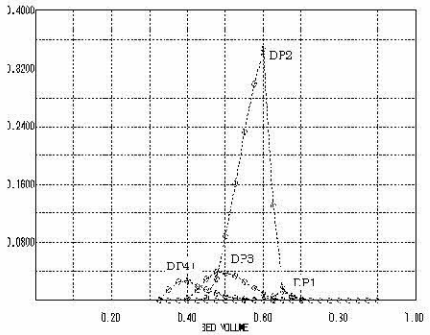
Separation of Glucose and Oligosaccharides

(Extracted from the Diaion Manuals pages 271 to 272)

(5) Separation of Glucose and Oligo-saccharides

Manufacturing processes of oligo-saccharides are categorized into two methods. The first one is enzymatic hydrolysis of starch and it can not only control Dextrose Equivalent, DE, but also produce specified oligo-saccharides such as highly concentrated disaccharides, tri-saccharides and tetra-saccharides. Maltose, isomaltose, maltotriose and maltotetraose are such representatives. The other method is condensation polymerization of disaccharides formed mainly from different monosaccharides with proper polymerization enzymes. Fructo-oligosaccharide and galacto-oligosaccharide are typical products.

Separation of these oligo-saccharides is accomplished by size-exclusion chromatography by using their size differences. CERs with enough structural strength and high heat resistance are usually used for the separation. Na-form is preferable, since Ca-form has too strong ligand exchange function.



[Fig.VIII-2-4] Batch separation of maltose [70]
Raw liquor: Sugar liquor by hydrolysis of starch (maltose)
Conc. mono-: 2%, di-: 79%, tri-: 12%, tetra- and over: 7%
Separation material: DIAION® UBK530
Temp.: 75 °C
SV: 0.60 (1/h)
Feed: 5% BV
Conc.: 60 wt%

Regarding the eluents, soft water can be used for Na-form CERs, but pure water should be necessary for Ca-form CERs that is used in the separation of glucose and fructose. Fig.VIII-3-2 illustrates one batch separation to heighten the maltose purity by separation of tri-saccharides from mother liquor of starch hydrolysis, 79% maltose. Separation by simulated moving bed system is demonstrated in Table VIII-3-2. These examples are from maltose-rich starting materials. Glucose and oligo-saccharides can be divided similar ways.

[Table VIII-2-4] Chromatographic separation of Maltose [70]

IER grade	DIAION® UBK530
System	Simulated moving bed
Flow rate	0.036 (1/h)
Eluent volume	5.00 (vol. ratio)
Temp.	75.0 (°C)

	Raw liquor (%)	M fraction (%)	O fraction (%)	Recovery (%)
Mono-saccharides	2.00	1.18	3.63	39.31
Maltose	79.00	98.35	40.54	82.82
Tri-saccharides	12.00	0.40	35.05	2.24
Over tetra- saccharides	7.00	0.06	20.79	0.58
Total	100.00	100.00	100.00	
Solid concentration	60.00	37.50	5.50	

* M : Maltose O : Oligo-saccharide