



Pulp and Paper Uses for Dow Chelating Agents

Dow chelating agents are important processing additives in the pulp and paper industry. The use of chelating agents can result in lower bleaching costs. This is achieved by improved bleachability of pulp and/or better control of metal ion catalyzed bleach degradation reactions. Dow chelating agents also limit reactions that produce colored complexes, reduce brightness reversion, as well as affect scale and pitch problems.

Better Bleaching of Pulps

Sources of metal ions in the (mechanical, chemical, recycled) pulping processes include contamination from process equipment and chemical additives, but primarily from the wood itself. These metals (Cu^{+2} , Mn^{+2} , Fe^{+3}) can contribute to lower bleaching efficiencies by catalyzing decomposition of hydrogen peroxide. Iron can react with other chemical species in the pulp to produce colored complexes resulting in inefficient sodium hydrosulphite brightening and brightness reversion. Used properly, Dow chelating agents effectively control these metal ions for bleaching operations.

Peroxide Bleaching

Metal ions (Cu^{+2} , Mn^{+2} , Fe^{+2}) catalyze decomposition of peroxide. Optimum peroxide bleaching efficiency is obtained when chelant is added to the pulp prior to a thickening stage and the chelated metals are subsequently removed in thickening prior to addition of peroxide to the pulp. Some benefits can be realized by adding the chelant with the hydrogen peroxide but this is not as efficient as pretreatment.

Silicate-Free Peroxide Bleaching

The use of sodium silicate as part of the peroxide bleaching formulation can result in severe silicate scale problems in process lines and equipment as well as interfere with the performance of positively charged wet-end chemicals. A Dow chelating agent can be used to partially or completely replace sodium silicate and control or eliminate these problems.

Hydrosulphite Bleaching

When bleaching mechanical pulps with sodium hydrosulphite, brightness gains of 2.0 G.E. units can be achieved with the

addition of 4-8 pounds of VERSENE™ 100 Chelating Agent per ton of oven-dried (O.D.) pulp, depending on specific mill bleaching conditions. VERSENE 100 Chelating Agent has also been used with refiner hydrosulphite bleaching to gain up to 3.5 G.E. units of additional brightness. If additional brightness gains are not required, addition of chelating agent can reduce the bleaching chemical costs required to maintain current brightness. Dow chelating agents should be added with the hydrosulphite to maximize the beneficial effects.

Brightness Reversion Control

Experience has shown that bleached pulps may revert in color when left standing for more than one half-hour in the presence of uncontrolled metal ions. This reversion can be reduced by adding 2-5 pounds of Dow chelating agent formulation per ton of O.D. pulp to the final bleached pulp. This has been demonstrated under mill and laboratory conditions for both chemical and mechanical pulps. Brightness reversion tendencies have been reduced up to four units G.E. brightness, depending on

actual mill conditions. In addition, spraying a solution of peroxide and VERSENEX™ 80 Chelating Agent onto wet lap bleached kraft pulp (0.25% of H₂O₂ at 50% and VERSENEX 80 per ton of O.D. pulp) can give added brightness reversion protection during storage and transit.

Scale Control

Metal ions causing scale deposits on process equipment and in digesters and heat exchangers can be controlled by Dow chelating agents and/or chelating agent formulations. These may be used during cleaning shutdowns or may be added continuously to reduce scale buildup and required shutdowns.

Pitch Control

Chelating agent additives also contribute to pitch control by controlling positive calcium ions which may act as nucleating sites for agglomerating pitch particles.

Iron in Papermakers' Alum and in Clay Additives

High levels of iron have been measured in papermakers' alum (1300 ppm) and in clay additives (2400 ppm). This iron can be controlled through the use of chelating agents to reduce iron-caused brightness reversion problems with both chemical and mechanical pulps. In particular, iron in alum has caused up to 3.0 G.E. units of brightness reversion in high groundwood furnishes. Experience has shown that reversion may be cut in half by addition of VERSENE™ 100 Chelating Agent to the alum. Amounts added must be sufficient to chelate the iron present.

For more information, contact us at your convenience:

www.versene.com

North America

Toll-Free

+1 (800) 441-4369

The Dow Chemical Company

2211 H.H. Dow Way

Midland, MI 48674

Notice: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, the Customer is responsible for determining whether products and the information in this document are appropriate for the Customer's use and for ensuring that the Customer's workplace and disposal practices are in compliance with applicable laws and other governmental enactments. The technology represented in this document may not yet be registered, and related products may not yet be available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

Notice: Any photographs of end-use applications in this document represent potential end-use applications but do not necessarily represent current commercial applications, nor do they represent an endorsement by Dow of the actual products. Further, these photographs are for illustration purposes only and do not reflect either an endorsement or sponsorship of any other manufacturer for a specific potential end-use product or application, or for Dow, or for specific products manufactured by Dow.

References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted.

©™ Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow