SOLUBLE COFFEE AND TEA SOLIDS

**Typical end products**
Instant coffee, tea extract, instant tea.

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

---

**Introduction**
Coffee and tea are the most consumed beverages worldwide after water. Coffee and tea are traditionally prepared by brewing coffee beans or tea leaves, respectively. Today, coffee and tea are available as instant powder for easier and quicker preparation.

**Application**
Instant coffee is manufactured by using a coffee extraction process. Coffee beans are boiled in water to extract the soluble solids. The coffee extract is evaporated and dried either by spray drying or freeze drying.

A spray dryer is sometimes preferred as it produces fine, rounded particles. In the spray dryer, the concentrated coffee is atomized by a nozzle and warm air is fed to the tower to dehydrate the droplets into particles. Some of the coffee exits the tower with the air. This coffee dust passes through a filter to recover the solids. The coffee is dissolved in steam, and the recovered liquid coffee extract is returned to the process.

Tea leaves go through the same process as coffee beans: extraction, concentration and spray drying. The most difficult part in the instant tea process is aroma preservation.

**Instrumentation and installation**
The K-Patents Sanitary Refractometer PR-43-A is used for accurate concentration measurement of soluble solids at different stages of the process.

The refractometer is used as a reliable and real-time indicator of extraction efficiency. Typical measurement range is 0-30 Brix and the normal process temperature is 5 ºC (41 ºF). Prism wash with high-pressure hot water is recommended in this point.

At the evaporators, the K-Patents refractometer is used to ensure that the desired concentration is fed to the dryer, thus optimizing the energy consumption. The evaporation is a triple-stage process, with stage...
concentrations consisting of 10-20 % dry solids, 15-30 % dry solids and 35-65 % dry solids. Under normal circumstances the process temperature is 52-82 ºC (126-180 ºF). Prism cleaning with steam is recommended at the evaporator outlet.

The K-Patents refractometer is also used to measure the concentration of recovered instant coffee dust after filtration. Typical measurement range is 8-20 Brix and the normal process temperature is 75-85 ºC (167 185 ºF).

### Instrumentation Description

<table>
<thead>
<tr>
<th>Instrumentation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<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>
</tr>
<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>
</tr>
</tbody>
</table>

### 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.

### Automatic prism wash

Prism wash system components are a refractometer with integral wash nozzle mounted at the refractometer probe or in a flow cell, wash supply line components and a Multi user interface MI with relay module for prism wash diagnostics and control. Alternative wash media can be used for wash, e.g. steam, high-pressure water and warm water (hot condensate).

### Measurement range

Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 Brix.