

# Biological Phosphorus Removal

Biological phosphorus (bio-P) removal has become a reliable and well-understood process within wastewater treatment, despite being one of the most complex processes in the activated sludge process. Extended fundamental and full-scale research has been carried out into the bio-P process and the state-of-the-art is described in this report.

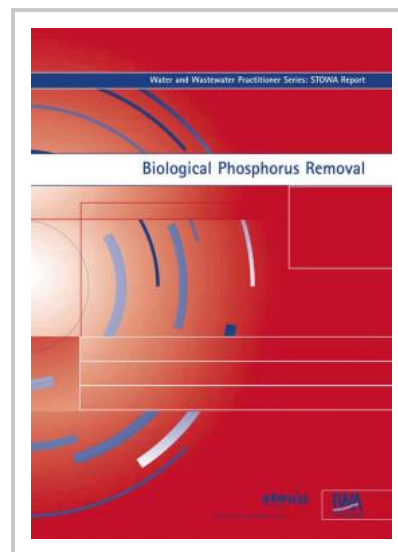
A summarising historical overview gives insight into the establishment of the appropriate microbiological and biochemical basis of the process and the development of bio-P configurations in practice. Aspects of the bio-P process that have a direct influence on the efficiency of phosphorus removal are subjected to an in-depth investigation.

This report presents guidelines for design and dimensioning in order to introduce and/or optimise the bio-P process in practice. Twelve bio-P installations are extensively described and the operational results and experiences are related to existing bio-P knowledge and guidelines. Based on a number of parameters, a comparison is made between the described bio-P plants. A steady state model is verified with extensive periods of practical experience of the plants.

The bio-P model (available to download below), offers a reliable insight into the bio-P process, coupled with sensitivity analyses regarding wastewater characteristics and process parameters for the anaerobic volume and the P-ortho concentration in the final effluent.

The report ends with a systematic approach to the design of the bio-P process, based on the background of the bio-P process itself, much practical experience and the analysis of operational bio-P plants. Also presented is a systematic approach to tackle operational aspects of the bio-P process in order to generate an acceptable low P effluent concentration. This optimisation of the bio-P process operation is supported by a decision diagram.

*Biological Phosphorus Removal* will be an invaluable source of information for all those concerned with wastewater treatment, including plant managers, process designers, consultants and researchers.



## Supplementary files for this work (previously provided on CD-ROM):

[Bio-P model \(final version\) and note \[1\]](#)

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