

CONTENT

	Page
1. Wastewater, Volumes and Composition	11
1.1 The Volumes of wastewater	11
1.2 Wastewater components	26
2. Characterization of Wastewaters and Sludges	37
2.1 Suspended solids	37
2.2 Organic matter	39
2.3 Nitrogen	48
2.4 Phosphorus	49
2.5 Alkalinity (TAL)	49
2.6 Sludge volume index etc.	50
2.7 Respiration rate of sludge	51
3. Basic Biological Processes	55
3.1 The biology in biological treatment plants	55
3.2 Conversions in biological treatment plants	61
3.3 Aerobic heterotrophic conversion of organic matter	65
3.4 Nitrification	75
3.5 Denitrification	86
3.6 Biological phosphorus removal	95
3.7 Anaerobic processes	99
4. Activated Sludge Treatment Plants	113
4.1 Mass balances, activated sludge plants	113
4.2 Concepts and definitions of the activated sludge process	120
4.3 Types of plants, activated sludge plants	126
5. Biofilters	143
5.1 Biofilm kinetics	143
5.2 Biofilm kinetics parameters	151
5.3 Hydraulic film diffusion	153
5.4 Two-component diffusion	157
5.5 Filter kinetics	159
5.6 Mass balances for biofilters	164
5.7 Concepts and definitions	165
5.8 Types of plants	167
5.9 Design of biofilters	173
5.10 Technical conditions concerning biofilters	179
5.11 Removal of particulate organic matter	182
5.12 Detailed model	188
6. Treatment Plants for Nitrification	195
6.1 Mass balances, nitrifying plants	196
6.2 Types of plants for nitrification	209
6.3 Design of nitrifying plants	218
7. Treatment Plants for Denitrification	229
7.1 Mass balances, denitrifying treatment plants	230
7.2 Types of plants for denitrification	241
7.3 Design of denitrifying plants	248
7.4 Redox-zones in the biomass	268

8.	Plants for Biological Phosphorous Removal	273
8.1	Mass balances, biological phosphorous removal plants with activated sludge	273
8.2	Plant types, biological phosphorous removal	276
8.3	Design of biological phosphorous removal	279
9.	Anaerobic Wastewater Treatment	285
9.1	Mass balances, anaerobic plants	286
9.2	Plant types, anaerobic processes	289
9.3	Design of anaerobic plants	295
10.	Treatment Plants for Phosphorous Removal from Wastewater	311
10.1	Mass balances for phosphorous removal processes	311
10.2	Mechanisms for chemical / physical phosphorous removal	314
10.3	Treatment plants for phosphorous removal	332
10.4	Design of plants for phosphorous removal	337
10.5	Operation of plants for phosphorous removal	346
	List of Symbols	353
	Index	375