

Dialogue

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An information service from the Lignin Institute

Lignin—Products With Many Uses

Lignins are derived from an abundant and renewable resource: trees, plants and agricultural crops. Lignins are nontoxic and extremely versatile in performance, qualities that have made them increasingly important in many industrial applications.

Commercial lignin is currently produced as a co-product of the paper industry, separated from trees by a chemical pulping

As a Dispersant

Lignosulfonates prevents the clumping and settling of undissolved particles in suspensions. By attaching to the particle surface, it keeps the particle from being attracted to other particles and reduces the amount of water needed to use the product effectively. The dispersing property makes lignosulfonate useful in:

cement mixes	leather tanning concrete
clay and ceramics	admixtures
dyes and pigments	gypsum board
oil drilling muds	pesticides & insecticides

process such as the one diagrammed on the reverse side. Lignosulfonates (also called lignin sulfonates and sulfite lignins) are products of sulfite pulping. Kraft lignins (also called sulfate lignins) are obtained from the kraft pulping process.

As a Binder

Lignosulfonates are a very effective and economical adhesive, acting as a binding agent or "glue" in pellets or compressed materials. Lignosulfonate used on unpaved roads reduce environmental concerns from airborne dust particles and stabilize the road surface. This binding ability makes it a useful component of:

coal briquettes	plywood & particle board
ceramics	animal feed pellets
carbon black	fiberglass insulation
fertilizers & herbicides	linoleum paste
dust suppressants	soil stabilizers

As a Sequestrant

Lignosulfonates can tie up metal ions, preventing them from reacting with other compounds and becoming insoluble. Metal ions sequestered with lignosulfonates stay dissolved in solution, keeping them available to plants and preventing scale deposits in water systems. As a result, they are used in:

- micronutrient systems
- cleaning compounds
- water treatments for boilers and cooling systems

Other delignification technologies use an organic solvent or a high pressure steam treatment to remove lignins from plants.

Because lignin is a very complex natural polymer with many random couplings, the exact chemical structure is not known. Physical and chemical properties differ depending on the extraction technology. For example, lignosulfonates are hydrophilic (will dissolve in water) and kraft lignins are hydrophobic (will not dissolve in water). The usefulness of commercial lignosulfonates products comes from their dispersing, binding, complexing and emulsifying properties.

As an Emulsifier

Lignosulfonate stabilizes emulsions of immiscible liquids, such as oil and water, making them highly resistant to breaking. Lignosulfonates are at work as emulsifiers in:

asphalt emulsions	pesticides
pigments and dyes	wax emulsions

Industry first began to use lignin in the 1880s when lignosulfonates were used in leather tanning and dye baths. Since then, lignosulfonates have even found applications in food products, serving as emulsifiers in animal feed and as raw material in the production of vanillin. (Vanillin is widely used as an ingredient in food flavors, in pharmaceuticals and as a fragrance in perfumes and odor-masking products.) Lignin uses have expanded into literally hundreds of applications - impacting on many facets of our daily lives.



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