SWEETENERS, FRUCTOSE, GLUCOSE (DEXTROSE)

**Typical end products**
Sweeteners for beverages, beer brewing, jams, preserves, sweets, confectionery, ice cream, liqueurs, pharmaceuticals, etc.

**Chemical curve:** R.I. per BRIX at Ref. Temp. of 20˚C

**Introduction**
Conversion of glucose (dextrose) to fructose is economically limited to 42-46 % fructose on a dry basis. This concentration of fructose is useful for many applications, however, in some applications, 42 % high fructose syrup is not sweet enough and a higher level of fructose is necessary.

Using chromatographic separation, fructose concentration can easily be increased to over 90 %. Blending the high fructose cut with additional 42 % syrup results in a 55 % HFS product suitable as a sweetener for soft drink bottlers.

**Application**
Fructose and glucose separation can be done with column-chromatographic technology.

First, the high fructose syrup (HFS) is fed to the fixed-bed separation columns filled with special absorbents, which absorb the fructose and glucose to different degrees (Figure 1). The glucose is the product, which leaves the columns first and can be separated from the fructose fraction.

With this technology high-purity (>99 %) glucose and high purity fructose (>90 %) can be produced.

**Figure 1.** Fractionation of glucose and fructose by chromatographic separation.

**Instrumentation and installation**
The K-Patents Process Refractometer PR-43 provides the basis for accurate and reliable control of the chromatographic separation.

The K-Patents refractometer is installed after the chromatographic column. The refractometer’s signal is connected to the process control system together with the measurement of a polarimeter. The refractometer measures in real-time the total concentration of the...
liquid and the polarimeter measures the fructose and glucose purity.

These two signals are sent to a computer, which calculates the fructose and glucose concentrations separately. The computer utilizes this information to control the selection valves, ensuring that the fructose and the glucose are fed into separate storage tanks.

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<tr>
<th>Instrumentation</th>
<th>Description</th>
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<tr>
<td>K-Patents Sanitary Compact Refractometer PR-43-AC</td>
<td>For hygienic installations in small pipe line sizes of 2.5 inch and smaller. The PR-43-AC refractometer is installed in the pipe bend. It is angle mounted on the outer corner of the pipe bend directly, or by a flow cell using a 3A Sanitary clamp, I-clamp or Varinline® connection.</td>
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<tr>
<td>K-Patents Sanitary Probe Refractometer PR-43-AP</td>
<td>For hygienic installations in large pipes, tanks, cookers, crystallizers and kettles and for higher temperatures up to 150°C (300 °F). The PR-43-AP refractometer is installed in the pipe line or vessel through a 2.5 inch or 4 inch Sanitary clamp, I-clamp, APV Tank bottom flange or Varinline® connection.</td>
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<tr>
<td>K-Patents Process Refractometer PR-43-GP</td>
<td>A general industrial refractometer for pipes and vessel installations. The PR-43-GP can be installed with 2, 3 and 4 inch flange and 3 inch Sandvik L coupling process connections and a variety of flow cells for pipe sizes of 1 inch and larger.</td>
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| User Interface                  | Selectable multichannel MI, compact CI or a web-based WI user interface options allow the user to select the most preferred way to access and use the refractometer measurement and diagnostics data.                                                                                             |
| Measurement range               | Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 Brix.                                                                                                                                                                                                                                                                                                                                                       |