

# Common Mistakes Made Using the Hach Pocket Colorimeter Chlorine Residual Test Kit



The above photo shows the Hach Pocket Colorimeter II with glass vial on the left and plastic vial on the right.

**W**hether performed in the lab or in the field, the accuracy of analytical test results is critical to properly operating a public water system. That applies when operators are monitoring chlorine residuals both at the point-of-entry and out in the distribution system. At least from a bacteriological standpoint, monitoring chlorine residuals may be the most important aspect of ensuring safe water for your customers. The obvious advantage of residual monitoring versus analyzing bacteriological water samples is that with residual monitoring the operator obtains instant results. And with those results, the operator can determine if the system's water is meeting the State-required minimum residuals and take corrective actions if needed. This article will attempt to review some of the more common mistakes made when using the Hach Pocket Colorimeter for residual monitoring. During the past couple of years, I have found a higher than expected number of operators not using their Hach test kits correctly. This includes both new and experienced operators.

## Read the manual

Probably the most important aspect of using a Hach Pocket Colorimeter is to thoroughly read the instruction manual, or at least that part of the manual that applies to how the test kit is to be used and the type residual being measured. While the differences between the types of tests are subtle, there can be a significant difference in the accuracy of the test results. This is especially true when operating the colorimeter in "Low Range" versus "High Range." To be consistent with the instruction

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manual, always confirm which vials should be used (glass vs. plastic), which direction the vials should face in the cell holder, the volume of sample required and amount of DPD reagent to add. This is critical because these criteria are different depending on which "range" you need to use to measure residuals.

The "Low Range" (LR on the colorimeter display) should be used when residuals are in the 0.02 to 2.2 mg/L range. When residuals are higher than 2.2 mg/L (free or total), the reading will flash indicating that "High Range" (HR) should be used instead. In "Low Range", only use the glass vials (not plastic) with the white diamond facing the keypad. Make sure to install the vial in this correct and consistent position so that results are more repeatable and precise. The sample cell should be filled to the 10-ml mark and one (1) powder pillow added (free or total). Always wipe excess water and fingerprints off the outside of the vial before placing in the cell holder and covering with the

instrument cap. If measuring free chlorine, take the reading within 1 minute of adding the DPD reagent. If measuring total chlorine, wait three to six minutes before taking the reading.

“High Range” can be used to measure residuals in the 0.1 to 8.0 mg/L range. In “High Range”, only use the plastic vials (not glass) with the triangle facing away from the keypad. Note this different orientation of the vials when using low vs. high range. Again, this provides more consistent and precise results. The sample cell should be filled to the 5-ml mark, not the 10-ml mark. Please note that the 5-ml mark is rather difficult to see on the plastic vials, but it is there. Just look closely to the top right of the indentation near the bottom of the plastic vial when the triangle is facing you. Add two (2) powder pillows (free or total). Always wipe excess water and fingerprints off the outside of the vial before placing in the cell holder and covering with the instrument cap. If measuring free chlorine, take the reading within one minute of adding DPD reagent. If measuring total chlorine, wait three to six minutes before taking the reading.

### The most common mistake?

Probably the most common mistake I have observed is the use of the glass vials in the “High Range” mode. Usually this results in false, high readings, often in the 4.0 to 6.0 mg/L range. The next two most common mistakes are overfilling the plastic vial to the 10-ml mark and only adding one powder pillow when in High Range. Again, I cannot stress enough to carefully read the instruction manual to make sure you are using your residual test kit correctly and obtaining accurate results.

Finally, I would like to review KDHE’s requirements for public water supply systems and disinfection requirements. First, Kansas Administrative Regulation (K.A.R.) 28-15-19 requires that all water supplied by a public water supply must be disinfected. This regulation also



This photo shows the foil powder pillow packets for both free (left) and total (right) chlorine. The packet expiration dates can be found in the last line. The free packet on the left expired in November 2011 (EXP 11/11). The total packet on the right expired in October 2008 (EXP 10/08). Operators should check their supply of powder pillows and replace them if expired.

requires that the operator must make daily determination of the chlorine residual in the system and record such data in a written log that can be reviewed by KDHE staff if ever requested. Finally, this regulation specifies what level of chlorination must be maintained. If free chlorine is used for disinfection purposes, a

minimum 0.2 mg/L residual must be maintained at the far ends of the distribution system. If combined chlorine is used, a minimum 1.0 mg/L residual must be maintained. Failure to maintain such residuals in more than 5 percent of measurements taken each month, for two consecutive months, is a violation of K.A.R. 28-15-19.

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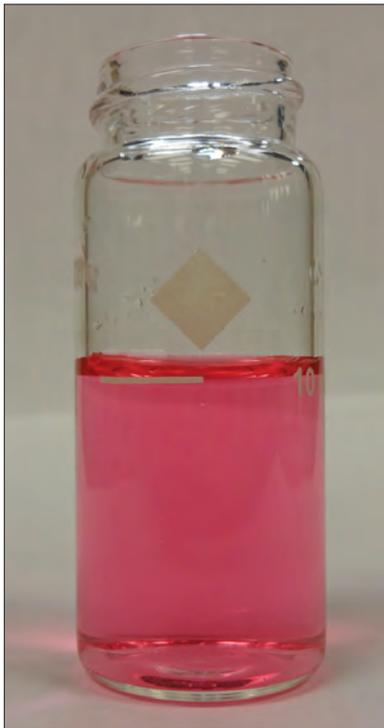
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Note the reading of 2.2 mg/L is taken in High Range (note arrowhead below HR). Consequently, the readout would not be flashing. However if this reading were taken in Low Range, it would be flashing, indicating the reading is 2.2 mg/L or higher and that it should be analyzed in High range.



The glass vial is only used in Low Range. The vial is filled to the 10-ml mark. Also notice the white diamond on the vial. It should be facing the keypad before covering with the instrument cap and taking readings.



The plastic vial is only used in High Range. The vial is filled to the 5-ml mark. Also note the raised triangle near the top of the vial. This triangle should be facing away from the keypad before covering with the instrument cap and taking readings.

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If you have any questions regarding use of any test kit or KDHE's disinfection requirements, please contact me for assistance. I can be reached at either (913) 850-8822 or [jeff@krwa.net](mailto:jeff@krwa.net). Or, don't hesitate to contact other KRWA staff or the office also. KRWA has numerous staff who are experienced with operating and maintaining water systems. Also, please note the two training sessions on July 22 and 23 at Salina. These feature Hach equipment.

*Jeff Lamfers began work for KRWA in November 2008. Jeff has more than thirty years of regulatory experience in the oversight and operation of water and wastewater systems with the Kansas Department of Health and Environment.*



*He is a graduate of the University of Kansas with a degree in Environmental Studies with an emphasis in aquatic biology.*



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