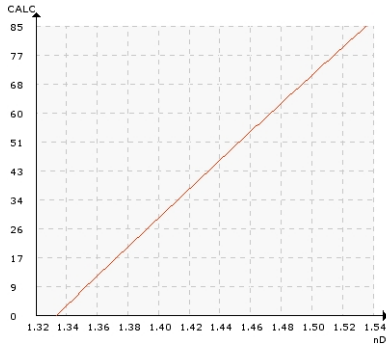


## GREEN LIQUOR

### Typical end products

Unbleached kraft pulp, bleached kraft pulp

Chemical curve: R.I. per black liquor conc% at ref. temp. of 20°C



### Introduction

The purpose of the chemical recovery process is to recover and regenerate the pulping chemicals, and to burn the organic material dissolved from wood to generate steam. The chemical recovery process consists of evaporation plant, recovery boiler and causticizing plant.

The object of the causticizing process is to convert the inactive sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) into the active cooking chemical, sodium hydroxide, as efficiently as possible. The process can be divided into four parts: green liquor clarification/filtration,

slaking, causticizing and white liquor clarification/filtration

### Application

The smelt from the boiler is dissolved in water and processed into green liquor in the dissolving tank. The raw green liquor, consisting mostly of sodium carbonate and sodium sulfide, is pumped to the causticizing area.

The green liquor is clarified and brought into contact with reburned lime. In causticizing, the green liquor is converted into white liquor by converting sodium carbonate into sodium hydroxide, an active cooking chemical. The white liquor is produced by the separation of the lime mud,  $\text{CaCO}_3$ , a by-product of causticizing, which is converted back into lime using a lime kiln.

The first step in controlling the causticizing process is to stabilize the green liquor's Total Titratable Alkali (TTA) going to the slaker. For control purposes, the TTA measurements of the green liquor's main streams, from the dissolving tank and from the clarifier, should be known. Effective causticizing control leads to improved white liquor quality and increased process capacity. Well performed lime dosage control reduces the recirculation flow of lime in the process, leading to less lime re-burning in the lime kiln.

<b>PULP AND PAPER</b>	
<b>APPLICATION NOTE</b>	<b>3.01.05</b>
<b>KRAFT (SULFATE) PULP: CAUSTICIZING</b>	

## Installation

The K-Patents SAFE-DRIVE™ Process Refractometer PR-23-SD is used to measure the green liquor dissolved density or the green liquor's TTA at two stages in the process: after the green liquor dissolving tank and after the green liquor clarifier. The in-line measurement allows real time trimming of the green liquor to meet the target TTA.

The digital measurement is unaffected by bubbles, suspended particles or color changes to the green liquor. Also, green liquor forms a heavy scaling in the pipe walls. This may be as much as an inch per week. The K-Patents in-line sensor design enables accurate measurement in these difficult scaling conditions.

Typical measurement range is 100-150 g/l (6.0-8.5 lb/ft<sup>3</sup>) and the process temperature is 85°C (185°F). Automatic prism wash keeps the prism clean, securing representative samples.

## Instrumentation



## Description

K-Patents SAFE-DRIVE™ Process Refractometer PR-23-SD for measuring black liquor dry solids and green liquor density or TTA in kraft chemical recovery process. K-Patents SAFE-DRIVE™ design allows for safe and easy insertion and retraction of the sensor under full operating pressure without having to shut down the process.

Measurement range:

Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 % by weight.