ACTI V-8® and ACTI V-8® HGL
Drier Accelerator and Stabilizer

Vanderbilt Minerals, LLC
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What is **ACTIV-8®**?

- **ACTIV-8** Drier Accelerator and Stabilizer is a solution of 1,10-phenanthroline in \( n \)-butanol or hexylene glycol.

- **ACTIV-8** is *NOT* a drier.

- 1,10-phenanthroline is a chelating agent.

- **ACTIV-8** works with cobalt and manganese driers to stabilize and accelerate the drying time.
**Typical Properties of ACTIV-8®**

<table>
<thead>
<tr>
<th>ACTIV-8 Drier Accelerator</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Ingredient</strong></td>
<td>1,10-phenanthroline (38 %)</td>
</tr>
<tr>
<td><strong>Solvents</strong></td>
<td>$n$-Butanol (52 %)</td>
</tr>
<tr>
<td></td>
<td>2-ethylhexoic acid (10 %)</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>0.95 g/mL</td>
</tr>
<tr>
<td><strong>VOC</strong></td>
<td>492 g/L (4.1 lbs/gal)</td>
</tr>
</tbody>
</table>

- **ACTIV-8** accelerates and stabilizes the drying rates of solvent-borne and water-borne coatings that cure by oxidative polymerization
Typical Properties of **ACTI V-8® HGL**

**ACTI V-8 HGL** Drier Accelerator

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>1,10-phenanthroline (38 %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent</td>
<td>Hexylene glycol (62 %)</td>
</tr>
<tr>
<td>Density</td>
<td>1.03 g/mL</td>
</tr>
<tr>
<td>VOC</td>
<td>640 g/L (5.3 lbs/gal)</td>
</tr>
</tbody>
</table>

- **ACTI V-8 HGL** is a water miscible drier-accelerator

- The addition of **ACTI V-8 HGL** to the waterborne coating will inhibit the loss of dry
Alkyd Drying and Metallic Driers

- Alkyd coatings form a film and dry by an oxidative process.

- Oxygen from the air cross-links the resin.

- The oxygen up-take process is catalyzed by the presence of certain transition metals.

- Cobalt (top drier) and manganese (through drier) are the most active metallic driers.

- Additional metallic driers include zirconium, calcium, zinc, iron, and rare earths.
Metallic Driers and **ACTIV-8®**

- **ACTIV-8** Drier Accelerator chelates with cobalt and manganese, also with zinc and iron.

- By the chelation, the most favorable valence state of the metal is maintained.

- Beware of *PINK AND ZINC*
  - Iron plus **ACTIV-8** creates a strong pinkish/red colored complex.
  - Zinc plus **ACTIV-8** forms an insoluble compound that does not aid in drying.
Why use **ACTIV-8®**?

- For the most consistent drying, a blend of driers and **ACTIV-8** Drier Accelerator is recommended.
- **ACTIV-8** and cobalt is the most powerful drying combination.
- In water-reducible alkyd coatings that use cobalt as the drier, **ACTIV-8 HGL** will prevent loss of dry.
How much ACTIV-8® do I need?

• The general rule of thumb is:
  
  • For solvent-borne alkyds use 10 parts (as supplied) of ACTIV-8 Drier Accelerator per 1 part of cobalt or manganese metal.
  
  • For water-reducible alkyds use 5 parts (as supplied) of ACTIV-8 HGL per 1 part of cobalt metal.

• There are three steps to determining the amount of ACTIV-8 to use.
Step 1: Determine the amount of resin solids in the coating

- Determine the amount of resin solids in the coating

- Example:
  
  - 195 kg of a 90% non-volatile solids alkyd resin solution contains:

  \[
  195 \text{ kg} \times 0.90 = 175 \text{ kg of resin solids}
  \]
Step 2: Determine the amount of metallic drier to use

- Driers are supplied as solutions of metallic salts of long chain organic acids in various solvents.
- Their concentrations are expressed as % metal.
- Recommended amounts of driers for air dry coatings are (based on resin solids):
  - Cobalt: 0.02—0.05%
  - Manganese: 0.02—0.06%
Step 2: Determine the amount of metallic drier to use

- **Example:**
  - For the 175 kg of resin solids in Step 1, determine the amount of 12% cobalt solution that is equivalent to 0.05%

\[
175 \text{ kg of resin solids} \times 0.0005 = 0.0875 \text{ kg of cobalt}
\]

\[
0.0875 \text{ kg / 0.12} = 0.729 \text{ kg of 12% cobalt solution}
\]
Step 3: Determine the amount of ACTIV-8® Drier Accelerator to use.

- Determine the amount of ACTIV-8 Drier Accelerator to use.

- Example:

  - The 0.729 kg of cobalt solution contains 0.0875 kg of cobalt metal.

    \[0.0875 \text{ kg} \times 10 = 0.875 \text{ kg of ACTIV-8}\]
Examples of effectiveness of **ACTI V-8®** Drier Accelerator

- **Paint:** **ACTI V-8 HGL** with cobalt drier in a water-reducible alkyd
- **Goal:** Improved loss of dry prevention

<table>
<thead>
<tr>
<th>Formulations</th>
<th>Control</th>
<th>Improved Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.15 % Co</td>
<td></td>
</tr>
<tr>
<td>Improved Formula</td>
<td>0.15 % Co</td>
<td>0.75 % <strong>ACTI V-8 HGL</strong></td>
</tr>
</tbody>
</table>
## Drying Test Results

<table>
<thead>
<tr>
<th></th>
<th>Control (0.15 % Co)</th>
<th>Improved Formula (0.15 % Co/0.75 % ACTIV-8 HGL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set to touch</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Tack free</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Hard dry</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td><strong>Day 60</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set to touch</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tack free</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Hard dry</td>
<td>&gt;24</td>
<td>7</td>
</tr>
</tbody>
</table>

- Use of **ACTIV-8 HGL** decreased loss of dry and improved dry times
Examples of effectiveness of ACTIV-8® Drier Accelerator

- **Coating**: high gloss black solvent-borne alkyd coating
- **Goal**: improve drying rate

### Formulations

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Improved Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05 % Co</td>
<td>0.05 % Co</td>
<td>0.05 % Co</td>
</tr>
<tr>
<td>0.33 % Zr</td>
<td>0.33 % Zr</td>
<td>0.33 % Zr</td>
</tr>
<tr>
<td>0.17 % MEKO</td>
<td>0.17 % MEKO</td>
<td>0.17 % MEKO</td>
</tr>
<tr>
<td>0.5 % ACTIV-8</td>
<td></td>
<td>0.5 % ACTIV-8</td>
</tr>
</tbody>
</table>
Drying test results

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Set to touch</th>
<th>Surface Dry</th>
<th>Through Dry</th>
<th>Hard Dry</th>
<th>Set to touch</th>
<th>Surface Dry</th>
<th>Through Dry</th>
<th>Hard dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3</td>
<td>17</td>
<td>27</td>
<td>&gt;48</td>
<td>2</td>
<td>4</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>(0.05% Co/0.33% Zr/0.17% MEKO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.05% Co/0.33% Zr/0.17% MEKO/0.5% ACTIV-8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Use of **ACTIV-8** significantly improved dry times
Summary

- **ACTI V-8®** is **NOT** a drier
- **ACTI V-8** is a drier accelerator
- Use **ACTI V-8** with cobalt or manganese
- For solvent-borne alkyds use 10 parts **ACTI V-8** per 1 part drier metal
- For water-reducible alkyds use 5 parts **ACTI V-8 HGL** per 1 part drier metal
More ACTIV-8® Resources

• Vanderbilt Minerals, LLC Website
  - www.vanderbiltminerals.com/paint

• Contact Vanderbilt Minerals directly:
  - (800) 562-2476
  - mineralsales@vanderbiltminerals.com

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More ACTIV-8® Resources

- Product Descriptions
- Sales specifications
- MSDS

- Technical data sheets
- A "How-to" guide for the use of ACTIV-8
- Examples of ACTIV-8 effectiveness