Tannin Stain Inhibition

April 19, 2012

Atlanta Section
Tannin staining is the discoloration of a painted surface due to the migration of water soluble Tannins (tannic acids) through the film. May appear immediately or after prolonged exposure to humid conditions. Tannins may be more concentrated around high pressure areas (i.e. – nails, strapping marks, knot holes).
Phenolic compounds found in plant parts.
  - Buds, roots, seed, stem tissue

Tannins are responsible for:
  - Taste in grapes (astringent)
  - Red wine (2-4 g/L)
  - White wine (0.2-0.4 g/L)
  - Color
  - Appearance
  - Oxidative discoloration
  - Anti-microbial activity
Tannin Stain Inhibition

**Manifestation of Tannin stains:**

**WOOD**

1. Penetration
2. Solubilization
3. Diffusion
4. Migration

**TANNIN STAINING**

*UN* inhibited Coating
Background Information:
Two Groups of Tannins

Categories

Hydrolyzable (HT)
- Rarer
- Hydrolyzed by mild acid or mild bases to yield carbohydrate & phenolic acids

Condensed (CT)
- More common
- Flavor-causing
Tannin Stain Inhibition

Definition of Tannins:

Tannins (tannic acids) are high molecular weight polyphenolic molecules found in wood – Lignins, Cellulose, and Hemicellulose.
(Tannin) Chelation and Precipitation

Proof of the Concept:

Control

Fe$^{3+}$-Tannate

Al$^{3+}$-Tannate

Insoluble complex
**Tannin Stain Inhibition**

**Methods of Reducing Tannins:**

**BARRIER PROPERTIES**

- Resin composition
- Pre-Treatment

**CHEMICAL REACTIONS**

- Chelation
- Sequestering
- Bleaching Agents
## HALOX Tannin Stain Inhibitors

**Select Physical Properties:**

<table>
<thead>
<tr>
<th></th>
<th>Powder</th>
<th>Liquid</th>
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<tbody>
<tr>
<td><strong>Cations</strong></td>
<td>Calcium Barium</td>
<td>Aluminum Zirconium</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>7.3</td>
<td>9.5</td>
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<tr>
<td><strong>Oil Absorption</strong></td>
<td>38.8</td>
<td>35.4</td>
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<tr>
<td><strong>% Water Solubility</strong></td>
<td>0.17</td>
<td>0.11</td>
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<tr>
<td><strong>Density g/ml</strong></td>
<td>2.77</td>
<td>3.10</td>
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<tr>
<td><strong>Mean particle size µm</strong></td>
<td>5.1</td>
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The chelation process is essentially the reaction of slightly water soluble metal cations from inhibitive pigments with hydroxyl groups on the phenolic rings present in all Tannins.
For improved package stability use:

- Tamol 681, 731, & 850 (DOW)
- Dispex HDN & DP6-7200 (BASF)
- Disperse Ayd W-28 (Elementis)
- Triton CF-10 (DOW)
- Surfynol 104A & 104PG (Air Products)
- Coatex A-122 (Coatex)
- DrewPlus L-475 (Ashland/Drew)
- BYK 035 (BYK Chemie)
- Rhodoline 643 (Rhodia)
• For proven resin performance:
  • Rhoplex and Maincoat (DOW)
  • Acronal (BASF)
  • Aquamac (PCCR)
  • Viacryl VSC 6275 (Solutia)
  • Neocryl (DSM)
Coalescing Agents

- Ester Alcohols (e.g. Texanol) and Propylene Glycol are preferred.
- Glycol Ethers (e.g. Propylene Glycol Monobutyl ether) may reduce tannin stain inhibitor efficiency.

Why?

Lewis Base \( \rightarrow \) Complexed metal ion rendered *unavailable*
Most times, resin selection has been made, in addition to preferred additive lists.

What do you do?

www.halox.com

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Key Technical Service

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