

ENVIRONMENTAL FOOTPRINT COMPARISON TOOL

A tool for understanding environmental decisions related to the pulp and paper industry



WOOD USE

EFFECTS OF DECREASED RELEASE OF CHLORINATED COMPOUNDS ON LAND AND WOOD USE

Effectiveness of Chlorine-based vs. Oxygen-based Bleaching

In his primer on the bleaching of chemical pulps, Ragauskas has compared the basic properties of bleaching agents in terms of a high (H), medium (M), and low (L) effectiveness (Ragauskas n.d.).

	Efficiency ^a	Reactivity ^b	Selectivity ^c	Dirt Removal ^d	Environmental Implications
Chlorine	H	H	H	H	H
Chlorine Dioxide	H	M	H	H	M
Oxygen	L	L	M	M	L
Peroxide	L	L	H	L	L
Sodium Hypochlorite	M	M	M	H	H
Ozone	H	H	M	L	L

^a the degree to which a bleaching agent's oxidizing power is used in desirable, lignin-degrading reactions

^b the fraction of the residual lignin that the bleaching agent is practically capable of removing

^c the degree to which the bleaching agent can remove lignin without dissolving or damaging the other components of the fiber, cellulose and hemicellulose

^d the ability to remove dirt particles, a very important characteristic benefited by slower lignin reaction time

The comparison illustrates why there was historical preference for elemental chlorine, apart from its environmental implications, and shows the advantage enjoyed by chlorine dioxide relative to oxygen-based bleaching agents.

References

Ragauskas, A. n.d. Basics of bleaching chemical pulps. IPST-Ga Tech. http://www.ipst.gatech.edu/faculty_new/faculty_bios/ragauskas/technical_reviews/Basics%20of%20Pulp%20Bleaching.pdf