

## CONTENTS

Series Editor's Preface	xxi
Editor's Preface	xxii
Foreword	xxvii
<b>Chapter 1. Surfactants : properties, production and environmental aspects</b>	<b>1</b>
1.1 Introduction : from soap to modern surfactants	1
1.2 General properties of surfactants	3
1.3 Production rates and use of relevant surfactants	10
1.4 Raw materials	19
1.5 Synthesis of surfactants	29
1.6 Analysis of surfactants and their degradation products	33
1.7 Fate of surfactants and environmental problems	36
1.8 Conclusion	44
References	45
<b>Chapter 2. Separation and detection</b>	<b>51</b>
2.1 GC and GC – MS determination of surfactants	51
2.2 Capillary electrophoresis in surfactant analysis	77
2.3 LC determination using conventional detectors	89
2.4 Atmospheric pressure ionisation mass spectrometry – I. General aspects	115
2.5 Atmospheric pressure ionisation mass spectrometry – II. Flow injection analysis – mass and tandem mass spectrometry in the analysis of surfactants – advantages and disadvantages	123
2.6 Atmospheric pressure ionisation mass spectrometry – III. Non-ionic surfactants : LC-MS-MS of alkylphenol ethoxylates and their degradation products	163
2.7 Atmospheric pressure ionisation mass spectrometry – IV. Non-ionic surfactants : LC-MS of alkyl polyglucoside and alkyl glucamides	191
2.8 Atmospheric pressure ionisation mass spectrometry – V. Non-ionic surfactants : Flow injection analysis – mass spectrometry and liquid chromatography – mass spectrometry of organosilicone surfactants	205
2.9 Atmospheric pressure ionisation mass spectrometry – VI. Non-ionic surfactants LC-MS of other non-ionic surfactants	227
2.10 Atmospheric pressure ionisation mass spectrometry – VII. Anionic surfactants : LC-MS of alkylbenzene sulfonates and related compounds	289

2.11	Atmospheric pressure ionisation mass spectrometry – VIII. Anionic surfactants : LC-MS of other anionic surfactants	305
2.12	Atmospheric pressure ionisation mass spectrometry – IX. LC-MS analyses of cationic surfactants : methods and applications	353
2.13	Atmospheric pressure ionisation mass spectrometry – X. LC-MS of amphoteric surfactants	385
	References	392
<b>Chapter 3.</b>	<b>Sample handling</b>	<b>393</b>
3.1	Sampling and sample treatment for surfactant analysis in water	393
3.2	Methods for the sample handling of non-ionic surfactants in sludges and sediments	415
3.3	Sample handling for the determination of surfactants in biota	429
<b>Chapter 4.</b>	<b>Quantification and quality assurance in surfactant analysis</b>	<b>443</b>
4.1	Introduction	443
4.2	Reference compounds in quantification of surfactants, their metabolites and reaction by-products	447
4.3	Advantages and limitations in surfactant quantification by liquid chromatography-mass spectrometry	473
4.4	Stability of surfactants in post-sampling storage	495
4.5	Interlaboratory studies for the determination of surfactants	509
<b>Chapter 5.</b>	<b>Environmental processes</b>	<b>525</b>
5.1	Aerobic biodegradation of surfactants	525
5.2	Anaerobic biodegradation of surfactants	577
5.3	Biodegradation of linear alkylbenzene sulfonates in the marine environment	591
5.4	Surfactant sorption on natural sediments	607
5.5	Fate of organosilicone surfactants	627
<b>Chapter 6.</b>	<b>Occurrence of surfactants in the environment</b>	<b>655</b>
6.1	Concentrations of surfactants in wastewater treatment plants	655
6.2	Occurrence of surfactants in surface waters and freshwater sediments – II. Alkylphenol ethoxylates and their degradation products	675
6.3	Occurrence of surfactants in surface waters and freshwater sediments – II. Linear alkylbenzene sulfonates and their carboxylated degradation products	695
6.4	Non-ionic surfactants in marine and estuarine environments	719
6.5	Anionic surfactants in marine and estuarine environments	749
6.6	Surfactants in drinking water : occurrence and treatment	763
6.7	Occurrence and fate of surfactants in soil, subsoil, and groundwater	787

<b>Chapter 7.</b>	<b>Toxicity of surfactants</b>	<b>827</b>
7.1	Toxicity of surfactants for aquatic life	827
7.2	Bioconcentration	869
7.3	Estrogenicity of surfactants	887
7.4	Risk assessment of surfactants	913
<b>Chapter 8.</b>	<b>Recommendations and future trends</b>	<b>927</b>
8.1	Monitoring	927
8.2	Analytical aspects	929
8.3	Legislative regulations force action	930
8.4	Final remarks and perspectives of a continuously changing market	934
	<b>Glossary</b>	<b>937</b>
	<b>Index</b>	<b>943</b>