Program ID #41, #42, #43

Chemical Oxygen Demand - COD

The Orion AQUAfast COD Chemistries can be measured using the Orion AQ4000 Advanced Colorimeter or an Orion AQUAfast II AQ2040 Colorimeter. Samples must be fully digested prior to making measurements. For detailed setup and measurement procedures for the Orion AQ4000, consult your colorimeter manual.

NOTE: *The Orion AQ4000 must be zeroed using the 16 mm vial containing distilled water. This test may be performed in the zero mode.*

Safety Information

Read MSDS before performing this test procedure. Wear safety glass and gloves. Material Safety Data Sheets are available upon request or see website.

CAUTION: *Samples are hot and contain corrosive reagent. Always handle COD samples with caution. Cool samples to room temperature before taking measurements.*

Sample Preparation and Digestion

The Orion Thermoreactor COD125 is recommended for sample digestion. See instruction manual for detailed information.

1. Choose the test range appropriate for your sample.

Cat. No.	Range	COD	Prgm. ID
CODL00	Low	0 – 150 mg/L	41
CODH00	Mid	0 – 1,500 mg/L	42
CODHP0	High	0 – 15,00 mg/L	43

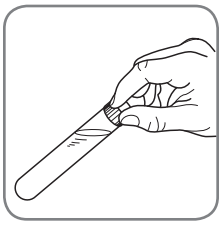

Figure 1

2. Using the syringe provided, add 2.0 mL of sample to the COD vial for the low and mid range tests; add 0.2 mL of sample to the COD vial for high range tests. For best results, use a pipette to transfer samples to COD vials.
3. When preparing samples for low range testing, prepare also a reagent blank by adding 2.0 mL of deionized water to a low range COD vial.
4. Replace caps on sample vials and make sure they are tightly screwed on. Holding only the cap of the vial, **see Fig 1**, invert vials several times to mix. Be sure to hold only the cap of the vial, as vial may become very hot when contents are mixed.
5. Turn Orion Thermoreactor on and insert prepared samples (including blank, when digesting low range samples) into the heating block.
6. Set the temperature to 150 °C and the time to 120 minutes. Allow samples to digest, then let cool for at least 45 minutes or until samples come to room temperature.

Test Method

Before testing, zero the instrument using a 16 mm vial and the 16 mm adapter. See AQ4000 manual for detailed instructions on the zero procedure.

1. Select the appropriate program ID for your test range by pressing the **prgm** key and entering the program ID number from the table above.
2. If measuring low range vials, set the reagent blank on the Orion AQ4000 before proceeding with sample measurements. See the Reagent Blank Setup Instructions below.
3. Wipe any liquid from the exterior of the vial and insert the vial into the Orion AQ4000 sample chamber.
4. Cover the vial with the sample cover and press the **meas** key.
5. The result will be displayed in mg/L or ppm COD for low and mid range tests. The result will be displayed in g/L for high range tests.

   Note: 1000 ppm = g/L.
6. Record the concentration readings from the Orion AQ4000 display or log measurement into the data logger by pressing the **log** key.
7. Dispose of reacted vials properly.

Reagent Blank Setup Instruction

When using low range test vials, set the meter blank using the digested reagent blank vial before processing with sample measurements. Ensure that the meter is in program 41 before processing.

1. Press **setup** key.
2. Press ▲ or ▼ keys until "BLANK" is displayed.
3. Press **yes** key, "SET BLNK?" is displayed.
4. Press **yes** key, "SAMPLE?" is displayed.
5. Insert vial containing digested deionized water sample and reagent into sample chamber. Cover sample with sample cover.
6. Press **yes** key and allow instrument to read the blank.
7. Blank value is displayed and unit will proceed to the next setup function.
8. Press **meas** key to proceed to the measure mode for sample measurement.

Calibration Standards

To check operation, use Orion COD calibration standards, Orion CODS01 (1,000 ppm) and CODS10 (10,000 ppm).

Helpful Notes

1. Always select COD chemistry range which best suits measurement range.
2. For low range (0 - 150 mg/L), a reagent blank vial is required. Use deionized water as the sample.
3. Suspended solids in the vials lead to incorrect measurements. For this reason, it is important to place the vials carefully in the colorimeter. The precipitate at the bottom of the sample should not be suspended. Do not mix vials after they have cooled.
4. DO NOT place hot vials in the colorimeter. Always cool the vials to room temperature for final measurement. A large temperature difference between the colorimeter and ambient conditions can lead to incorrect measurement, or build-up of condensation around the optics of the sample chamber.
5. Run samples and blanks using the same lot code of vials. The blank is stable when stored in the dark and can be used for further measurements with vials of the same lot code.
6. Solutions must be disposed of properly.

Chemical Methods

Method– The organic material present in the sample is oxidized by a standard amount of potassium dichromate oxidizing mixture. The excess of this reagent, after oxidation is complete, is measured photometrically. Ensure proper disposal of reagents.

Application– Samples can be measured where the chloride content does not exceed 1,000 mg/L (LR/MR) or 10,000 mg/L (HR). In exceptional cases, compounds contained in the water cannot be oxidized adequately, which results in minimum findings, compared with the reference method. Different methods of sampling, the preparation of the sample itself and the time elapsed between taking the sample and analysis, can all affect the results obtained.

Ordering Information

Orion	Description
COD125	Orion Thermoreactor for COD, 25 places, 110V/220V
CODL00	Orion COD Test Kit, 0 - 150 mg/L, 25 Tests
CODH00	Orion COD Test Kit, 0 - 1,500 mg/L, 25 Tests
CODHP0	Orion COD Test Kit, 0 - 15,000 mg/L, 25 Tests
CODS01	Orion COD Standard, 1,000 mg/L, 475 mL
CODS10	Orion COD Standard, 10,000 mg/L, 475 mL
AQ4CBL	Orion AQUAfast IV RS232 Cable
AC2V16	Orion Replacement Vials, 16 mm, pack of 10
AQ4000	Orion AQUAfast IV Advanced Colorimeter
AQ2040	Orion AQUAfast II COD Colorimeter

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