PeCOD® Analyzer

- ✓COD
- ✓Estimated BOD



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Who Is MANTECH?

Manufacturer of laboratory, online and portable analyzers for water, wastewater, soil, food and beverage analysis.

*Mission to generate the **highest quality results** in the **shortest amount of time** with the goal of enabling our customers to have significant **positive economic and sustainable impacts** on their businesses and communities.*







Trusted & Proven Globally



>4,000 analyzers

>50 countries

>750,000 samples/day

Chemical/Biochemical Oxygen Demand

- The amount of oxygen required to fully oxidize organic matter
  - A valuable measurement for the determination of water quality in natural waterways and waste streams
- COD By Dichromate Method
  - Uses **hazardous chemicals** (e.g., dichromate, mercury and acid)
  - Analysis time is **3 hours** per batch
- BOD5
  - Involves ***5-day incubation period*** to allow for biological oxidation of organic matter
  - Time consuming and complex





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PeCOD® BOD/COD Analyzer



Safe & Green

- No hazardous chemicals (e.g., mercury, dichromate, etc.)
  - Only salt & sugar
- No PPE required
- Zero risk of cross-contamination



Rapid Results

- Results in **10 minutes or less** vs. 3 hours or 5 days
- Make informed & impactful decisions for process optimization

Reliable & Trusted

- Conforms to MECP method E3515 & ASTM International Method D8084
- Hundreds of analyzers in the market

Accurate

- Detection limit of 0.7mg/L and upper range 12,000mg/L
- Sample dilution allows measurement >200,000mg/L

Easy-to-Use

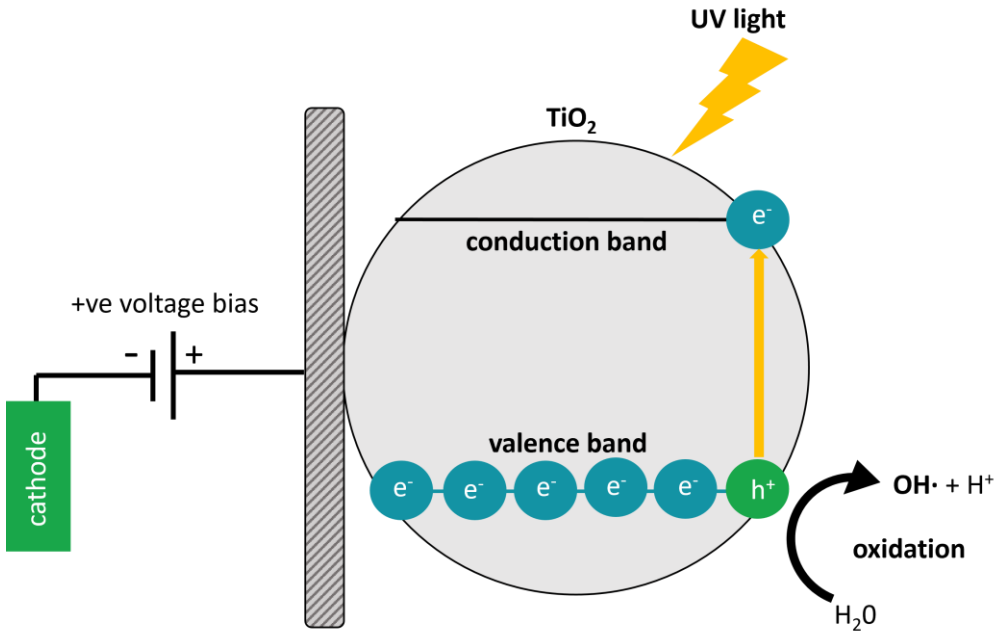
- Designed for staff unfamiliar with water quality analysis (e.g., operators and engineers)

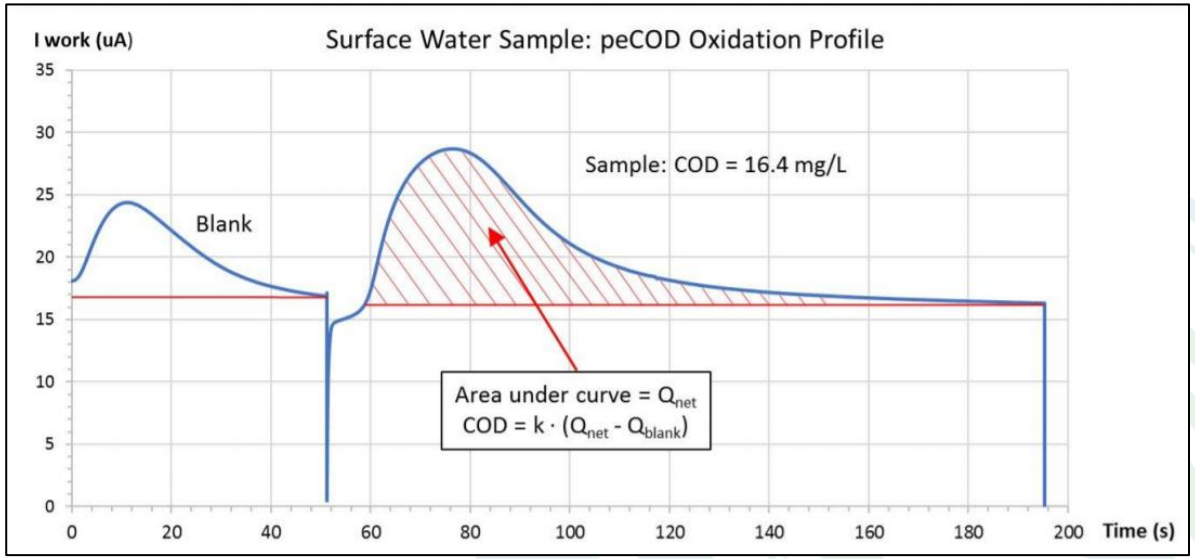
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PeCOD®| A Nanotechnology Based Approach

Advanced Oxidation with Titanium Dioxide:





Energy Generated from Oxidation = Oxygen Demand

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Patented Technology

Core technology is the PeCOD® sensor consists of:

- UV-activated nanoparticle TiO2 (titanium dioxide) photocatalyst
- Coupled to an external circuit



Powerful oxidization potential ensures:

- Rapid results – **ONLY 10-minutes!**
- Complete oxidization of virtually all species
- A true measure of COD/BOD



Manufactured at MANTECH-sponsored Lab at University of Waterloo's Institute of Nanotechnology

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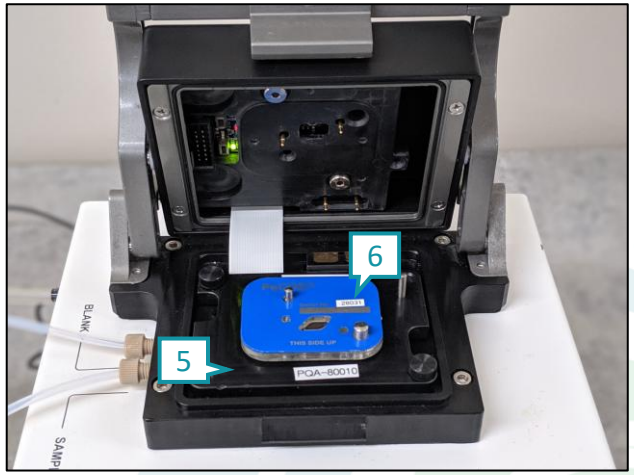
x

UNIVERSITY OF WATERLOO
CONCORDIA CUM VERITATE

PeCOD® Components

1. Port A – for sample and calibration solution
2. Port B – for blank control solution
3. Port W – for waste
4. Analyzer Lid
5. Electrode Block
6. Sensor





Consumable Items:

- Calibrant Solution - COD Standard
- Electrolyte
- Sensors

Believe it or not…

The most hazardous component being introduced is the sample itself! As PeCOD is treating the sample with an advanced oxidation process (AOP), the sample waste exits cleaner than when it was introduced. Meaning the sample waste can be disposed of down the drain.

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Sample Preparation

1. Pour sample in test tube
2. Homogenize sample for 1-2 minutes ***OR*** pre-filter
3. Pre-dilute sample with deionized water (DI), if necessary
4. Use bottle-top dispenser to add electrolyte (salt solution)
5. Stir ***OR*** homogenize to mix sample
6. Press “START”



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Would you rather add a 1- to 2-minute step to a **safe, simple, and rapid method** or use an **unsafe, hazardous** method and wait **3+ hours** for results?

One Technology, Multiple Configurations



Benchtop



Automated



Portable



Online

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Online Solutions

- Full autonomous control
- Sampling every hour or at user-selected frequency
- Automated calibration and QC checks
- Sends results and alerts for reagent and consumable replacements
- View past and current results in user-friendly software
- Communication through Modbus TCP to SCADA or PLC



Additional Parameters:

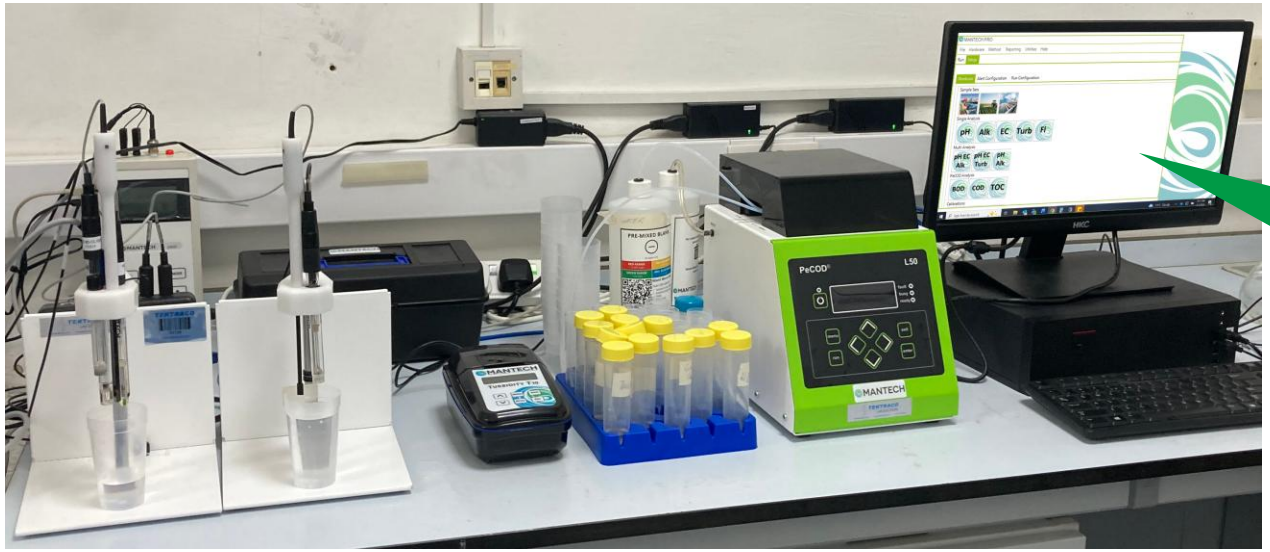
- ✓ pH
- ✓ Turbidity
- ✓ Ammonia
- ✓ Chlorine
- ✓ ...and more

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Benchtop Solutions

This is an example of a MANTECH MT3 & PeCOD installed at a laboratory in Europe!



- MANTECH's MT benchtop solutions can be run from the same computer as the PeCOD using MANTECH Pro software
- Capable of adding additional parameters such as pH, conductivity, turbidity, ORP, and more!



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PeCOD® Applications







Municipal

- Incoming COD monitoring
- Weather events
- Discharge compliance
- Potable water analysis
- Water reuse applications

Industrial

- In-plant COD monitoring
- Process optimization
- Upset prevention
- Discharge compliance
- Fine avoidance

Laboratory

- Rapid COD analysis
- Automated with multi-parameter
- Improved accuracy and detection
- Safety of employees
- Reduction of hazardous waste

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PeCOD® Customer: Industrial Wastewater

Case Study: PeCOD® Optimizes Treatment Operations



Without PeCOD®	With PeCOD®
Results in • 3-6 hours COD incoming • 30 days BOD discharge (monthly billing)	Results in 10-minutes
Uninformed operational decision-making	Operational feedback for optimization
Unknown BOD discharge	Continuous BOD monitoring of discharge

Reduced consumption of raw materials, energy, transportation & sewer discharge costs =

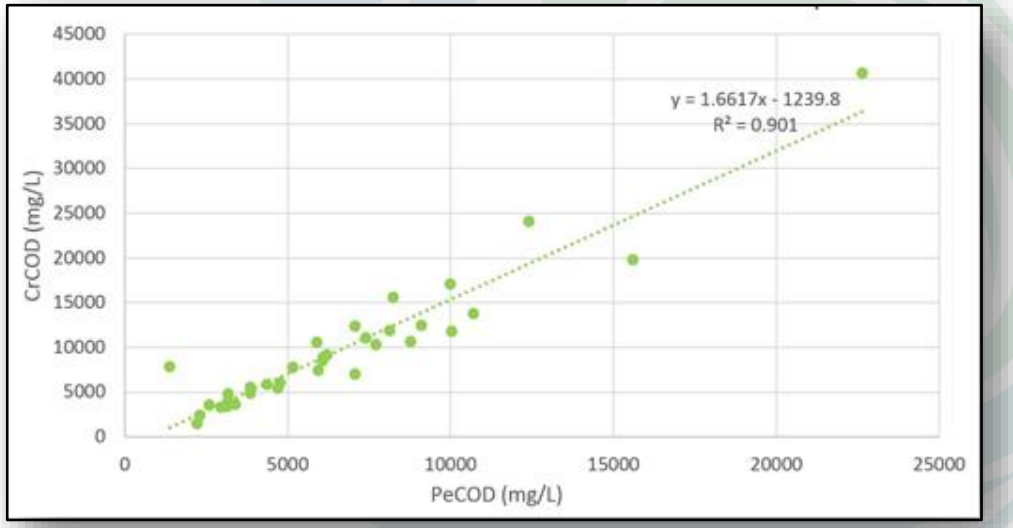
Saved >$500,000 since PeCOD®

THE *ANCHOR* OF THE PLANT!

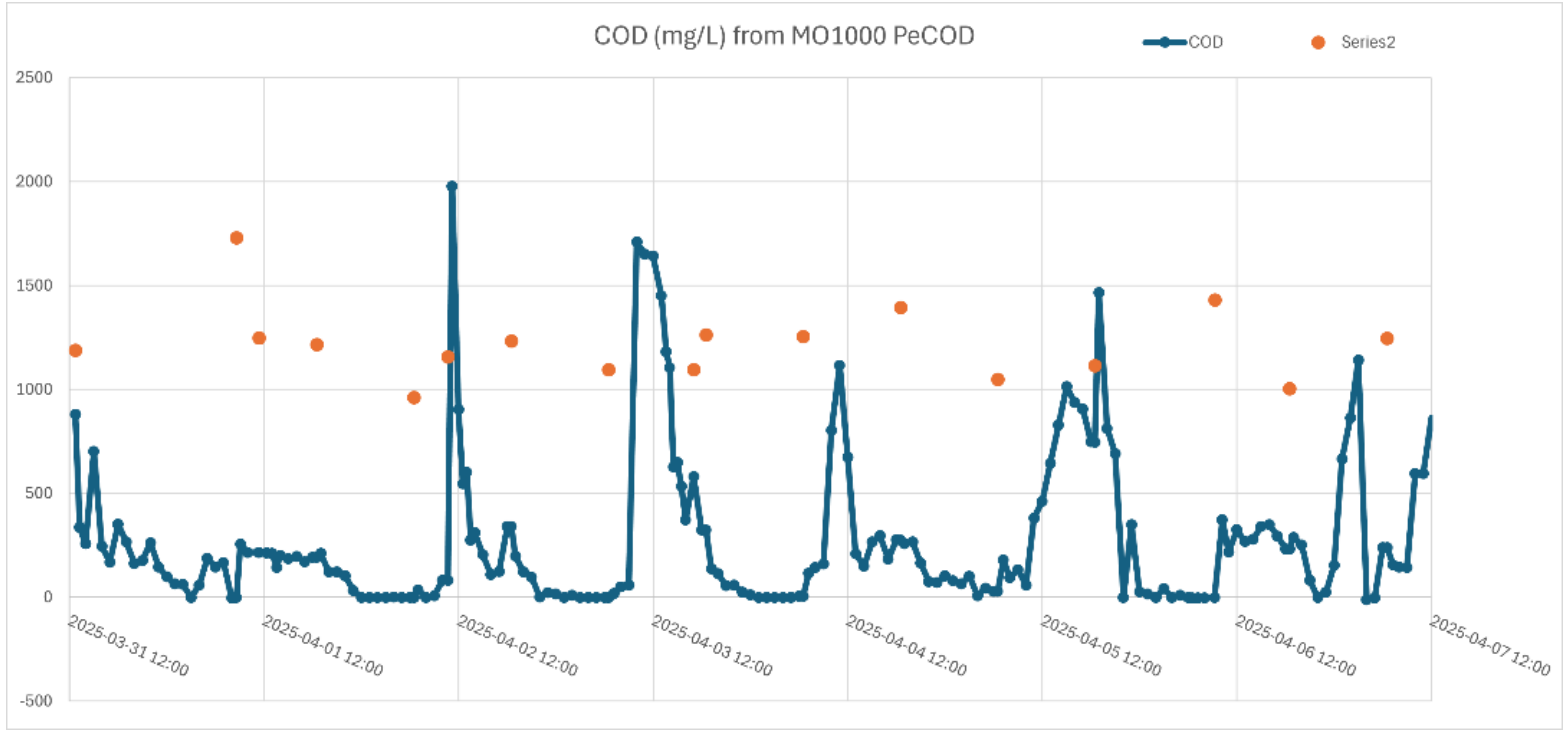
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PeCOD® strong correlation to BOD5 (sometimes stronger than CODCr)



PeCOD® MO1000 for COD at a Wastewater Treatment Plant









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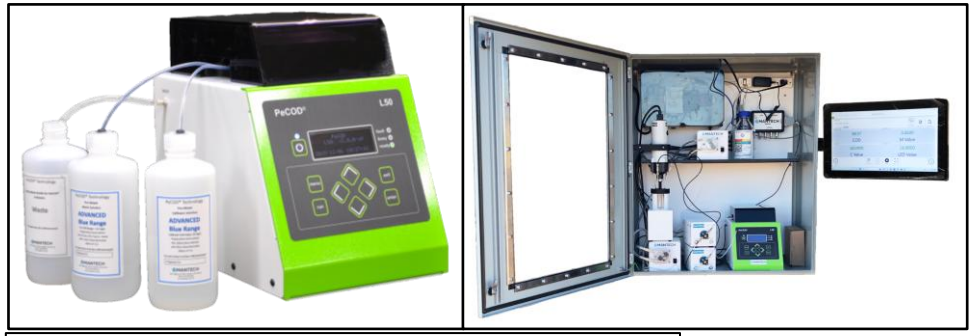
PeCOD® Customer: Municipal Wastewater

Sewer Discharge Compliance



Industrial Discharger

- Monitor own discharge into sewer
- Avoid fines and/or surcharges
- Optimize on-site treatment



Benchtop & online models are ideal.

Municipal Enforcement

- Monitor industrial discharge into sewer
- Enforce fines and/or surcharges
- Support WWTP operations



Benchtop and portable models are ideal.

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