The AS-CSTR Module

(Perfectly Mixed Activated Sludge)

Audience and Processes

Targeted at **Municipal WWTP Operators and Process Designers** managing standard aeration basins. This module models a single, completely stirred-tank reactor where oxygen is supplied to degrade organic matter and nitrify ammonia.

Functionality

- **COD/BOD Removal:** Predicts the oxidation of organic matter.
- **Nitrification Tracking:** Models the conversion of ammonium to nitrate.
- **Biomass Growth:** Calculates the production of heterotrophic and autotrophic biomass.
- **Oxygen Demand:** Estimates the specific O2 transfer rate required to maintain set-point Dissolved Oxygen (DO).

Usage: The Core Setup

- **Influent Definition:** Input flow rate and fractionation of COD (soluble vs. particulate).
- **Reactor Volume:** Define tank dimensions and aeration capacity.
- **Sludge Management:** Set the Sludge Retention Time (SRT) or Recycle Flow Rate to stabilize the microbial community.

Concepts and Assumptions: The ASM1 Engine

- **ASM1 Foundation:** Uses the **ASM1** matrix to describe the kinetics of carbon oxidation and nitrogen conversion.
- **Instantaneous Mixing:** Assumes a perfectly uniform concentration of biomass and substrate throughout the tank.
- **Constant Temperature:** Models kinetics based on a constant ambient temperature.

Benefits

- **Energy Optimization:** Prevents over-aeration by matching oxygen supply to biological demand.
- **Effluent Compliance:** Ensures the discharge meets COD and NH4-N regulatory limits.

MODELA Computational fluid dynamics for the industry

infomodela@modela.co.uk

www.modela.co.uk