
Contents

1	Quality Assurance Management	1
2	Analytical Methods	7
2.1	Determination of Moisture	7
2.2	Total Soluble Solids (Brix)	9
2.3	Determination of Sugars	10
2.3.1	Determination of Reducing Sugars	10
2.3.2	Determination of Total Sugars	13
2.3.3	Chromatographic Analysis of Sugars	13
2.3.4	Enzymatic Analysis of Sugars	14
2.4	StarchTest	17
2.5	Determination of Alcohol Insoluble Solids	18
2.6	Determination of Acidity	19
2.6.1	Determination of Titratable Acidity	19
2.6.2	Determination of Organic Acids	20
2.6.2.1	Gas-Liquid Chromatography (GLC)	20
2.6.2.2	High Performance Liquid Chromatography (HPLC)	21
2.6.2.3	Enzymatic Determination	22
2.7	The Brix/Acid-Ratio	25
2.8	Measurement of pH	25
2.9	Determination of Ash	27
2.10	Determination of Vitamin C	28
2.11	Determination of Carotenoids	30
2.12	Determination of Anthocyanins	33
2.13	Determination of Benzoic Acid	35
2.14	Determination of Sorbic Acid	38
2.15	Determination of Sulphur Dioxide	39
2.16	Determination of Pectinesterase Activity	41
2.17	Measurement of Cloud Stability	43
2.18	Colour Index	45
2.19	Determination of Non-enzymatic Browning	46
2.20	Determination of Furfural	47

2.21	Determination of Hydroxymethylfurfural	49
3	Physical Measurements	57
3.1	Measurement of Colour	57
3.2	Measurement of Consistency	60
3.2.1	Viscosity	60
3.3	Distance Consistometer	70
3.3.1	Texture	71
3.4	Puncture Testing	72
3.5	Distance Measuring Instruments	75
3.6	Measurement of Water Activity	79
4	Sensory Analysis	83
4.1	Organization of the Tests	83
4.2	Statistical Test Designs	85
4.2.1	Difference Tests	85
4.2.2	Quantitative Difference Tests	88
4.2.3	Descriptive Flavour Profile	90
4.2.4	Threshold Test	90
4.3	Selection and Training of Panel Members	92
4.4	Statistical Tables	93
5	Microbiological Analysis	105
5.1	Facilities, Equipment, Glassware, and Media for a Modest Microbiological Laboratory	105
5.2	Microbiological Examination of Tropical Fruit Products	107
5.2.1	Direct Microscopic Count (DMC)	107
5.2.1.1	Film Method	108
5.2.1.2	Counting Chamber	109
5.2.2	Colony Count Methods	110
5.2.2.1	General Guidelines	110
5.2.2.2	Culture Media	111
5.2.3	Fermentation Test	114
5.3	Classification of Microorganisms	116
5.4	Detection of Microbial Contamination and Spoilage Using Chemical Methods	117
5.4.1	Determination of Diacetyl	117
5.4.1.1	Distillation Method	118
5.4.1.2	GLC Method	119
5.4.2	Determination of Lactic Acid	119

5.4.2.1	A Rapid Spot Test for the Detection of Lactic Acid . . .	120
5.4.2.2	Enzymatic Determination of Lactic Acid	121
6	Water Control	125
6.1	Importance and Standards	125
6.2	Methods of Analysis	126
6.2.1	Measurement of Colour	127
6.2.2	Measurement of Turbidity	128
6.2.3	Measurement of pH	129
6.2.4	Measurement of Conductivity	130
6.2.5	Determination of Residue, Filterable and Non-filterable Residue	131
6.2.6	Determination of Alkalinity	132
6.2.7	Determination of Hardness	135
6.2.8	Determination of Iron	139
6.2.9	Determination of Nitrate	140
6.2.10	Determination of Residual Chlorine	142
6.2.11	Determination of Toxic Metals	145
6.3	Microbiological Examination	145
6.3.1	Total Count	147
6.3.2	Coliform Tests	148
6.3.2.1	Presumptive Test	148
6.3.2.2	Confirmed Test	149
6.3.2.3	Completed Test	150
6.3.3	Coliform Test by Membrane Filter Technique	151
7	Sanitation Control	153
7.1	Definition and Terminology	153
7.2	Factors Affecting Cleaning Efficiency and Costs	156
7.2.1	Nature of Soil and Soil Formation	156
7.2.2	Water Quality	156
7.2.3	Temperature	157
7.2.4	Turbulence	158
7.2.5	Time	159
7.2.6	Nature of Surfaces and Surface Finishes	159
7.2.7	Detergent Formulation and Concentration	161
7.2.8	Disinfectants (Sanitizers)	165
7.2.9	Chlorination of Water	167
7.2.10	Cleaning Procedures	170
7.3	Evaluation of Cleanliness and Sanitation	172
7.3.1	Visual Evaluation	173
7.3.2	Microbiological Evaluation	174

7.4	Control of Employee Hygienic Practices	177
7.5	Pest Control	180
8	Waste Disposal Control	185
8.1	Definition and Terminology	185
8.2	Factors to be Considered in Waste Disposal Control ..	187
8.2.1	Character of the Waste	187
8.2.2	Waste Flow	188
8.2.3	Segregation of Highly Contaminated Wastewater ...	190
8.2.4	Reduction of Waste Flow	190
8.2.5	Solid Waste Disposal and Utilization	191
8.2.6	Existing or Proposed Regulations Governing Waste Disposal	192
8.2.7	Selection of Treatment and Disposal Procedures	193
8.3	Methods of Analysis	199
8.3.1	Total Suspended Matter	199
8.3.2	Settleable Matter	200
8.3.3	Dissolved Oxygen (DO)	200
8.3.4	Biochemical Oxygen Demand (BOD)	203
8.3.5	Chemical Oxygen Demand (COD)	208
9	Assessment and Improvement of Quality	213
9.1	Inspection, Quality Control, and Quality Assurance ..	213
9.2	Total Quality Management	214
9.3	Standards for Quality Assurance Management Systems	214
9.4	Quality Improvement	215
Appendix 1		217
Appendix 2		225
Subject Index		233