

## Dynamic parameter estimation to calibrate the activated sludge model for an enhanced biological phosphate removal process

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### ABSTRACT

A parameter calibration of activated sludge models (ASMs) was performed to predict effluent chemical oxygen demand (COD), total nitrogen (TN), total phosphate (TP) and total suspended solid (TSS) concentrations of the enhanced biological phosphate removal process. Such calibration is an essential process for simulating the behavior of real-world wastewater treatment processes properly. Six different simulations were attempted to develop a reliable calibration method using two different parameter estimation methods for three objective functions. For the parameter estimation method, dynamic parameter estimation (DPE) and static parameter estimation (SPE) were investigated. The objective functions were based on the effluent quality (EQ) index of benchmark simulation and the effluent quality standards (EQS) in Korea. When using the same parameter estimation method, the predicted errors with the EQS-based objective functions could be decreased by approximately 20% over EQ index-based functions for TSS. When using the same objective function, the error with DPE was around 40% less than the error with SPE for TSS and TP. Therefore, applying DPE to the objective function based on the EQS was a proper calibration method of the ASM to predict a reliable effluent for the real process.

**Keywords:** Dynamic parameter estimation; Model calibration; Sensitivity analysis; Activated sludge model; Enhanced biological phosphate removal process

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