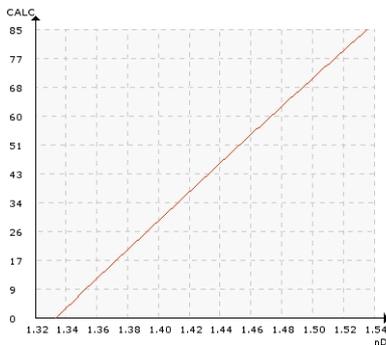


SULFITE PULP, BROWN OR RED LIQUOR

Typical end products

Specialty papers, fine paper, tissue, glassine, cellulose derivatives (rayon, cellophane, cellulose acetate, methylcellulose)

Chemical curve: Black liquor R.I. per Conc% by weight at Ref. Temp. of 20°C



Introduction

Sulfite pulp process is another chemical pulp process. The sulfite process produces wood pulp, which is almost pure cellulose fibres, by using various sulfurous acid salts to extract the lignin from wood chips in large pressure vessels called digesters. The salts used in the pulping process are either sulfites (SO_3^{2-}) or bisulfites

(HSO_3^-), depending on the pH. The counter ion can be sodium (Na^+), calcium (Ca^{2+}), potassium (K^+), magnesium (Mg^{2+}) or ammonium (NH_4^+).

The market for sulfite pulp is a small fraction of the kraft pulp's. However, sulfite pulp remains an important commodity for specialty papers and a source for non-paper applications such as rayon, cellulose acetate and cellulose ether derivatives.

Compared with the kraft pulping (sulfate process) sulfite pulping is not as versatile. The pulp itself is bright and easy to bleach. However, the suitable wood species are limited. For instance, it is not possible to use pine as the raw material. Sulfite pulps have properties, which are desirable for tissues and fine quality papers.

Process

Pulping Process

The chipped wood, usually spruce, and the cooking liquor are brought to a digester, where the actual cooking takes place.

The pulp is in contact with the pulping chemicals for 4 to 14 hours and at temperatures ranging from 130 to 160°C (266 to 320°F), depending on the chemicals

PULP AND PAPER	
APPLICATION NOTE	3.02.00
SULFITE PULP PROCESS	

used. Pulp and spent cooking liquor are led through a blow tank to pulp washers. In the washing process, the spent cooking liquor and the pulp are separated with hot, pressurized water. The pulp is passed through screens and into storage. It is ready for bleaching.

Chemical Recovery

The spent cooking liquor from sulfite pulping is called brown or red liquor (compared to black liquor in the kraft process).

After the washers, the weak red liquor enters a storage tank, having approximately 13-15% solids. The liquor is concentrated in a multiple-effect evaporator system and transferred into a strong liquor tank, when the required concentration reaches (between 60-65%) the boiler operation. In the recovery boiler, the strong red liquor is burned off and the base (usually magnesium) is recovered for recycling.

Installation

The K-Patents SAFE-DRIVE™ Process Refractometer PR-23-SD is used to measure concentrations at different phases of the process.

The refractometers situated before and after the digester control the concentration of the cooking liquor to give optimal digestion of pulp. Measurement range is 0-15%b.w. and temperature is approximately 100°C (212°F).

Weak red liquor concentration is measured after the washers. The temperature is 60°C (140°F) and the concentration is 20%b.w.

Installations before and after the evaporators measure concentrations of 10-20%b.w. and 50-70%b.w. respectively. The temperature is between 120 and 130°C (248 and 266°F). These concentration measurements are used to maintain a consistent flow to the feed, maximizing evaporator capacity. Through the strong liquor measurements, the refractometer provides a safety control. The concentration is 60-65%b.w. and the temperature can rise up to 110°C (230°F).

Instrumentation	Description
	<p>K-Patents SAFE-DRIVE™ Process Refractometer PR-23-SD for measuring brown/red liquor dry solids in sulfite pulping 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.</p>
<p>Measurement range:</p>	<p>Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 % by weight.</p>