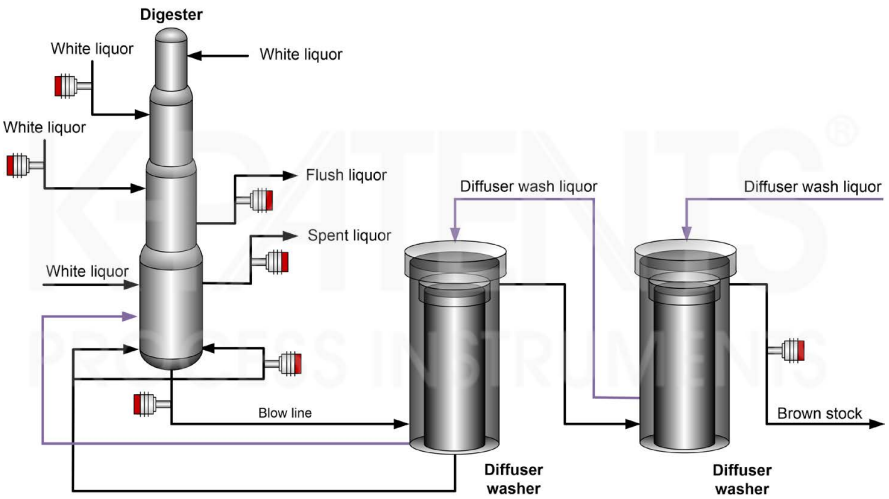
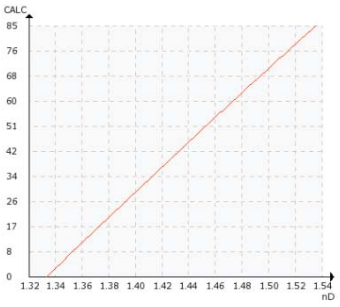


KRAFT PULP, BLACK LIQUOR, WHITE LIQUOR, BROWN STOCK

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 first main operation in the Kraft pulping process involves the extraction of cellulose from wood by dissolving the lignin that binds the fibers together in a strongly alkaline solution.

This process is known as *cooking*. After the wood pulp is obtained, it is washed and bleached to obtain the fibrous product.

To optimize the pulp chemical consumption and water usage, the black liquor concentrations have to be measured before and after washing.

Application

Incoming wood is debarked and chipped to an optimal size to minimize the fibre damage, and to maximize the impregnation of the cooking liquor. The chips and the cooking liquor are fed into a large vessel known as *digester.* The pulping reaction takes place at a high temperature and under pressure.

After cooking, the pulp passes through a blow line to the blow tank and then to a washing section. The diffuser washers separate the black liquor from the fibers by washing them with a washing liquor or water. The products from the fiber line are a clean pulp, and a diluted black liquor known as *weak liquor*.

The washed pulp is then screened before it is sent to the bleaching plant, and the weak black liquor passes from the washing section to the chemical recovery area.

Instrumentation and installation

The K-Patents SAFE-DRIVE™ Refractometer PR-23-SD is used to measure black liquor solids in the extraction, blow line and washing stages. The refractometer is mounted directly on the pipe for continuous measurement of dry solids content in the liquors.

The refractometer's measurement is unaffected by bubbles, particles, consistency, flow, ion changes, pH, temperature, pressure, color or turbulent flow. The

measurement surface is periodically cleaned using an automatic integrated prism cleaning system.

The real-time information from the refractometer allows to monitor the efficiency of the digester, calculate mass balances and create operation models for the digester. In addition, the brown stock washing operation can be controlled and optimized.

Black liquor concentration measurement with the SAFE-DRIVE PR-23-SD help to increase washing efficiency, obtain a consistent pulp quality, reduce bleaching chemical consumption and the environmental load, and increase evaporation efficiency.

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.