

## How to Run a CHEMetrics COD Test

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### What is a Chemical Oxygen Demand Test?

Chemical Oxygen Demand, or COD test, measures how much dissolved oxygen (DO) is consumed by the oxidation of organic matter and inorganic compounds such as ammonia or nitrite under controlled conditions. COD is widely recognized as an indicator of wastewater influent and effluent quality. The test is typically performed using the UESPA accepted dichromate reactor digestion method. This method has a water sample react with a mixture of sulfuric acid and potassium dichromate in a sealed container and then digested for 2 hours at 150°C. The sample is then read in a spectrophotometer to determine the results. You can often find COD tests supplied in screw top vials that contain a premeasured sulfuric acid and potassium dichromate mixture. You can find all of CHEMetrics' COD product offerings on our [COD analyte page](#).

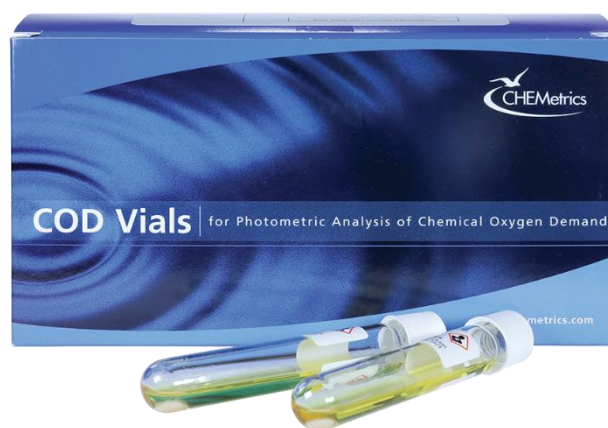


Figure 1: CHEMetrics COD Vials come in packs of 25 or 150 (98 for HR+)

### How to Perform a COD Test

A COD test can take over two hours to perform due to the digestion required, so ensuring that you've followed the test method correctly can save you a lot of wasted time. The video below shows you step by step instructions on how to perform a COD test with any of the CHEMetrics COD test kits. If you prefer step by step instructions continue reading below.

<https://www.youtube.com/watch?v=2h7mKlAkjxE>

### Steps to Perform a COD Test

An easy-to-use printout of our instructions comes with every pack of vials and is available on our website under each COD vials product page.

1. Homogenize 500 ml of sample for two minutes in a blender to ensure an even distribution of solids throughout the sample. This will ensure regular results and prevent wild variations between vials.
2. Preheat the digester block to 150°C (302°F).
3. Remove the cap from each COD vial. Store the vials in a [vial rack](#) to prevent any spillage.

4. Pipet two milliliters of sample into each vial. Be aware that adding the sample will cause an exothermic reaction and the vial will become hot. Just another reason to ensure you are wearing the proper safety equipment!
  - a. If you are using a high range kit (CHEMetrics: K-7370S, K-7375, K-7371S, and K-7376) pipet 0.2 mL instead.
5. Secure the cap onto each COD vial. Be sure not to overtighten the cap as it could damage the closure.
6. Immediately invert each vial ten times while holding the vial by the cap only as the vial will be hot from the reaction caused when adding the sample.
7. Prepare the reagent blank by removing the COD vial cap and pipetting deionized water rather than sample into the vial. Make sure that the reagent blank vial is the same lot number as the test vials.
  - a. Note: At least one reagent blank must be run with each set of samples with each new lot number of COD vials.
8. Wipe the vials with a damp towel to remove smudges and fingerprints from the vial and place them in the preheated digester block.
9. Allow the vials to heat in the digester block at 150°C (302°F) for two hours.
10. Once the two hours are finished, turn the digester block off and allow the vials to remain in the unit for 15 to 20 minutes to cool. Remove the vials and return them to the vial rack. CAUTION: the vials will still be hot.
11. Ensure all caps are secured tightly, then invert each vial several times. Be aware that hot vials may shatter if dropped or cooled rapidly.
12. Store the vials in the dark for 30 minutes as they cool to room temperature.

### Obtaining the Results of Your COD Test

When obtaining results, the analyst may use Hach instrumentation, a CHEMetrics photometer, or any other manufacturers' spectrophotometer. Before moving on, wipe down the reagent blank and test vials until they are clean and dry.

#### Hach Spectrophotometer Instructions:

1. Apply program number 430 for low range COD vials (CHEMetrics: K-73050S, K-7355, K-7351S, and K-7356) or program 435 for high range vials (CHEMetrics: K-7360S, K-7365, K-7361S, and K-7366).
2. Zero the instrument with the reagent blank vial.
3. Remove the reagent blank and place your first vial in the sample compartment.

#### CHEMetrics V-2000 Photometer Instructions:

1. Install the 16 mm sample cell adapter into the photometer and power it on.
2. Insert the ZERO vial into the V-2000, cover it with the light shield, and press the zero key.
3. Enter program 48 to read low range COD vials or program 49 for high range or high range plus COD vials, then press the yes key.
4. Press setup and use the arrow keys until "BLANK" is displayed, then press yes
5. When "SET BLNK?" appears, press yes.
6. When "SAMPLE?" appears, insert the reagent blank COD vial, cover with the light shield, and press yes. The display will briefly show an absorbance value, then move to the next function.
7. Press the measure key to exit the setup menu



Figure 2: A V-2000 can read multiple CHEMetrics tests including COD.

8. Remove the reagent blank via, insert the test vial, cover with the light shield, and again press the measure key. The instrument will read the vial and display the test result which may be logged manually.
  - a. For high range plus COD Vials, multiply the result by 10.
  - b. For instructions on logging results manually or automatically to the memory, see the V2000 operator manual.

#### CHEMetrics A-7320 or A-7325 Single Analyte Meter:

1. Press the power key. The display will show "cod".
2. Insert the COD reagent blank into the sample compartment and press the Zero/Test key. The "cod" symbol will flash for approximately eight seconds.
3. Insert the COD test vial into the sample compartment making sure it's properly seated and again press the Zero/Test key.
4. The "cod" symbol will flash for three seconds, then the sample test result will appear in the display as part per million COD. Record the test result.



Figure 3: A Single Analyte Meter Reading a COD test.

#### Other Spectrophotometers:

For other brand spectrophotometers, refer to the specific instrument's operator manual for appropriate set-up instructions. Use a 420 nanometer wavelength for low range COD vials or a 620 nanometer wavelength for the high range and high range plus vials. Refer to CHEMetrics COD instructions for range-specific calibration equations to convert absorbance values to test results as part per million COD.

#### Conclusion

COD analysis can be time consuming so understanding the ins-and-outs of the test before you run one can prevent headaches further down the line. When performing these tests, it is recommended that analysts use COD standards of known concentration to verify instrument performance and accuracy of test results.

CHEMetrics offers the [A-7301 1000 ppm COD calibration standard](#) as well as the [A-7310 10,000 ppm COD calibration standard](#). For questions about how to run this or any other CHEMetrics test, please contact [technical support](#) or call us at 800.356.3072 and ask for technical support.