

## CONTENTS

	Page
1. Historical Review	1
2. Theory of the Washing Process	7
2.1 Influence of the Water	7
2.2 Types of Soil	11
2.3 Physical Soil removal	13
2.4 Subsequent Processes	35
2.5 Concluding Remarks	36
3. Detergent Ingredients	41
3.1 Surfactants	41
3.2 Builders	63
3.3 Bleaches	77
3.4 Auxiliary Agents	87
4. Household Detergents	103
4.1 Heavy-duty Detergents	103
4.2 Specialty Detergents	109
4.3 Laundry Aids	111
4.4 Aftertreatment Aids	115
5. Institutional Detergents	121
5.1 Partially Built Detergents	122
5.2 Detergents for the Pre-and Main Wash	122
5.3 Perborate-Containing Detergents	124
5.4 Completely Built Detergents	125
5.5 Specialty Detergents	125
6. Production of Powdered Detergents	127
6.1 Requirements	127
6.2 Production Processes	128
6.3 Raw Materials	135
7. Analysis	141
7.1 Detergent Ingredients	142
7.2 Purposes of Detergent Analysis	142
7.3 Sample Preparation	142
7.4 Analytical Methods	142
7.5 Sources of Information	148
8. Test Methods for Laundry Detergents	151
8.1 Laboratory Methods	151
8.2 Practical Evaluation	152
8.3 Consumer Tests	153
9. Economic Aspects	155
9.1 Detergent Components	156
9.2 Detergents	160
9.3 Fabric Softeners	165
10. Ecology	167
10.1 Laundry, Wastewater, and the Environment	167
10.2 General Criteria and Assumptions Regarding the Treatment of Laundry Wastewater	167
10.3 Contribution of Laundry to the Sewage Load	168
10.4 Detergent Laws	171
10.5 Other Detergent Ingredients	183
10.6 Outlook	187
11. Toxicology	189
11.1 Detergent Ingredients	190

11.2	Finished Detergents	194
11.3	Conclusions	194
12.	Textiles	195
13.	Washing Machines and Wash Programs (Cycles)	205
13.1	Household Washing Machines	205
13.2	Laundry Dryers	218
13.3	Washing Machines for Institutional Use	219
14.	References	223
	Index	241