

Kraft Pulping Explained: How Wood Chips Become Paper

Kraft Pulping Process Explained

The chemical pulping process is commonly referred to as kraft pulping. In kraft pulp mills, the word “**kraft**” means *strength*, and “**liquor**” refers to the chemical liquids used to:

- Turn wood chips into pulp
- Recover and reuse the pulping chemicals

The 3 main liquors are:

- **White liquor** dissolves non-fibrous parts of the wood chips
- **Black liquor** carries away the dissolved wood material and used chemicals
- **Green liquor** is the chemical recovery step that helps regenerate fresh white liquor

The liquors work in a closed loop.

More than 90% of these chemicals are reused.

Why the Kraft Pulping Process Is Needed

The kraft pulping process is essential because it's proven to be the most effective and efficient large-scale way to **separate wood fibers from lignin**. It preserves the strength needed to make everyday products and enables the chemicals to be reused repeatedly.

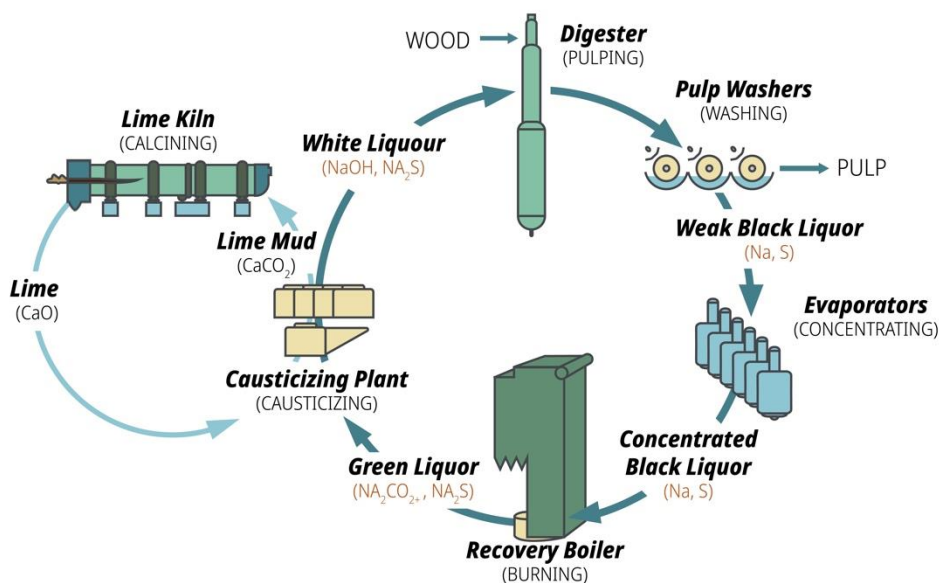
Wood fibers are held together by lignin, a **natural glue-like** material. The chemicals used in the kraft process **loosen** that bond so the useful wood fibers can be separated from the lignin without damaging them.

The process also keeps wood fibers **long and strong**. That is important when manufacturing products like cardboard boxes, paper towels, paper bags, paper cups, printer paper and more.

How the Liquor Cycle Works

The liquor cycle is also referred to as the kraft recovery process.

1. **White liquor cooks the wood chips.** The chemicals in white liquor help separate the useful wood fibers from lignin.
2. **Black liquor is collected after cooking.** It contains the dissolved wood material, including lignin, and the pulping chemicals.
3. **Black liquor is concentrated and burned** to separate the chemicals from the dissolved wood material. Burning the dissolved material produces useful energy that powers the mill, while the leftover chemicals are used to make green liquor.
4. **The leftover chemicals become green liquor** by being dissolved in water.
5. **Green liquor becomes white liquor again.** The green liquor is treated with lime to regenerate white liquor, allowing the mill to reuse the chemicals.
6. **The cycle repeats**, allowing the mill to reuse chemicals continuously.



Why the Kraft Recovery Process Matters

The kraft recovery process is a closed-loop process and contributes to paper production circularity. **White liquor** starts the process. **Black liquor** carries away what is removed from the wood and provides energy. **Green liquor** is the bridge that helps make white liquor again. This helps mills reduce waste, improve efficiency and support continuous pulp production.

Papermaking “Liquors” Defined

WHITE LIQUOR

What it is? A strong alkaline cooking liquid made mainly of sodium hydroxide and sodium sulfide.

What it does: Used to “cook” the wood chips. Breaks down lignin—the natural glue—and separates it from the useful wood fibers.

BLACK LIQUOR

What it is? The liquid leftover after cooking the chips. It contains dissolved wood material, especially lignin, along with the used pulping chemicals.

What it does: It is concentrated and burned to separate the chemicals from the dissolved wood material. The dissolved wood material is burned in a recovery boiler. That produces steam and bioenergy to power the mill and can be sold to the electrical grid. The leftover chemical material is used to make green liquor.

GREEN LIQUOR

What it is? A liquid made by dissolving the leftover chemical material from burned black liquor in water.

What it does: It is treated with lime to turn it back into white liquor, completing the chemical recovery cycle.