4 Sugar and bulk sweeteners, 72

Christof Krüger

- 4.1 Introduction, 72
- 4.2 The production of sugar, 72
- 4.3 Sugar qualities, 74
- 4.4 The storage of sugar, 75
- 4.5 Sugar grinding and the prevention of sugar dust explosions, 77
- 4.6 Amorphous sugar, 80
- 4.7 Other sugars and bulk sweeteners, 81
 - 4.7.1 Invert sugar, 81
 - 4.7.2 Glucose, 82
 - 4.7.3 Fructose, 82
 - 4.7.4 Tagatose, 83
 - 4.7.5 Lactose, 84
 - 4.7.6 Isomaltulose, 84
 - 4.7.7 Trehalose, 84
 - 4.7.8 Polydextrose, 84
 - 4.7.9 Inulin, 85
 - 4.7.10 Sorbitol, 86
 - 4.7.11 Mannitol, 86
 - 4.7.12 Xylitol, 86
 - 4.7.13 Erythritol, 87
 - 4.7.14 Maltitol, 87
 - 4.7.15 Maltitol syrup, 88
 - 4.7.16 Isomalt, 88
 - 4.7.17 Lactitol, 88
- 4.8 Physiological characteristics of sugars, bulk sweeteners and special polysaccharides, 89
- 4.9 The sweetening power of sugars and bulk sweeteners, 92
- 4.10 Other sensory properties of sugars and bulk sweeteners, 93
- 4.11 Solubilities and melting points of sugars and bulk sweeteners, 95
- 4.12 Maximum conching temperatures of chocolate masses with different bulk sweeteners, 95
- 4.13 Separate conching process for "no sugar added" chocolates, 97
- 4.14 Pre- and probiotic chocolates, 97

Conclusions, 98

References, 98

5 Ingredients from milk, 102

Ulla P. Skytte and Kerry E. Kaylegian

- 5.1 Introduction, 102
- 5.2 Milk components, 103
 - 5.2.1 Milk protein, 103
 - 5.2.2 Milk fat, 105

- 5.2.3 Lactose, 114
- 5.2.4 Vitamins and minerals, 114
- 5.3 Milk-based ingredients for chocolate, 114
 - 5.3.1 Milk fat ingredients, 115
 - 5.3.2 Milk powders, 118

Conclusion, 131

References, 131

6 Chocolate Crumb, 135

Martin A. Wells

- 6.1 Introduction and history, 135
- 6.2 Benefits of milk crumb, 136
- 6.3 Typical crumb recipes, 137
- 6.4 Flavour development in chocolate crumb, 137
- 6.5 Sugar crystallisation during crumb manufacture, 141
- 6.6 The structure of chocolate crumb, 142
 - 6.6.1 Crystallinity, 143
 - 6.6.2 Fat availability, 143
 - 6.6.3 Fat droplet size, 143
 - 6.6.4 Aeration, 144
 - 6.6.5 Overall particle size distribution, 145
- 6.7 Typical crumb processes and equipment, 145
 - 6.7.1 Batch oven process, 146
 - 6.7.2 Continuous processes, 146
- 6.8 Effect of the crumb process upon the crumb properties, 150
- 6.9 Changes to crumb during storage, 150

Conclusion, 151

References, 152

7 Properties of cocoa butter and vegetable fats, 153

Geoff Talbot

- 7.1 Introduction, 153
- 7.2 Cocoa butter, 154
 - 7.2.1 Fatty acid and triglyceride composition, 154
 - 7.2.2 Polymorphism, 156
 - 7.2.3 Minor components, 161
- 7.3 Cocoa butter equivalents, 162
 - 7.3.1 Main CBE component fats, 164
 - 7.3.2 Other CBE component fats, 170
 - 7.3.3 Structured triglycerides in CBEs, 171
 - 7.3.4 Production and uses of CBEs, 173
- 7.4 Lauric cocoa butter substitutes, 176
 - 7.4.1 Quality control, 177
 - 7.4.2 Hydrogenated lauric CBSs, 178