

CONTENTS

CONTRIBUTORS	ix
PREFACE	xi

Molecular Architecture and Therapeutic Potential of Lectin Mimics

YU NAKAGAWA AND YUKISHIGE ITO

I. Introduction	2
II. Synthetic Lectin Mimics	4
1. Molecular Architecture of Boronic Acid-Dependent Lectin Mimics	4
2. Antiviral Potential of Boronic Acid-Dependent Lectin Mimics	11
3. Molecular Architecture of Boronic Acid-Independent Lectin Mimics	15
4. Antiviral and Antimicrobial Potential of Boronic Acid-Independent Lectin Mimics	27
III. Naturally Occurring Lectin Mimics	33
1. Antimicrobial and Carbohydrate-Binding Profiles of Pradimicins and Benanoimicins	33
2. Molecular Basis of Carbohydrate Recognition by PRMs	40
3. Antiviral Profile and Mode of Action of Pradimicins	45
IV. Conclusion and Future Prospects	48
Acknowledgments	49
References	49

Enzymatic Conversions of Starch

PIOTR TOMASIK AND DEREK HORTON

I. Introduction	61
1. Introduction and General Remarks	61
2. Historical Background	62
3. Former Reviews	64
II. Enzymes and Microorganisms for Conversion of Starch	65
1. Introduction	65
2. Alpha Amylases (EC 3.2.1.1).	80
3. Beta Amylases (EC 3.2.1.2)	98
4. Glucoamylase (EC 3.2.1.3)	103
5. Other Amylases	111
6. α -Glucosidase (EC 3.2.1.20)	111
7. Pullulanase (EC 3.2.1.41)	114
8. Neopullulanase (EC 3.2.1.135).	117
9. Isoamylase (EC 3.2.1.68)	117
10. Other Hydrolases	119

11. Enzymatic Cocktails	120
12. Glycosyltransferases (EC 2.4.1)	123
13. Microorganisms	124
III. Hydrolysis Pathways and Mechanisms	127
1. Role of Adsorption	127
2. Mechanism of Inhibition	130
3. Mathematical Models of Enzymatic Hydrolysis	132
4. Effect of Light, Microwaves, and External Electric Field	135
5. Kinetics	136
IV. Amylolytic Starch Conversions	144
1. Introduction	144
2. Pulping	145
3. Malting	146
4. Mashing	146
5. Liquefaction	148
6. Saccharification	151
7. Effect of the Botanical Origin of Starch	159
8. Role of Starch Pretreatment	174
9. Role of Temperature	180
10. Role of the Substrate Concentration	181
11. Role of Water	181
12. Role of Elevated Pressure	182
13. Role of pH	182
14. Role of Admixed Inorganic Salts	183
15. Role of Inhibitors	186
16. Stimulators of Hydrolysis	188
17. Engineering Problems	189
18. Applications of the Enzymatic Processes	191
V. Starch as a Feedstock for Fermentations	208
1. General Remarks on Fermentation	208
2. Alcohol and Alcohol–Acetone Fermentations	209
3. Carboxylic Acid Fermentations	232
VI. Nonamylolytic Starch Conversions	238
1. Glycosylation	238
2. Esterification and Hydrolysis	241
3. Methanogenic and Biosulfidogenic Conversions	243
4. Isomerization	243
5. Hydrogen Production	245
6. Trehalose	246
7. Bacterial Polyester Formation	247
8. Branching of Starch	247
9. Oxidation	247
10. Polymerization	247
11. Cyclodextrins	249
VII. Starch Metabolism in Human and Animal Organisms	258
1. Digestible Starch	258
2. Resistant Starch	261

VIII. Starch Analytics Involving Enzymes	262
1. Starch Evaluation and Analysis	262
2. Enzyme Evaluation	266
References	268
 AUTHOR INDEX.	 437
SUBJECT INDEX	525