

P.D.
1.9.83

High performance liquid chromatography
of carbohydrates.

by

V. D. P. Scrimanne

Ph.D. Thesis

88900

University of New South Wales

Australia.

1982

CR

Com
M:CD

SUMMARY

Carbohydrates as a group are of high importance, considered from both the practical and theoretical aspects. The different types of polysaccharides linked by glycosidic bonds, account for the different solubility, reactivity and appearance of the vast range of carbohydrates, which occur in living organisms.

The behaviour of partially methylated sugars and methylated glycosides were studied in hplc using different columns and different solvent systems. The information thus obtained was used to investigate the structures of unknown carbohydrates. The results show that hplc is useful in the methylation analysis of polysaccharides, and for the preparation of reference compounds.

Study of the formation of methyl glycosides showed that hplc is useful for the preparation of many methyl glycosides. Rates of glycosidation could be followed and optimum conditions determined for the formation of a particular glycoside. The method is also applicable to the synthesis of the methyl glycosides of disaccharides, as shown by the isolation of the methyl glycosides of maltose. The glycoside work was extended to the compositional analysis of polysaccharides. Glycosides formed during methanolysis of polysaccharides were separated and quantitatively estimated.

Successful separation of oligosaccharide series up to DP 8-9 was achieved. Oligomers of the same DP but from different structural series e.g. the maltose and isomaltose series, had different retention times, showing that the separation mechanism operating was structure dependent.

CHAPTER 1

Introduction	page
	1

CHAPTER 2

2.1	Studies of partially methylated sugars and alditols	24
2.1.1	Introduction	24
2.1.2	Results and Discussion	29
	2.1.2.1. Partially methylated sugars	29
	2.1.2.2. Partially methylated alditols	37
2.1.3	Experimental	42
2.2	Methylation analysis of a trisaccharide	44
2.1.1	Introduction	44
2.2.2	Results and Discussion	45
2.2.3	Experimental	48
2.3	Partially methylated methyl α -D-glycosides	49
2.3.1	Introduction	49
2.3.2	Results and Discussion	51
2.3.3	Experimental	59
2.4	Studies on partially methylated sucrose	59
2.4.1	Introduction	59
2.4.2	Results and Discussion	60
2.4.3	Experimental	63

CHAPTER 3

3.1	Methyl glycosides of monosaccharides	66
3.1.1	Introduction	66
3.1.2	Results and Discussion	71
3.1.3	Experimental	83

	page	
3.2	Synthesis of methyl maltosides	85
3.2.1	Introduction	85
3.2.2	Results and Discussion	88
3.2.3	Experimental	93
3.3	Studies on uronic acids	96
3.3.1	Introduction	96
3.3.2	Results and Discussion	100
3.3.3	Experimental	115
3.4	Quantitative studies on methyl glycosides	117
3.4.1	Results and Discussion	117
3.4.2	Experimental	120
3.5	Polysaccharides	121
3.5.1	Introduction	121
3.5.2	Results and Discussion	126
3.5.3	Experimental	135

CHAPTER 4

4.1	Oligosaccharides	136
4.1.1	Introduction	136
4.1.2	Results and Discussion	145
4.1.3	Experimental	154
4.2	Effects of added solvents on separation of oligosaccharides in starch syrup	155
4.2.1	Introduction	155
4.2.2	Results and Discussion	155
4.2.3	Experimental	163
	References	164
	Appendix	180