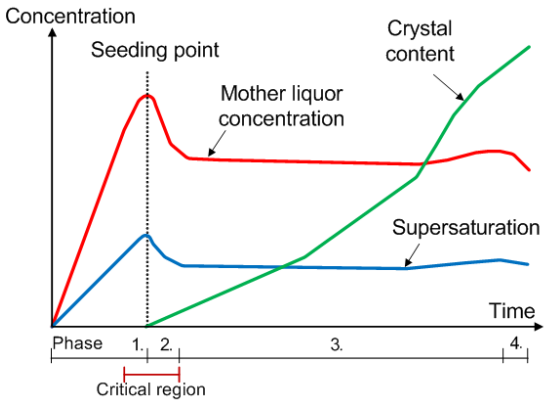
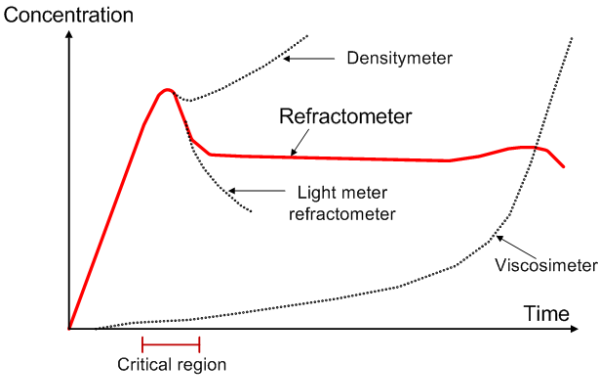
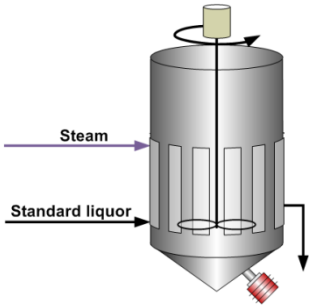




BEET SUGAR



Introduction

Crystallization has a major effect on product quality and production costs. Supersaturation is the driving force of crystallization and crystal growth. The speed of crystallization depends on this parameter. Excessive superaturation results in poor crystal quality (fines and conglomerates). The crystals are melted, concentrated, re-circulated and crystallized again. This leads to a waste of time and energy, decreased yield of sugar per strike, increased water usage and increased production costs. A selective measurement of the liquid phase is required for successful control of the supersaturation.

Refractometer

The K-Patents Process Refractometer is successfully used for selective measurement of liquid phase over the complete crystallization strike. Due to the unique digital principle, the K-Patents refractometer measures the true concentration of the mother liquor, without being influenced by the sugar crystals or bubbles in the pan.

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, which gives no useful information. The nuclear density meter gives no information about the concentration drop or of the supersaturation level after the seeding.

Viscosimeter / Rheometer

The viscosimeter signal is mainly a function of the crystal content but is also influenced by the 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 the signal is low and highly temperature dependent.

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 of a 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.

Microwave Density Meter

Microwave density meter can measure only the total solids (liquid and undissolved solids phase). Microwave probes are based on the measurement of attenuation and phase shift of microwave radiation. Both are related to the length travelled by the radiated signal, and the density and dielectric characteristics of the medium.

Phase shift is the result of decreasing speed of propagation. Due to the fact that water has a high dielectric constant compared to sugar and the

accompanying non-sugars, water content (and, consequently, solids content) is the major parameter, which determines the dielectric properties of the medium. As an output the microwave probes provide density or solids content of the massecuite.