SulfoLoop SULFUR RECOVERY PLANT USING ThioKraft TECHNOLOGY

SINGLE STORY

Sodium-sulfur balance in control with major chemical savings.

ANDRITZ

ANDRITZ ThioKraft plant

ThioKraft: Sodium-sulfur balance in control with major chemical savings

ANDRITZ SulfoLoop™ sulfur recovery plant uses ThioKraft technology, a new and clear example of what can be achieved at a pulp mill to control the sodium-sulfur balance, at the same time as enabling significant savings in chemical use.

ANDRITZ explores many avenues on its mission to transform pulp mills into truly circular and self-sustaining production powerhouses. It's latest addition to the SulfoLoop product family, ThioKraft, uses bacteria to convert sulfides from green liquor into elemental sulfur.

The process was originally developed by the Dutch biotech company Paques along with Stora Enso. Paques specializes in biological sulfur removal with its technology being commonly applied in wastewater treatment in the pulp and paper industries. ANDRITZ has recently partnered with Paques to offer the sulfur recovery solution for pulp mill circularity.

How ThioKraft technology works

Controlling the sodium-sulfur balance at a pulp mill is a crucial task and can be expensive when it comes to purging sulfate streams to wastewater and adding make-up chemicals to achieve the perfect result. So, imagine being able to control the required sodium-sulfur balance in the process, and at the same time creating a fully usable side stream of sulfur to make sulfuric acid for the mill's needs.

The ThioKraft process is designed to benefit the control of the sodium sulfur balance by extracting only a minor share of the green liquor and removing the sulfur using bacteria in a bioreactor. Bacteria originating from sulfur lakes are able to withstand high salinity and pH. The green liquor is then treated in a bioreactor where the bacteria oxidize sulfide-ions into elemental sulfur, finally producing solid sulfur cakes with a filter press.

"The green liquor is taken in and introduced to the bacteria, along with air, nutrients, and CO_2 where the sulfide is converted into elemental sulfur," says Aino Pesola, Development Engineer, Research & Innovation.

After the conversion process the treated green liquor goes back to the mill and the sulfur slurry is pressed into a solid form.

"In the ThioKraft process, we take just a small percentage of green liquor, enough to optimize the sodium-sulfur balance.

In the end the mill needs to add less make-up sodium to the process, or it can use cheaper sodium make-up chemicals, such as sodium sulfate."

AINO PESOLA
Development Engineer
Research & Innovation

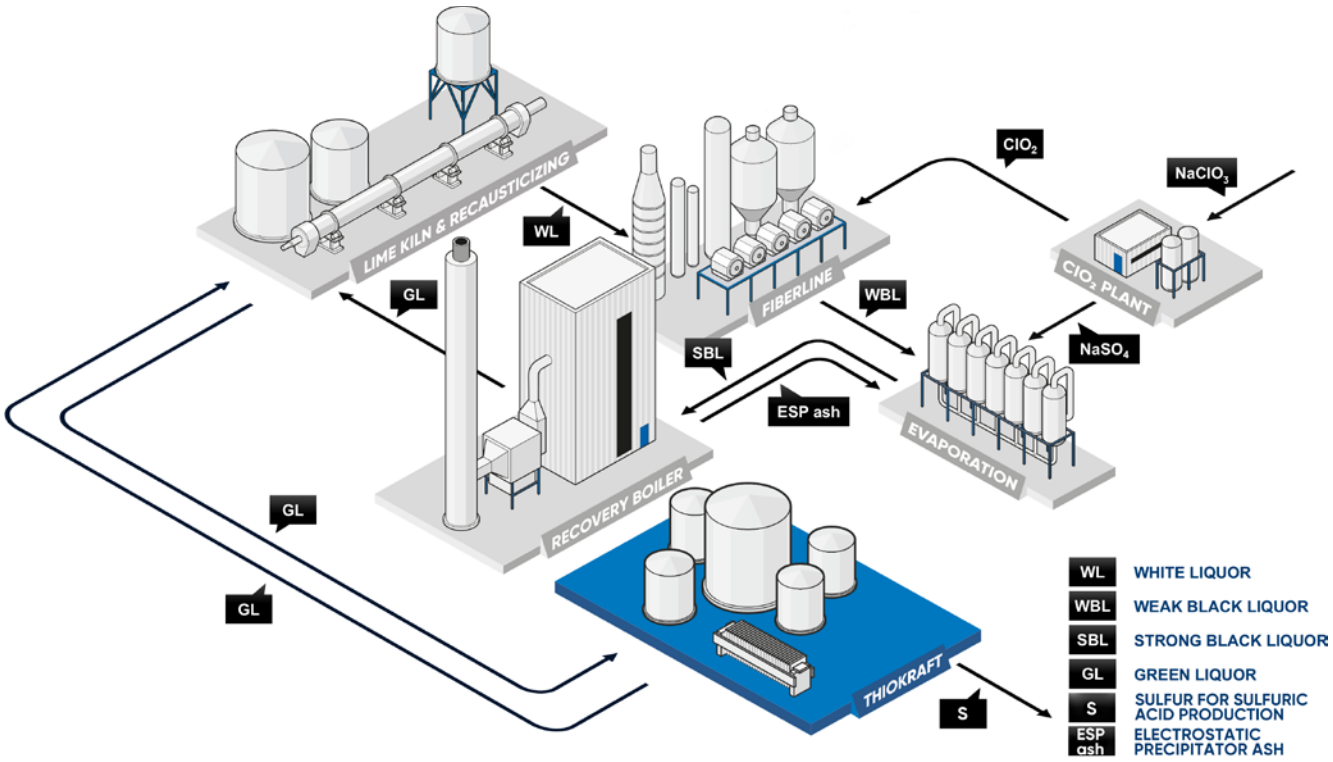
Synergies with the SulfoLoop sulfuric acid plant

ThioKraft can run alongside ANDRITZ's SulfoLoop sulfuric acid plant. The sulfuric acid plant only removes some 4 kg of sulfur per ADT of pulp from concentrated non condensable gases (CNCG) without additional process steps. For the sulfur recovery plant, there is no technical limit for the sulfur extraction, which can be very useful, for example, in mills investing in lignin recovery.

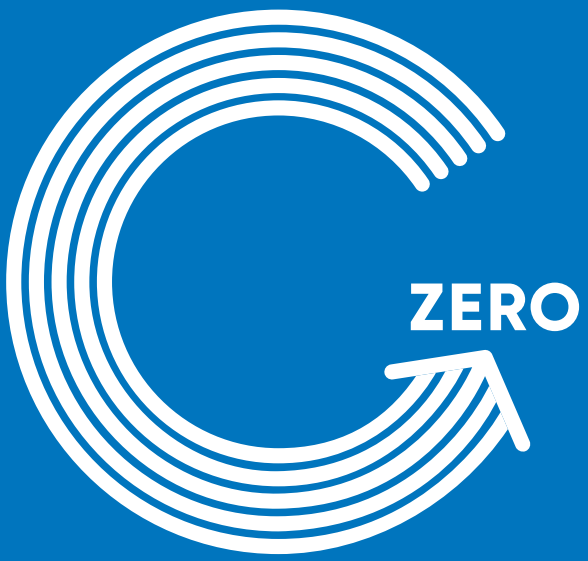
Sulfur recovery plants are economically viable even at small pulp mills, unlike sulfuric acid plants, which need larger scale. Ideally, multiple nearby mills would host sulfur recovery units feeding one central sulfuric acid plant. Alternatively, adding sulfur recovery enhances flexibility in mills expanding capacity or investing in processes like lignin recovery.

Pesola explains, "With ThioKraft, as long as the sulfuric acid plant is designed to run complementary with elemental sulfur, the mill can, in future scenarios, take more sulfur out of the cycle and replace part of the purchased elemental sulfur with internally produced sulfur."

The ThioKraft system utilizes not just green liquor from the mill, but also CO_2 from the flue gases. In addition, the system can use mill internal liquid streams instead of fresh mill water. "Obtaining CO_2 from the lime kiln is another advantage of the ThioKraft system as it closes more loops and avoids the cost of acquiring CO_2 elsewhere," adds Pesola.



FROM DEEP RESEARCH INTO OPPORTUNITY AND FINAL PRODUCT



ANDRITZ has deeply researched the opportunity ThioKraft technology represents in the pulp process and has worked with Paques on utilizing the technology. Pesola concludes, “We have recently signed an agreement with Paques and we can now offer the technology under our SulfoLoop brand of products. Basically, Paques will supply the technology license and core equipment, and ANDRITZ does the rest, installs the technology, and optimizes the process.”

A SulfoLoop sulfur recovery plant using the ThioKraft process is part of ANDRITZ’s CircleToZero™ product portfolio, which focuses on eliminating unused side streams, creating new added value products, and laying a foundation for zero emissions and zero waste production.

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EUROPE
ANDRITZ OY
p: +358 020 450 5555

BRAZIL
ANDRITZ BRASIL Ltda.
p: +55 41 2103 7611

CircleToZero@andritz.com

ANDRITZ.COM

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