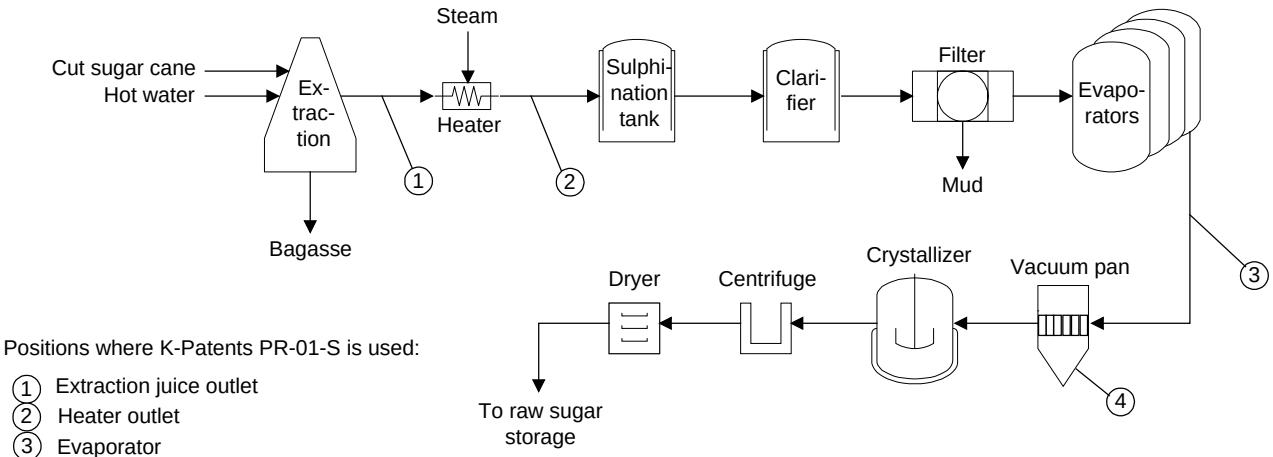
Cane Sugar Process (Milling)



Cane Sugar

See also
Cane Sugar Affination 1.02.01
Cane Sugar Decolourisation 1.02.02
Cane Sugar Evaporation 1.02.03
Cane Sugar Vacuum Pan 1.02.04
Cane Sugar Recovery Pan 1.02.05

Introduction

After sugar cane has been harvested it must be processed within less than 24 hours to avoid sugar loss by inversion to glucose and fructose.

Preparation and Extraction

The cane is first washed to remove mud and debris. Then the cane is chopped and shredded in huge roller mills for extracting the juice. About 93% of the juice is extracted. Water and weak juice from the last mill is added to help to macerate the cane and to aid in the extraction. The spent cane, called bagasse is either used as fuel, as raw material for paper or hardboard, or as insulating material.

Heating

The juice is sent to multiple heaters where the sugar content is increased to 16-17 Brix.

Sulphitation and Clarification

Sulphur dioxide is added to the juice to remove impurities and for decolourisation. After that lime is added to precipitate impurities and to help to remove colouring matter, organic acids and other suspended material. The limed juice is sent to clarification to settle. The clear juice goes to the evaporation plant.

Rotary filters are generally used to recover the sugar from the settled-out mud.

Evaporation

The filtrate is evaporated in triple- or quadruple-effect evaporators to a thick pale-yellow juice of about 60 Brix.

Crystallization

The thick juice goes to the vacuum pans where it is evaporated to supersaturation. When the predetermined degree of supersaturation is reached, seeding takes place and the crystals are grown to the required size. The massecuite is discharged to a crystallizer where the crystallization is completed.

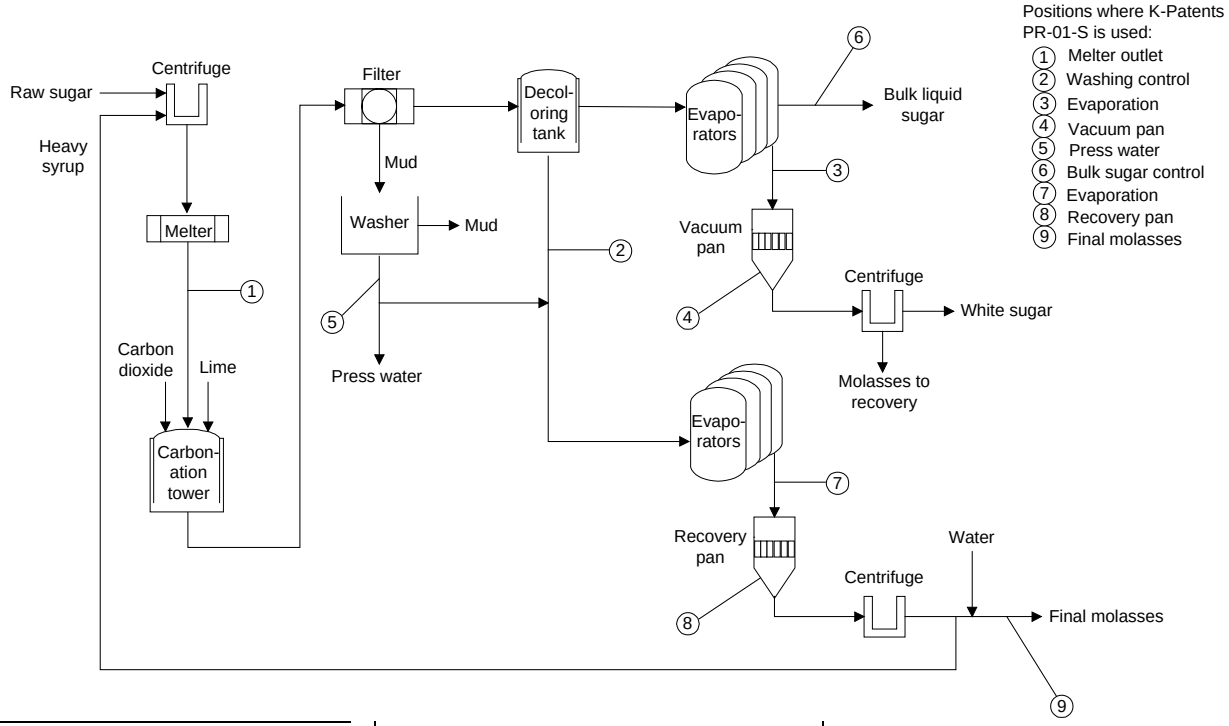
Centrifuging and Drying

The massecuite is sent to a centrifuge where the syrup is separated from the crystals. After drying of the crystals, the light brown raw sugar is ready for shipping to a refinery. The molasses is often used for cattle feed, or citric acid, and fermentation products.

Benefits

The digital technology of K-Patents Process Refractometer PR-01-S combined with the sturdy design results in a highly accurate and reliable measurement. Improved control over the complete process can be achieved.

Cane Sugar Process (Refining) 2 (2)



Cane Sugar

Introduction

The raw sugar received by a refinery contains 96,5 to 98,5% sucrose and therefore 1,5 to 3,5% impurities which comprise organic matter, inorganic compounds, water and micro-organisms. The raw sugar is also highly coloured.

Refining Process

The first step in refining is called affination, wherein the raw sugar crystals are treated with a heavy syrup (typically 60-80 Brix) in order to remove the film of adhering molasses. This strong syrup dissolves little or none of the sugar but softens or dissolves the coating impurities. The mixture, called magma, is spun in centrifuges and washed with hot water to remove the adhering molasses film.

The washed raw sugar crystals are then dissolved in water and diluted to about 54 Brix.

During carbonation the syrup is mixed with milk of lime and reacted with carbon dioxide to produce a precipitate of calcium carbonate (chalk). The chalk precipitate entraps organic non-sucrose and inorganic impurities.

Pressure filters are used to remove the chalk precipitates and to produce a clear, light brown syrup.

The brown syrup is then passed over a series of acrylic and styrene resin columns and granular activated carbon columns. The resulting low coloured syrup (fine liquor) is used for crystallisation of white sugar or for the production of bulk liquid sugar.

The fine liquor, after reduction of its water content by multiple effect evaporation, is fed to vacuum boiling pans. Crystallization is initiated by seeding the concentrated liquor with slurry. The process is continued until the crystals reach the desired size. The resultant mixture of crystals and mother liquor is fed in centrifugals and the sugar crystals are washed with hot water to remove any adhering syrup.

K-Patents Process Refractometer, PR-01-S is used in several stages in the refining process. The measurement is not affected by entrapped air bubbles, undissolved components or colour changes of the product. This leads to improved product quality.

This reliable measurement is particularly important for the control of the pans. It ensures better crystal size distribution and better yield. Furthermore, the growth of false grain can be avoided which reduces the need of screening the product.