

CHEMICAL OXYGEN DEMAND (COD)



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COD – Take Home Messages

- COD is an indirect measure of organics.
- COD is measured by oxidizing organics with a strong oxidant (dichromate) and measuring the amount of oxidant consumed in the reaction.
- Correlation between COD and BOD is sample specific and may not always be possible.



What is COD?

- COD is a measure of the oxygen equivalent of the organic matter content of a sample that is susceptible to oxidation by a strong chemical oxidant.

Standard Methods for the Examination of Water and Wastewater



What is COD?

- In other words....
 - COD is an indirect measure of the amount of organics in a water sample.



What is COD?

- The COD test uses a strong chemical oxidant (potassium dichromate), acid, and heat to oxidize organic carbon to carbon dioxide and water.





What is COD?

- The COD test measures the amount of dichromate (oxidant) consumed in the breakdown of organic matter.
 - More oxidant consumed = High levels of organics
 - Less oxidant consumed = Low levels of organics



The Chemistry of COD

- COD is a two step process
 - Digestion
 - Determination





The Chemistry of COD

- Required reagents for COD:
 - Hach COD reagent vials





The Chemistry of COD

- Reagent vials contain:
 - Potassium dichromate
 - 50% sulfuric acid
 - Silver salt (catalyst)
 - Mercuric salt (inhibits chloride interference)



The Chemistry of COD

- Colorimetric measurement
 - **High Range** – measures increase in green color at 620nm
 - **Low Range** – measures decrease in yellow color at 420nm



COD vs. BOD

- Why compare COD to BOD?
 - Faster process control
 - Know what you are sending downstream within two hours rather than five days.
 - COD is a more stable measurement method



COD vs. BOD

- Why is COD more stable than BOD?
 - The tests use different methods of oxidation
 - BOD - Microorganisms
 - COD – Chemicals (potassium dichromate)



COD vs. BOD

- Microorganisms are susceptible to pH, temperature, and other variables in the water.
 - Oxidation efficiency depends on the condition of the microorganisms
- Potassium dichromate will oxidize regardless of water conditions.



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