DEPARTMENT OF HEALTH

Chlorine Residual Measurement

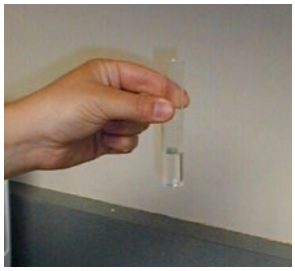
FOR FACILITIES PROVIDING CONTINUOUS CHLORINATION

Step-By Step Instructions for Chlorine Residual Measurement (DPD Method) Using a Color Comparator or Digital Colorimeter

These are general instructions. Procedures may vary for different types of test kits. Be sure to follow the specific manufacturer's instructions for the kit you are using. Test kits may be purchased from a variety of sources, including directly from chemical/instrument supply companies (such as Hach, LaMotte, Taylor, and others), environmental or laboratory supply catalogs, and local pool product suppliers.

1. At the sampling site, allow the water to run for a few minutes, then proceed with measurement.

2. Fill the sample vial to the mark indicated in the instructions (usually 5 ml or 10 ml mark). If using a digital colorimeter, remember to take a baseline (zero) measurement prior to adding the reagent.

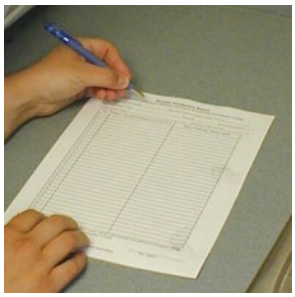


3. Add the tablet, powder, or drops needed for the desired chlorine measurement (free or total) to the sample vial. Be sure not to touch the reagent. Cap the vial and gently invert or swirl to mix in reagent. Avoid excessive shaking of the vial which could create air bubbles and influence the measurement.

4. Allow color to develop according to your kit's specific instructions. Then place sample vial into comparator or digital colorimeter.

5. Compare sample color to the standards on the comparator to determine residual level and record the value. If using a digital colorimeter, press the "read" button.

6. Fill out the appropriate columns on your Monthly Disinfection Report form, if applicable. If the chlorine measurement is being taken at the same time and location as a total coliform bacteria sample, record the chlorine residual on the chain of custody lab form sent with the bottle.



7. Dispose of the sample in the sink and thoroughly rinse out the vial before storing the kit to avoid staining.

What methods can I use for chlorine residual measurement?

Chlorine residual measurements must be made using a DPD colorimetric method. Test strips are not allowed for compliance measurements. Both digital and visual color-comparator style instruments are allowable if the range and precision of the instrument allows for:

- Minimum measurement range of 0.1 mg/L or lower.
- Maximum measurement range of 3.0 mg/L or higher.
- Increments of 0.1 mg/L or less in the range of 0.1 mg/L - 0.5 mg/L.
- Increments of 0.5 mg/L or less in the range of 1.0 mg/L to 3.0 mg/L.

Note: The values listed above are based on currently available test kits.

How can I ensure my measurements are accurate and reliable?

- Old water will rapidly lose chlorine residual. Sample at the time of peak water usage and flush the tap for at least 1 minute prior to sampling.
- Fill the sample vial to the correct level for the corresponding DPD reagent packets (usually 5 milliliter (mL) or 10 mL).
- Ensure that DPD reagent packets are not expired.
- Rinse the sample vial after usage to prevent staining. Store dry.
- When using a visual color-comparator, read the sample in good lighting. Ensure that the sample vials are not stained and that the color-comparator is not faded.
- When using a digital instrument, refer to the manual to ensure you are using the correct mode (e.g., low range or high range) and vial size for the intended measurement.
- If the reading exceeds the maximum range of the instrument, dilute the sample with distilled water and make another measurement. Multiply the result by the appropriate dilution factor.

What if my chlorine residual is lower than the target or required value?

To troubleshoot low chlorine residuals, refer to the following table. If low residuals persist, contact MDH.

Minnesota Department of Health
Drinking Water Protection
651-201-4700
www.health.state.mn.us

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To obtain this information in a different format, call: 651-201-4700.

Troubleshooting Low Chlorine Residual

Cause	Indications	Solution
Low water usage	The water meter reading hasn't changed. The water storage tank level hasn't changed. The feed pump hasn't been heard running. There are very few people on-site using water.	Flush system until required residual is achieved
Broken roller tube (peristaltic pumps only)	The pump runs but the chlorine level in the feed tank doesn't go down. Leaks or puddles under the pump motor.	Replace roller tube.
Broken diaphragm or check valve seats (diaphragm pumps only)	The pump runs but the chlorine level in the feed tank doesn't go down. The pump won't prime.	Replace component.
Broken discharge line	The pump runs and chlorine level in the feed tank goes down. Leaks or puddles under the discharge line.	Replace discharge line.
Broken suction line	The pump runs but the chlorine level in the feed tank doesn't go down. Air bubbles are visible in the suction and/or discharge lines. No leaks or puddles. Other pump components are in good condition.	Replace suction line.
Old bleach	The pump runs and chlorine level in the feed tank goes down. The pump speed needs to be increased or the chemical tank needs filling more frequently. The bleach is older than 3 months.	Refill chemical tank with new bleach.
Clogged injection point	The pump runs and the chlorine level in the feed tank may or may not go down. Leaks or puddles under injection point.	Clean or replace injection quill.
Chemical tank is low/empty	The pump runs. The level of chemical in the feed tank is at or near the bottom.	Refill chemical tank.
Residual is >20 mg/L	When measuring residual, the DPD reagent flashes a dark color that quickly disappears. The pump runs and chlorine level in the feed tank goes down. You have increased the pump speed or refilled the feed tank recently. The water smell/tastes like chlorine.	Flush entire system and reset pump speed to regular level.
Electrical issue	The pump does not run.	Check power to pump and pressure switch. Consult electrician.