



Book review

FUNDAMENTALS OF BIOLOGICAL WASTEWATER TREATMENT

Udo Wiesmann, In Su Choi, Eva-Maria Dombrowski

WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim,
ISBN: 978-3-527-31219-1, 2007, XXVII+362 pages

At the beginning of the new millennium water is becoming a strategic resource. Water has been and will continue to be a major factor for the survival of humans and human activities that needs certain concern and protection. Because of the limited resources of fresh water, careful use and frequent reuse after appropriate treatment are requirements for sustainable development and a healthy life.

The authors of the book *Fundamentals of Biological Wastewater Treatment* are convinced both that it is necessary to learn lot of thinks essential to develop and continue to promote water recycling systems. In this frame, the biological wastewater treatment processes play a highly important role.

This book is structured on 13 chapters and a Subject Index.

In the first chapter, *Historical Development of Wastewater Collection and Treatment*, there are presented water supply and wastewater management in antiquity and medieval age. Also, there are presented early biological wastewater treatment processes, experiments with the activated sludge process and early Regulations for the control of wastewater discharges.

The next chapter, *Wastewater Characterization and Regulations*, contains a comprehensive description of the wastewater pollutants and the connected legislation. First, there are presented the classification of wastewater pollutants and methods for measuring dissolved organic substances as total parameters. Then, the German legislation and EU Guidelines are presented.

The chapter 3 *Microbial Metabolism* describes the proteins and nucleic acids, the catabolism and anabolism needed for understanding the composition and morphology of bacteria, as well as their role in biological wastewater treatment.

Chapter 4 discussed about the determination of stoichiometric equations for catabolism and anabolism. Chemical reactions can be traced by

measuring the concentrations of educts as well as intermediate and final products by continuous or discontinuous measurements after taking samples. The following condition is of high importance and can be used for checking the results: balances must be fulfilled for each element. The same condition is valid for biological systems. Therefore, it is possible to study bioreactors using the balances of elements.

Gas/liquid oxygen transfer is discussed in detail in chapter 5 because of its high importance for all aerobic processes in biological wastewater treatment.

In the chapter *Aerobic Wastewater Treatment in Activated Sludge Systems* kinetics and reaction engineering models are described, with and without oxygen limitation and retention time distribution in activated sludge reactors.

The next chapter, *Aerobic Treatment with Biofilm Systems*, offers information about biofilm reactors for wastewater treatment, mechanisms and models for oxygen mass transfer in biofilm systems.

Chapter 8 describes the anaerobic degradation of organic compounds. First, there are presented catabolic reactions-cooperation of different groups of bacteria. In contrast to most widely propagated aerobic degradation processes, the anaerobic conversion of organics down to methane and carbon dioxide is limited to the work of three different groups of bacteria (acidogenic, acetogenic and methanogenic bacteria). Then, the anaerobic kinetics in wastewater treatment is described.

The chapter *Biodegradation of Special Organic Compounds* offers information about chlorinated compounds, nitroaromatics, polycyclic aromatic hydrocarbons and mineral oils and azo reactive dyes concerning their properties, use, environmental problems and kinetics. The treatments of wastewater containing such refractory organic compounds are also described in this chapter.

Chapter 10 is dedicated to the biological nutrient removal. First, biological nitrogen and phosphorus removal is analyzed. The great significance of nitrogen and phosphorus removal has led the authors to elaborate a separate report on their stoichiometric and kinetic backgrounds individually. Then, biological nutrient removal processes are described. This section presents and discusses biological removal systems which provide the elimination of either nitrogen or phosphorus, or of both components. The utilization of biological nutrient removal processes for the treatment of wastewater has environmental, economical and operational benefits.

In the chapter *Modelling of the Activated Sludge Process* various models of the activated sludge process, their structure and their application are explained.

Chapter 12 is dedicated to the membrane technology in biological wastewater treatment. The high performance of membrane technology has been proven in recent years in a wide range of fields, such as chemical industry, drinking water treatment, biotechnology and environmental technology. The German work groups of the DWA have provided excellent reports on the application of membranes in the field of wastewater treatment. The number of membrane processes installed for the treatment of municipal wastewater is rather low but steadily increasing.

The benefit of using membranes is the possibility to reuse industrial water in different qualities and the gain of reusable material as well as environmental aspects integrated in the production process. This chapter offers informations about mass transport and mass transfer resistance mechanism, performance and module membrane design and membrane bioreactors.

In the final chapter, *Production Integrated Water Management and Decentralized Effluent Treatment*, the authors explain what integrated water management and decentralized effluent pretreatment are and how they can be applied in specific industries such as the chemical, pharmaceutical, food, textile, drinks, paper and cellulose, iron and steel industries.

The book *Fundamentals of Biological Wastewater Treatment* by Udo Wiesmann, In Su Choi and Eva-Maria Dombrowski provides important information about the fundamentals and engineering aspects of biological wastewater treatment. This book is obviously a very valuable tool for the specialists in the field, for researchers, and students for enlarging their horizon on biological wastewater treatment, as well as to others process alternative that might include biological treatment and efficient use of resources.

Corina Petronela Musteret

Department of Environmental Engineering
and Management

Faculty of Chemical Engineering
Technical University of Iasi, Romania