

Operator Quiz Corner
Measuring Chlorine Residuals
(Dan Laprade, Training Coordinator)

Measuring chlorine residuals is not only a requirement for regulatory reporting purposes, but also an important parameter used to monitor overall distribution system water quality.

There are many different approved methods for measuring chlorine residual. The *amperometric titration method* is considered a more accurate method, but is best done in a laboratory with accurate titration equipment. The most common method is what is known as the *DPD method* where a N,N-diethyl-p-phenylenediamine reagent is added to the sample bottle. The DPD reagent will cause the water to turn various shades of pink depending upon how much chlorine is in the water. Years ago the shade of pink was compared to a color chart to estimate the chlorine residual concentration. Current electronic hand-held test kits are much more accurate and work by shining a light through the water sample. The intensity of light passing through the sample is then converted to a digital display of the chlorine residual concentration. In either test method the residual being measured is either the *Free Chlorine Residual* or the *Total Chlorine Residual*. Operators must be sure to use the appropriate reagent (*Free* or *Total*) for the chlorine residual measurement that is desired. An important relationship that operators should be familiar with when understanding chlorine residuals is: Total Chlorine Residual = Combined Chlorine Residual + Free Chlorine Residual.

Watch this video for a refresher on how to use a chlorine test kit to measure residuals in the field:
<https://www.youtube.com/watch?v=hC-lrykgJNc>

Answers to the following chlorine residual problems can be found by going to the MWWA website and clicking on the "Education" tab and clicking the link under the heading "Answer to Chlorine Residual Practice Problems".

- 1) The electronic hand-held chlorine residual test kits measure the amount of light passing through the sample bottle. Instruments that use the principal of shining a specific wavelength of light through a sample are called?
 - a) Titrators
 - b) Spectrophotometers
 - c) Analyzers
 - d) Reactors

- 2) Which of the following are reasons for monitoring chlorine residuals in the distribution system?
 - a) Compliance with the Surface Water Treatment Rule
 - b) Preventing Total Coliform problems
 - c) Monitoring proper disinfection at the treatment facility
 - d) Detecting a possible distribution system leak or cross connection
 - e) Identifying distribution system locations with low flows or stagnant water
 - f) All of the above

- 3) What is the *Combined Chlorine Residual* if the measured *Free Chlorine Residual* is 1.0 mg/L and the *Total Chlorine Residual* is 3.0 mg/L?
 - a) 1.0 mg/L
 - b) 2.0 mg/L
 - c) 3.0 mg/L

d) 4.0 mg/L

4) The Surface Water Treatment Rule requires that _____ chlorine be measure in the distribution system at the same time and location as _____ samples?

a) free or total, Total Coliform

b) free, point of entry

c) total, disinfection byproducts

d) total, lead and copper

5) The Surface Water Treatment Rule requires that adequate inactivation of pathogens be demonstrated through the daily reporting of a "CT value". When using chlorine, the calculation is done by measuring the _____ chlorine residual.

a) combined

b) total

c) free

d) any of the above