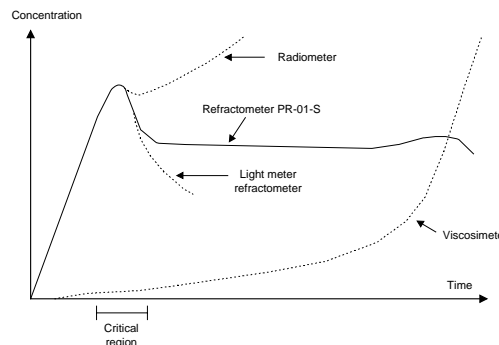
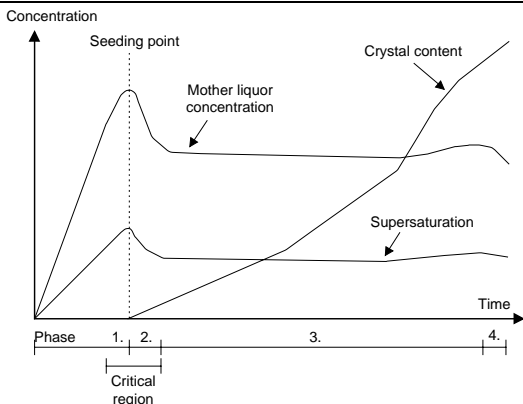


Beet Sugar Crystallization



Beet Sugar

See also

[Beet Sugar Production 1.01.00](#)
[Beet Sugar Extraction 1.01.01](#)
[Beet Sugar Evaporator Control 1.01.02](#)
[Beet Sugar Crystallization Control 1.01.03](#)
[Beet Sugar Green Syrup and Molasses 1.01.05](#)
[Desugarisation of Molasses by Chromatographic Separation 1.01.06](#)

Introduction

K-Patents Process Refractometer, PR-01-S is used to determine the seeding point and to control the drop of mother liquor concentration after the seeding. The seeding point and supersaturation are critical for crystal quality.

2. Vacuum Pan Control

After seeding the concentration of the mother liquor drops. The reason for this is partly that sugar is taken from the mother liquor to the crystals and partly because some juice may be added to prevent spontaneous crystallization.

In this phase the supersaturation control is critical for the final result of the stroke. The number of crystals should be constant from the seeding to the end of the stroke. If the supersaturation drop is too big, the crystals will stop growing and even melt. If the supersaturation remains too high, new crystals will form spontaneously (called "false grain"). Or the

crystals will start to grow in an irregular shape.

After seeding, supersaturation continues to be self regulating. The total crystal surface is large enough to keep the saturation at a metastable level. If supersaturation temporarily increases, the speed of crystallization will increase and bring the supersaturation back to the low metastable level. The factor limiting the speed of the crystal growth is in most cases the heating capacity.

3. Comparison of different measurement methods

3.1 Refractometer

The supersaturation is driving the growth of the crystals. The supersaturation is a function of the mother liquor concentration and temperature. Due to the unique digital principle of K-Patents PR-01-S, this refractometer measures the true concentration of the mother liquor without influence from the sugar crystals or bubbles in the pan.

3.2 Nuclear density meter and ultrasonic meter

The nuclear density meter measures the total amount of sugar; crystals + dissolved sugar. Just

after seeding the nuclear density meter signal is an indeterminate mixture of liquor concentration and crystal content, that gives no useful information. The nuclear density meter gives no information about the concentration drop and of the supersaturation level after the seeding.

3.3 Viscosimeter / Rheometer

The viscosimeter signal is mainly a function of the crystal content but it is also influenced by mother liquor concentration and temperature. The relation has to be empirically determined from case to case. When there are few or no crystals, as around the seeding point, the sensitivity of signal is low and very temperature dependent.

3.4 Conductivity meter

Conductivity measurement cannot give a precise seeding point determination. Conductivity meters cannot be used in the A-pan due to the too low conductivity level. Even if conductivity measurement is improved by RF measurements, it is not enough. RF measurement is too sensitive to the variations in syrup purity, non-sugar composition and temperature.