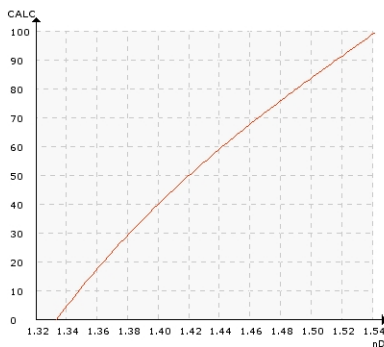


CONDENSED MILK, MILK POWDER, INFANT FORMULA

Typical end products

Evaporated milk (condensed unsweetened milk), sweetened milk, milk powder, infant formula, baby milk

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



Introduction

Evaporated and condensed milk are two types of concentrated milk, which the water has been removed from. Evaporated milk (also called unsweetened condensed milk) is concentrated to one-half or less of its original bulk. This is done by evaporation under high pressures and temperatures, without the addition of sugar, and usually containing a specified amount of milk fat and solids. Condensed milk is evaporated milk, often with added sugar. The milk is then canned for consumer consumption and commercial use.

Powdered milk is made by evaporating milk to a totally dehydrated powder. One purpose of drying the milk is to preserve it. Another purpose is to reduce its bulk for economical transportation.

Baby milk, or infant formula, is primarily used as a substitute for human milk. The finished product is either supplied as a dried powder, or as a canned or bottled liquid.

Application

The K-Patents Sanitary Refractometer PR-23-A is an ideal in-line refractometer for milk based products. The sensor is 3A Sanitary approved, EHEDG tested, and it withstands CIP and high temperatures. The sensor is angle mounted on the outer radius of a pipe bend directly or by using a flow cell, a Sanitary clamp or a Varivent® connection. This way the best flow conditions and self-cleaning effect can be achieved.

The K-Patents Sanitary Refractometers PR-23-A are used:

- For standardisation (e.g. after hydration tank) to check that correct total solids of the milk are achieved.
- After evaporation to continuously control milk concentration levels.
- In evaporators to monitor sugar syrup addition when making sweetened condensed milk. A sugar content of at least 62.5% in the aqueous phase is required to produce an osmotic pressure high enough to inhibit the growth of bacteria.
- To monitor feed product concentration to the spray dryer.

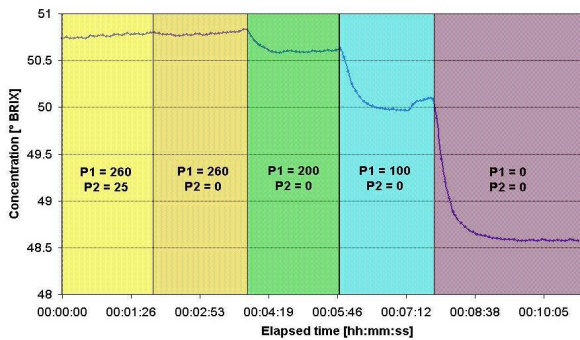
Although Brix is an equally effective scale for control purpose, K-Patents refractometer can also be calibrated for dry solids or total solids if these are the dairy plants' preferred standard reference scales.

Instrumentation and Installation

The sensor is located after the homogenizer as homogenization causes the fat globules to break down and become smaller. This has an influence on the Refractive Index nD value of milk. Fat globules are detectable by a K-Patents refractometer as long as they are smaller than 6 µm.

This globule size is achieved by adjusting the pressure of the homogenizer; the higher the pressure the smaller the globules. Also, this way fat can be taken into account in the measurement. The recommended homogenizer's **primary pressure** is


P₁ = 26 MPa (260 bar).



Typically, prism wash is not required for any of these applications if the flow velocity is higher than 1.5 m/ and the lines are frequently CIP cleaned. For low velocities a steam prism washer is recommended.

The high accuracy control achieved with K-Patents precise in-line concentration measurements helps to improve end product quality and to reduce operating costs.

Additionally the K-Patents PR-23-AC has a built-in web server that can be accessed via Ethernet, which significantly improves its ease-of-use. Obtaining real-time measurement data displays and diagnostics, altering instrument configuration settings or updating program versions can all be done remotely.

Instrumentation	Description
	<p>K-Patents Sanitary Compact Refractometer PR-23-AC for small pipe line sizes of 2.5 inch and smaller.</p> <p>The PR-23-AC sensor 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.</p>
Automatic prism wash:	Prism wash with steam: The components of a steam wash system are a sensor with integral steam nozzle mounted at the sensor head, a shut-off valve for steam line and an indicating transmitter equipped with relays to drive the wash valves. The wash is used in applications where flow velocity is below 1.5 m/s (5 ft/s).
Measurement range:	Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 Brix.