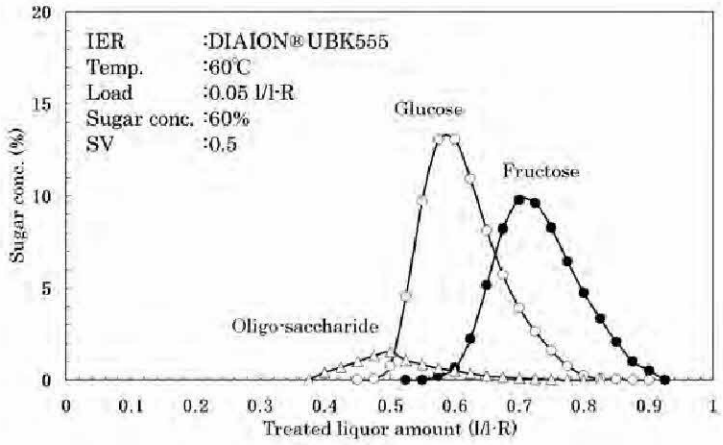
Separation of Glucose and Fructose

(Extracted from the Diaion Manuals pages 270 to 271)

(4) Separation of Glucose and Fructose

Fructose-glucose liquid sugar, F55, containing 55% fructose and is sweeter than sucrose. Simple isomerization of glucose can only produce liquid sugar of 42% fructose, F42, at the highest concentration due to the reaction equilibrium; the sweetness of F42 is about 90% of sucrose. Hence, F55 is made by mixing of F42 with high fructose corn syrup, 90 ~96% fructose, that is made from isomerized sugar liquor by ligand exchange chromatography.



[Fig.VIII-2-3] Pulse separation of glucose and fructose[69]

Treated with Ca-form CERs, DIAION® UBK555, oligo-saccharides, glucose and fructose elute from resin column in this order as illustrated in Fig.VIII-2-3. In this operation, the fraction containing high purity fructose is collected as product, and the fraction of high purity glucose is returned to the isomerization step. However, the batch operation is poor both in productivity and economy and the production cost is rather high than sucrose. Simulated moving bed systems are applied to decrease the production cost. Table VIII-2-3 illustrates such separation results of 90%, and ≥95% high fructose corn syrup from isomerized sugar syrup of 42% fructose, F42.

[Table VIII-2-3] Separation of isomerized sugar, F42, by revised Simulated moving bed [69]

Operation			90% Purity			96% Purity		
Separation agents			DIAION® UBK555			DIAION® UBK555		
Amount of raw liquor		(l/h)	0.090			0.075		
Eluent		(v/v)	1.29			1.60		
			Raw (F42)	Fructose fraction	Glucose fraction	Raw (F42)	Fructose fraction	Glucose fraction
Composition concentration	Solid	(wt%)	60.0	38.9	25.5	60.0	37.0	22.4
	Fructose	(%)	42.0	90.2	4.6	42.0	96.4	3.5
	Glucose	(%)	52.0	8.3	85.9	53.0	2.6	88.7
	Oligo saccharides	(%)	6.0	1.5	9.5	5.0	1.0	7.8
Recovery	Solid	(%)		43.7			41.4	
	Fructose	(%)		94.0			95.1	

The same process is applied for the separation of mannose/ glucose, fructose/ psicose and xylose/ arabinose as well as glucose/ fructose.