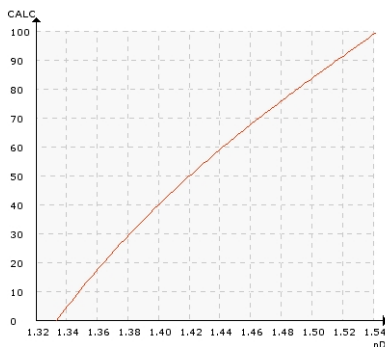


## FERMENTING JUICE

### Typical end products

Alcoholic beverages made from fermented juices such as wines, beers and ciders.

### Chemical curve: R.I. per BRIX at Ref. Temp. of 20 °C



### Introduction

Fermentation is a key process in the making of alcoholic beverages such as wines, beers and ciders. In this process, yeast species metabolize carbohydrates, mainly sucrose or glucose, and amino acids under anaerobic conditions into ethanol and carbon dioxide.

Alcoholic fermentation determines the strength and quality of the final product. Thus, monitoring and controlling fermentation is critical for ensuring a consistent and high-quality beverage.

### Application

For alcoholic fermentation, grape juice (or other fruit or cereal juice containing sugars) is taken to large fermentation tanks. The sugar content in the juice is important as it determines the final alcohol content. For example, for a red wine the typical starting Brix is 25, corresponding to a refractive index of about 1.37.

As the fermentation progresses alcohol and carbon dioxide are produced and the Brix value decreases. This happens, because the alcohol has a lower density than the water. Fermentation is stopped when the ideal sugar and alcohol level is reached.

After the fermenters, the product is filtered, its quality is analyzed before it is finally bottled.

### Instrumentation and installation

K-Patents Sanitary Refractometers PR-43-A monitor the Brix content, which indicates the conversion rate, the degree of fermentation and the alcohol volume (%) in the production of alcoholic beverages.

K-Patents Sanitary Compact Refractometer PR-43-AC is installed before the fermenters to monitor the Brix value of the juice before fermentation. This ensures the target alcohol level is achievable and prevents upsets in the fermentation process.

The Sanitary Probe Refractometer PR-43-AP-L170 is installed directly in the fermenters to monitor and



control in real-time the fermentation process. Alternatively, the PR-43-AC can be installed on a bypass via a sanitary coupling or Varivent® connection.

Changes in the refractive index values are used to continuously follow the fermentation process as alcohol is produced and to determine the degree of fermentation. This improves understanding of fermentation, provides an indirect measurement of alcohol content, and helps to determine when the batch is ready.

Final sugar content and alcohol level of the beverage is conventionally measured by periodical sampling after fermentation and analyses in the lab. K-Patents PR-43-AC can also be installed after the fermenters to monitor in real-time the quality of the final product.

K-Patents refractometers are the ideal tool for process optimization and for increasing productivity as they have a fast response. The refractometers reduce the need for manual sampling and risk of contamination.

K-Patents PR-43-A refractometers are 3A Sanitary and EHEDG certified for completely safe food and beverage production. Moreover, K-Patents technology is accurate and reliable as it is not affected by suspended particles, bubbles or color of the medium, which is a common source of error in other instruments in this application, such as density meters.

Instrumentation	Description
	<p>K-Patents Sanitary Probe Refractometer PR-43-AP 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. The user interface of the refractometer can be installed locally in the field, remotely in the control room or in both locations by connecting several user interfaces in a network.</p>
	<p>K-Patents Sanitary Compact Refractometer PR-43-AC 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 or Varivent® connection. The user interface of the refractometer can be installed locally in the field, remotely in the control room or in both locations by connecting several user interfaces in a network.</p>
<p>Measurement range:</p>	<p>Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 Brix.</p>