363.61 ANA

Contents

Series Preface xi

Preface xiii

List of Contributors xv

1 Drinking Water Regulations 1
Pierre Hecq, Adriana Hulsmann, Fred S. Hauchman, Jennifer L. McLain and Franz Schmitz

1.1 EU Directive on Drinking Water – Past, Present and Future 3
1.1.1 EU Water Legislation 3
1.1.2 The Drinking Water Directives – Revision Processes 3
1.1.3 Main Aspects of the Drinking Water Directives 4
1.1.4 Revision of the DWD and WHO Guidelines 9
1.1.5 Conclusions 9
1.2 Drinking Water Regulations in the United States 10
1.2.1 Introduction 10
1.2.2 History of the Safe Drinking Water Act 10
1.2.3 Development of Regulations 11
1.2.4 Highlights of the Safe Drinking Water Act 12
1.2.5 Implementation of Regulations 15
1.2.6 Conclusions 16
1.3 Standardization 16
1.3.1 Introduction 16
1.3.2 Requirements to be met by Laboratories and Analytical Methods 17
1.3.3 Standardization in CEN TC 230 Water Analysis and ISO TC 147 Water Quality 17
1.3.4 Development of Standards in ISO/TC 147 19
1.3.5 Special Standards Development Procedures 23
1.3.6 Drafting of Standards 24
1.3.7 EU Requirements for Standard Methods 28
References 35

2 Bromate Determination 39
A.-Hakim R. Elwaer, Philippe Quevauviller, K. Clive Thompson and Cameron W. McLeod
2.1 Introduction 40
2.2 Ion Chromatographic Methods 41
2.2.1 Identification and Removal of the Main Interferences 41
2.2.2 Sample Pre-treatment Automation 43
2.3 Alternative Laboratory Methods 45
2.3.1 Ion Chromatography / ICP-MS 45
2.3.2 Ion Chromatography Spectrophotometry Detection 46
2.3.3 Ion Pair Chromatography – Fluorescence Detection 47
2.3.4 Flow Injection – ICP-MS 48
2.4 Field-based Methods 49
2.4.1 Spectrophotometric Method with Methylene Blue 49
2.4.2 Flow Injection – Spectrophotometric Detection 51
2.5 Stability of Bromate 51
2.5.1 Effect of Water Matrix on Bromate Stability 52
2.5.2 Stability of Bromate Species Immobilized on Alumina Microcolumns 53
2.6 Interlaboratory Excercise for Bromate Determination 55
2.7 Toxicity, Occurrence and Current Status of Bromate in Drinking Waters 59
References 61

3 Lead Monitoring 63
Theo van den Hoven and Nellie Slaats
3.1 Factors Determining the Lead Concentration in Drinking Water 64
3.1.1 Sources of Lead in Drinking Water 64
3.1.2 Factors Determining the Lead Concentration in Drinking Water 65
3.2 Sampling of Lead in Drinking Water 68
3.2.1 Available Sampling Procedures 68
3.2.2 Definition of a 'Representative Sample' 69
3.2.3 Representative Sampling at an Individual Consumer's Tap 73
3.2.4 Lead Analyses in Tap Water 73
3.3 Comparison of Sampling Procedures in the Field 75
3.3.1 European Study 75
3.3.2 Applied Sampling Procedures 75
3.3.3 Characteristics of Test Areas 77
3.3.4 Applied Test Procedures 78
3.3.5 Performance Criteria of Sampling Protocols 79
3.3.6 Representativeness of the Tested Protocols 81
3.3.7 Reproducibility of the Tested Protocols 91
3.3.8 Costs, Practicality and Consumer Acceptance 95
3.3.9 Final Evaluation of Sampling Procedures 96
3.3.10 Experience with the Monitoring Protocol in France 98

3.4 Fit for Purpose Lead Monitoring Protocols 98
3.4.1 The Requirements for Sampling and Monitoring Lead in Accordance with the DWD 98/83/EC 98
3.4.2 Sampling and Monitoring Strategy 100
3.4.3 Lead Monitoring Purposes 101
3.5 Lead Levels in Drinking Water in Tap Water 109
3.5.1 Overview of Lead Levels in Test Areas 109
3.5.2 Effect of Water Composition 110
3.5.3 Effect of Plumbing Materials 111
3.5.4 Water Consumption 111
References 112

4 Materials in Contact with Drinking Water 115
Jean Baron
4.1 Parameters Used for the Control of Materials Effects 116
4.1.1 Organoleptic Assessments 116
4.1.2 General Hygiene Assessments 117
4.1.3 Substances that Pose a Risk to Health 117
4.1.4 Enhancement of Microbial Growth 118
4.2 Test Procedure for Metallic Materials 118
4.2.1 Introduction 118
4.2.2 Metallic Materials 119
4.2.3 Experiments within Conormative Research 123
4.2.4 Discussion 148
4.2.5 Conclusions 155
4.3 Test Procedure for Cementitious Materials 156
4.3.1 Introduction 156
4.3.2 Technical Background 160
4.3.3 Effect of Preconditioning and Migration Water 161
4.3.4 Reproducibility Tests 169
4.3.5 Effect of Preconditioning at Different Ageing Times 170
4.3.6 Conclusions 171
References and Bibliography 172

Index 175