute.
2. Label the glasses with locations for each of three samples.
3. Put 50 mL of sample in respective glasses. We suggest you take a few samples from your community as chlorine residuals can be different further away from the treatment plant.
4. Dip one test strip in glass for **20 seconds** * with constant back and forth motion, so that water passes through the small aperture in the test strip.
5. Remove and shake the test strip once, briskly, to remove any excess water on the strip. Allow the test strip to dry for 20 seconds by lying across glass.
6. Match with the best colour to determine the Residual Chlorine concentration in mg/L or parts per million (ppm). Complete the colour matching within **one minute**.

Results: Compare results to the Canadian Drinking Water Guidelines. The Canadian Guideline sample should give a result very close to the guidelines; a **lighter** blue for the sample means that the water **Does Not** meet Canadian Drinking Water Guidelines, there is also 0.5 mg/L maximum level that also means the water **Does Not** meet Canadian Drinking Water Guidelines.

Visit the Safe Drinking Water Foundation Website www.safewater.org to learn more about issues affecting safe drinking water.

Temperature compensation Chart (Adjust mixing time appropriately)

Temp. (Degrees C)	19	20	21	22	23	24	25
Time (Seconds)	28	26	24	22	21	20	19

Safe Handling of Materials:

Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.

Residual Free Chlorine:

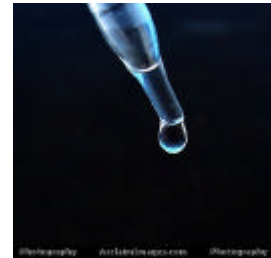
What is Residual Free Chlorine and why do we test for it?

Chlorine is a chemical that is used to disinfect water prior to it being discharged into the distribution system. It is used to ensure water quality is maintained from the water source to the point of consumption. When chlorine is fed into the water, it reacts with any iron, manganese, or hydrogen sulphide that may be present. If any chlorine remains (residual), it will then react with organic materials, including bacteria. In order to ensure that water is sufficiently treated through the whole distribution system, an excess of chlorine is usually added. This amount is usually adjusted to make sure there is enough chlorine available to completely react with all organics present. The chlorine will decrease in concentration with distance from the source, until it reaches the point where the chlorine level can become ineffective as a disinfectant. Bacteria growth will occur in distribution systems when very low levels of chlorine are encountered. Therefore, it is important to make sure there is enough chlorine to efficiently disinfect even at the far ends of the distribution system. Chlorination can kill many pathogenic (disease causing) micro organisms such as *E.coli*, but others, like *Cryptosporidium* and *Giardia*, are very resistant to chlorine and require other measures to properly remove them.

There are some important chlorination trends found in drinking water treatment:

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- As chlorination increases, the time required to disinfect decreases.
- Chlorination is more effective as the temperature increases.
- Chlorination is less effective as pH increases (becomes more alkaline).
- Chlorination is less effective in turbid water.



Residual chlorine may have a taste and/or odour that some people may find disagreeable. However, most would prefer that to drinking water that contains potentially harmful inorganic and organic materials.

What are the current Canadian recommendations for residual chlorine?

There are two ways in which residual chlorine is measured. Free Chlorine is the chlorine that remains in the water that has not reacted with anything (organic or inorganic). Total Chlorine is the chlorine that remains in the water that is both free and reacted.



The Federal-Provincial-Territorial Committee on Drinking Water recommends a minimum Free Chlorine residual of 0.1mg/L or a minimum Total Chlorine level of 0.5mg/L.

What are the health risks associated with low residual chlorine?

Studies have shown that when residual chlorine levels drop below recommendations, several water quality problems can occur. With regard to public health, bacteria and selected viruses, called bacteriophage, are able to multiply in water that is not properly disinfected and, depending on the species, could potentially cause waterborne illnesses.

It is important to note that, although chlorination has been the most common method of disinfection for over 100 years, there have been recent studies that have shown that chlorine in water can react with otherwise innocent organic material in drinking water and form chemicals called Trihalomethanes (THMs), such

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as Chloroform. THMs have been shown to be potentially carcinogenic (Cancer causing) and are, therefore, carefully monitored in water systems that are routinely chlorinated. While recommendations only state minimum residual chlorine levels, it is important that a careful balance is maintained in drinking water. There needs to be enough chlorine to make sure everything is properly disinfected. However, an extreme excess of chlorine is not necessary and may lead to high levels of THMs and the adverse health risks described previously.

What do I do if my water does not meet residual chlorine recommendations?

In municipal water systems, the drinking water is chlorinated prior to being distributed and chlorine residuals should be measured at the far end of the distribution line. This ensures that the house located furthest from the plant still receives water that is adequately disinfected. If your water does not have appropriate chlorine residual levels, contact your local treatment facility and have them conduct further tests to make sure enough disinfectant is added to the water at the plant. For homes that get their water from wells, either commercial disinfectants or diluted household bleach may be used to adequately treat drinking water. Usually, gaseous chlorine is added to the water at large treatment facilities. However, this form of chlorine is too dangerous to be used for home use and other disinfectants such as those mentioned above are recommended. Contact a local water treatment authority to determine the recommended levels for your well system.

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