



Environmental safety begins with reliable measurements

Thermo Scientific products for effective wastewater treatment

Wastewater Analysis

Municipal/Industrial

Wastewater commonly refers to the liquid waste collected and transported to treatment facilities via a system of sewers. It is generally divided into two broad classifications: domestic and industrial. The chemical composition of the wastewater is carefully measured both as it enters treatment and before it is released into public rivers, lakes and the oceans. Therefore, the accuracy of all measurements is critically important. In the United States, wastewater is regulated by the Environmental Protection Agency, as well as state and municipal authorities, with each providing varying standards that must be strictly followed. Companies that fail to comply may be fined thousands of dollars per day until they meet the regulations. There are five basic processes in wastewater treatment:

Pretreatment

The first step includes the physical separation of solids from the flow by screening, grinding debris, and settling out heavy inert grit. Although this step results in the removal of a very small percentage of solids, it is essential for helping to prevent problems downstream in the treatment process.

Primary Treatment

Here, gravity settling in primary clarifiers removes some of the total suspended solids.

Secondary Treatment

Secondary treatment comprises biological processes that use microorganisms to digest the organic material that remain after primary clarification. It stabilizes the raw organic material that could threaten the receiving water. Additional steps in this stage include trickling filters, lagoons and stabilizing ponds, rotating biological contactors (RBCs), and various kinds of activated sludge processes.

Tertiary Treatment

Tertiary treatment includes numerous options. For instance, polishing ponds for bacteria and BOD removal are often added to secondary trickling filter plants to help improve overall efficiency. If additional treatment is required for a system discharge permit, processes such as nitrification or de-nitrification, ammonia stripping, and phosphorous precipitation may be implemented.

Disinfection

Disinfection is needed to destroy harmful organisms in the effluent. Disinfecting wastewater is commonly achieved through chlorination, polishing ponds, ozonation, and UV radiation.

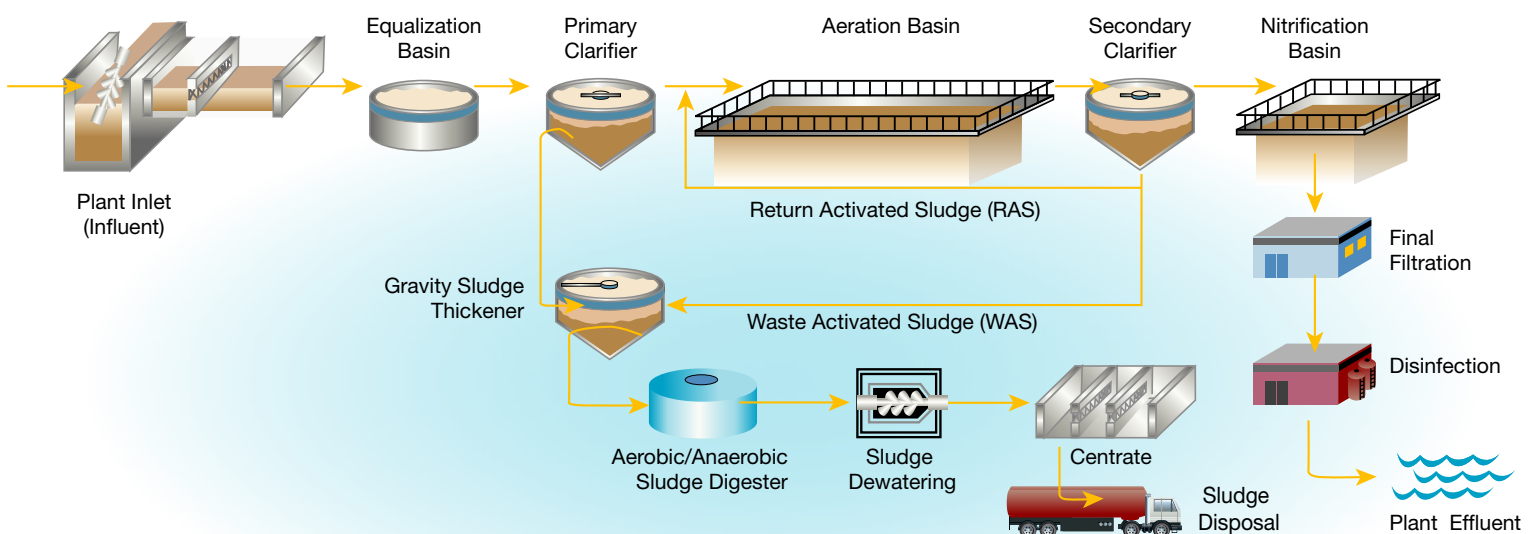
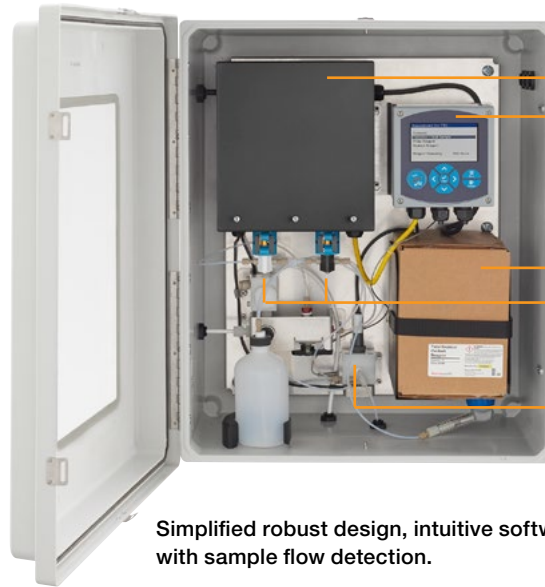


Figure 1: Wastewater treatment process demonstrates the five basic processes described above.

Instruments for wastewater analysis

Thermo Scientific™ Orion™ 7070iX TRO Analyzer is designed to provide accurate and precise measurements to meet low-level regulatory requirements, down to 0.01 ppm with 0.001 ppm resolution. The electrode-based measurement technology is not subject to interferences observed in the DPD method (color and turbidity). Analyzer is designed to operate in either continuous or simulated batch mode.



- Electronics compartment
- Controller offers simple operation with an intuitive menu and navigation
- Analyzer enclosure
- Reagents
- Delivery pumps for reagent and standard. Sample enter using process pressure.
- Chlorine ISE electrode and measurement cells use bead cleaning technology

Simplified robust design, intuitive software with sample flow detection.

Thermo Scientific products for wastewater treatment by process

| | Plant Influent | Aeration Basin | Nitrification Basin | Aerobic/Anaerobic Sludge Digester | Plant Effluent |
|---|----------------|----------------|---------------------|-----------------------------------|----------------|
| Thermo Scientific™ AquaSensors™ DataStick™ pH Measurement System | ● | ● | | | ● |
| AquaSensors™ AnalogPlus™ pH Sensors | ● | ● | | | ● |
| Thermo Scientific™ Alpha™ pH Sensors | ● | ● | | | ● |
| AquaSensors DataStick Dissolved Oxygen Measurement System | | ● | ● | ● | |
| AquaSensors RDO Pro-X Optical Dissolved Oxygen Sensor | ● | ● | ● | ● | ● |
| AquaSensors AnalogPlus Dissolved Oxygen Sensor | | ● | ● | ● | ● |
| AquaSensors AnalogPlus Dissolved Ozone Sensor | | | ● | | |
| Alpha Dissolved Oxygen Sensors | | ● | ● | ● | ● |
| AquaSensors AnalogPlus ORP Sensor | | ● | | | |
| Thermo Scientific™ Orion Star™ A-Series Portable Meters | ● | ● | ● | ● | ● |
| AquaSensors DataStick Suspended Solids Turbidity Measurement System | ● | ● | | | ● |
| Orion™ AquaMate™ Spectrophotometer | ● | | ● | | ● |
| Orion Star A Benchtop Meters | | | ● | | ● |
| Orion™ AQUAfast™ Colorimeters and Turbidimeters | ● | ● | | | ● |
| Orion™ 3106 COD Analyzer | | | | | ● |
| Orion™ 7070iX TRO Analyzer | ● | | ● | | ● |
| Orion™ 8010cX Ammonia Analyzer | ● | | ● | | ● |



Thermo Scientific™ AquaSensors™ RDO Pro-X Optical Dissolved Oxygen Sensor

Rugged, versatile DO monitoring system with luminescent technology.

- No membranes
- Designed to deliver high accuracy with fast and stable response
- Resists photo-bleaching and abrasive media
- Plug-and-play design with digital network interface



AquaSensors™ We AnalogPlus™ Differential pH Sensors

Outstanding performance in continuous, demanding applications.

- 1 inch or 1.5 inch NPT mounting
- Replaceable salt bridge helps extend sensor life
- NTC300 or PT1000 temperature elements
- Thermoplastic body material (PEEK or CPVC) helps protect built-in electronics from moisture and humidity



Thermo Scientific™ Orion™ 8010cX Ammonia Analyzer

EPA approved colorimetric method for 0.02 to 500 mg/L detection range.

- Low reagent consumption – lower operation costs-reduced chemical waste production (5 L/ month)
- Robust designed fluid handling components to provide reliable and accurate measurements
- Color touch screen with intuitive menu



Thermo Scientific™ Orion™ 3106 Chemical Oxygen Demand Analyzer

On-line COD optimized for wastewater measurements.

- 20 to 2000 mg/L COD measurement range
- Automated ranging
- Designed for low operating costs - reduced maintenance and reagent consumption
- Temperature compensation



AquaSensors™ DataStick™ Suspended Solids Turbidity System

Versatile system to monitor all solid concentrations - integrates with control systems.

- Fouling correction optics
- Rugged construction
- Local and remote configuration and diagnostics
- Temperature measurement included



Orion™ AquaMate™ Spectrophotometer

Ideal laboratory instrument for extensive, full wavelength measurement of wastewater.

- High resolution, 1.8 nm spectral bandwidth
- Advanced optics designed for virtually maintenance-free performance
- High-speed wavelength scanning

Leaders in Sensing Technology

From supplying safe drinking water or reliably controlling wastewater treatment processing, to delivering significant value to industrial water treatment providers – our water experts can help you meet your application challenges. Thermo Scientific process water analysis measurement products are designed for flexibility, ease of use, and low cost of operation in water treatment,

delivering accuracy you can trust with confidence year after year. Select from our digital plug-and-play systems, advanced optical DO sensors, and a broad portfolio of differential and analog measurement capabilities to build your water quality solution.

Find out more at thermofisher.com/processwater