

# Increasing Efficiency in BOD Analysis with Automated Sample Preparation and Measurement

# Topics for Discussion

- Method Protocol
  - SM 5210B
- Sample Pretreatment
- BOD Analysis
- Automation!



# Method Protocol

- Samples
  - pH
  - Residual Chlorine
- BOD Analysis
  - Dilution Water
  - Sample Addition
  - Seed and Nitrification Inhibitor
  - Initial Read and Cap
  - Incubate
  - Final Read



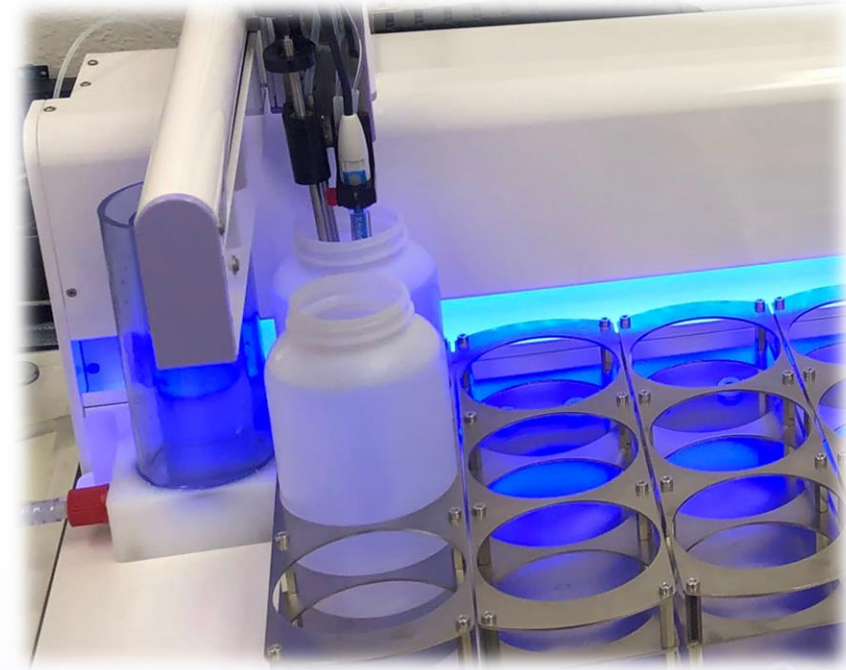
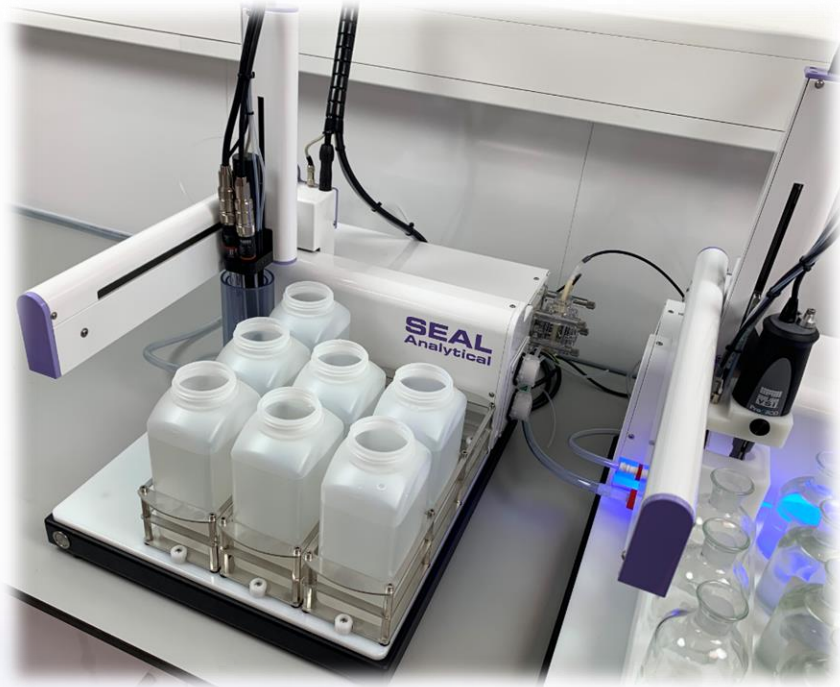
# Sample Pretreatment

# Sample Pretreatment

- Residual Chlorine Check
  - Sodium Sulfite
- Sample pH
  - Check pH
  - Adjust the Sample pH if Required
- Sample Temperature
  - $20 \pm 3^{\circ}\text{C}$



# Sample Pretreatment



# BOD Analysis

# BOD Analysis

- Dilution Water
  - Distilled or Deionized Water
    - Copper Interference
    - Chlorine Interference
    - DI Water System Maintenance
    - Blank Checks
      - < 0.2 mg/L BOD
      - Software Pass/Fail Criteria
      - Replace Source Water
      - Remake Dilution Water





# BOD Analysis

- Dilution Water
  - Source Water Storage
    - Plastic or Glass Carboy
    - Contamination Free
    - Passing Blank Checks
      - $< 0.2$  mg/L BOD
  - Prepared Dilution Water
    - Addition of Nutrients
    - Stable 24 Hours



# BOD Analysis

- Sample Dilutions
  - Minimum 3 Dilutions
- 1.0 mg/L Residual DO and DO Uptake 2.0 mg/L
  - After 5 Day Incubation Period
- BOD Bottle - 67% Sample
  - Limited Nutrients
  - Add Nutrients
  - 1 mL/L or 0.3 mL/300 mL BOD Bottle



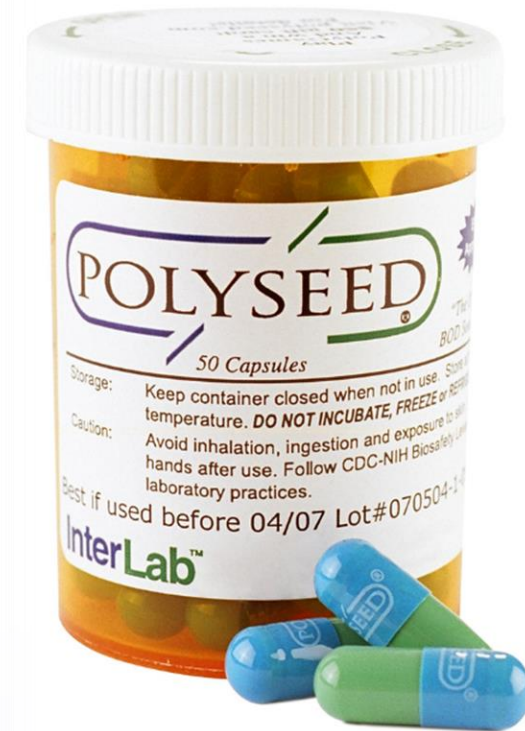
# BOD Analysis

- Seed
  - Ensures Sufficient Microbial Population
- Seed Sources
  - Influent
  - Effluent
  - Commercial Seed



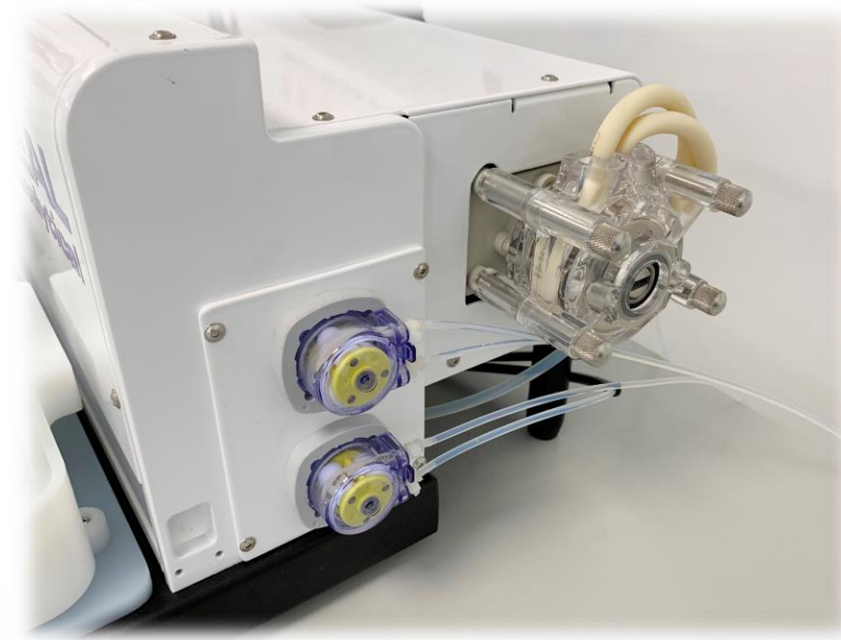
# BOD Analysis

- Seed
  - Commercial Seed Sources
    - Freeze Dried Seed
      - Prepare with Dilution Water
      - Stir or Aerate 1 Hour
      - Settle for 15 Minutes
- Constant Stirring
- No Filtration



# BOD Analysis

- Nitrification Inhibitor
  - Carbonaceous BOD or cBOD
- Addition of Nitrification Inhibitor
- TCMP
- Automated Addition
  - ATU
  - Polyseed NX



# BOD Analysis

- Initial Read
  - Calibrate Probe
  - Allow Probe to Stabilize
  - Automated Rinsing



# BOD Analysis

- Capping BOD Bottles
  - Create Water Seal
    - Vapor Barrier
  - Cap or Foil
    - Reduce Risk of Evaporation
- Final DO Read
  - Calibrate Probe
  - Calculations!
  - Data Export



# Automation



# Automation

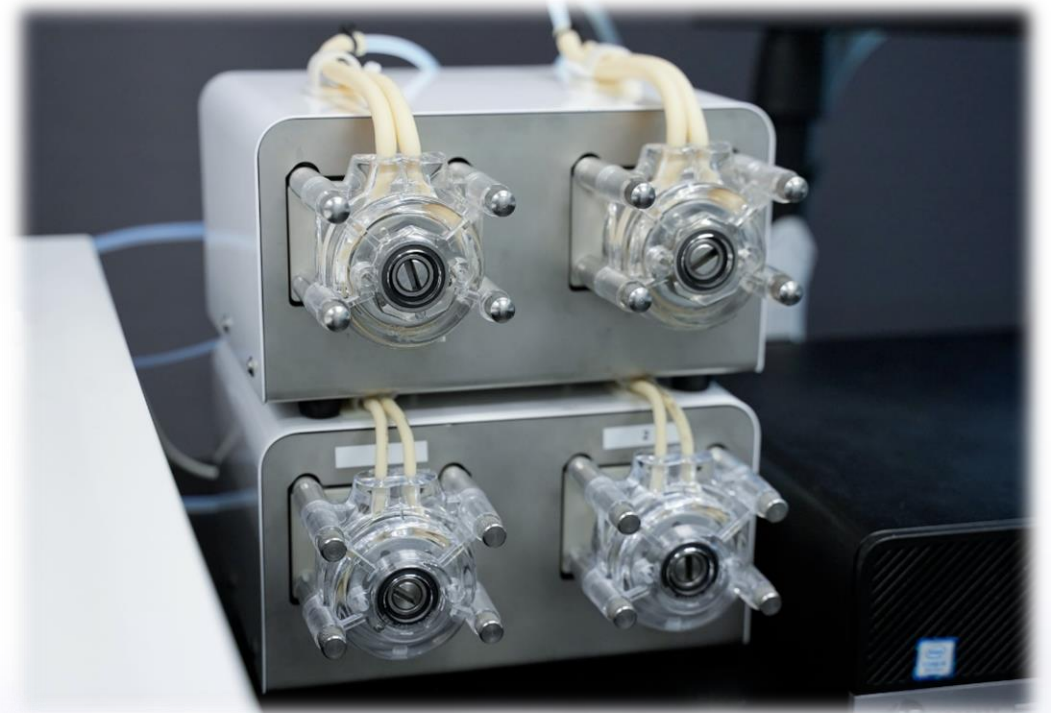
- Automating BOD Analysis
  - Add Dilution Water
  - Add Seed
  - Add Inhibitor
  - De-capping/Capping
  - Reading DO
  - 1 – 6 Probes



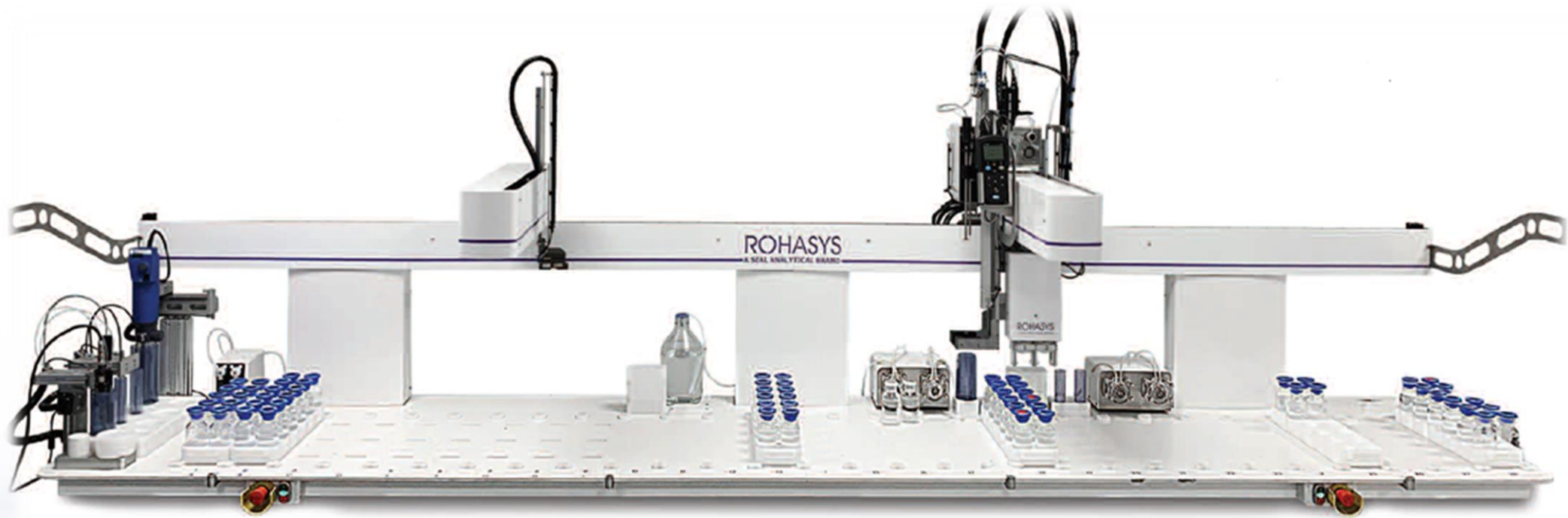
# Automation



# Automation



# Automation



# Automation

- Reading Barcode
- Reading Conductivity
- Reading pH & Adjusting pH
- Sample Dilutions
- Dosing Sample
- Make Dilutions
- Add Dilution Water
- Add ATU
- Add Seed
- De-capping/Capping
- Reading DO

