ACTIV-8® and ACTIV-8® HGL

Drier Accelerator and Stabilizer

Vanderbilt Minerals, LLC

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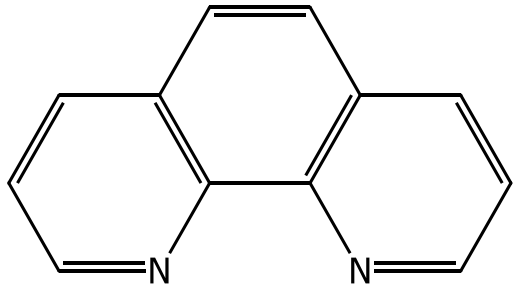
What is **ACTIV-8®**?

- **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®**

ACTIV-8 Drier Accelerator	
Active Ingredient	1,10-phenanthroline (38 %)
Solvents	*n*-Butanol (52 %) 2-ethylhexoic acid (10 %)
Density	0.95 g/mL
VOC	492 g/L (4.1 lbs/gal)

- **ACTIV-8** accelerates and stabilizes the drying rates of solvent-borne and water-borne coatings that cure by oxidative polymerization

Typical Properties of **ACTIV-8® HGL**

ACTIV-8 HGL Drier Accelerator	
Active Ingredient	1,10-phenanthroline (38 %)
Solvent	Hexylene glycol (62 %)
Density	1.03 g/mL
VOC	640 g/L (5.3 lbs/gal)

- **ACTIV-8 HGL** is a water miscible drier-accelerator
- The addition of **ACTIV-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 kg x 0.90 = 175 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 kg of resin solids x 0.0005 =

0.0875 kg of cobalt

0.0875 kg / 0.12 = 0.729 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 kg x 10 = 0.875 kg of **ACTIV-8**

Examples of effectiveness of **ACTIV-8®** Drier Accelerator

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

Formulations	
Control	0.15 % Co
Improved Formula	0.15 % Co 0.75 % **ACTIV-8 HGL**

Drying Test Results

Gardiner Circular Dry Time Recorder - Hours				
	Control (0.15 % Co)		**Improved Formula** (0.15 % Co/0.75 % **ACTIV-8 HGL**)	
Day 1	Set to touch Tack free Hard dry	1 10 18	Set to touch Tack free Hard dry	1 3 5
Day 60	Set to touch Tack free Hard dry	1 14 >24	Set to touch Tack free Hard dry	2 4 7

- 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	
Control	0.05 % Co 0.33 % Zr 0.17 % MEKO
Improved Formula	0.05 % Co 0.33 % Zr 0.17 % MEKO 0.5 % **ACTIV-8**

Drying test results

Gardiner Circular Dry Time Recorder - Hours				
	Control (0.05% Co/0.33% Zr/ 0.17% MEKO)		**Improved Formula** (0.05% Co/0.33% Zr/ 0.17% MEKO/0.5 % **ACTIV-8**)	
Day 1	Set to touch Surface Dry Through Dry Hard Dry	3 17 27 >48	Set to touch Surface Dry Through Dry Hard dry	2 4 11 22

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

Summary

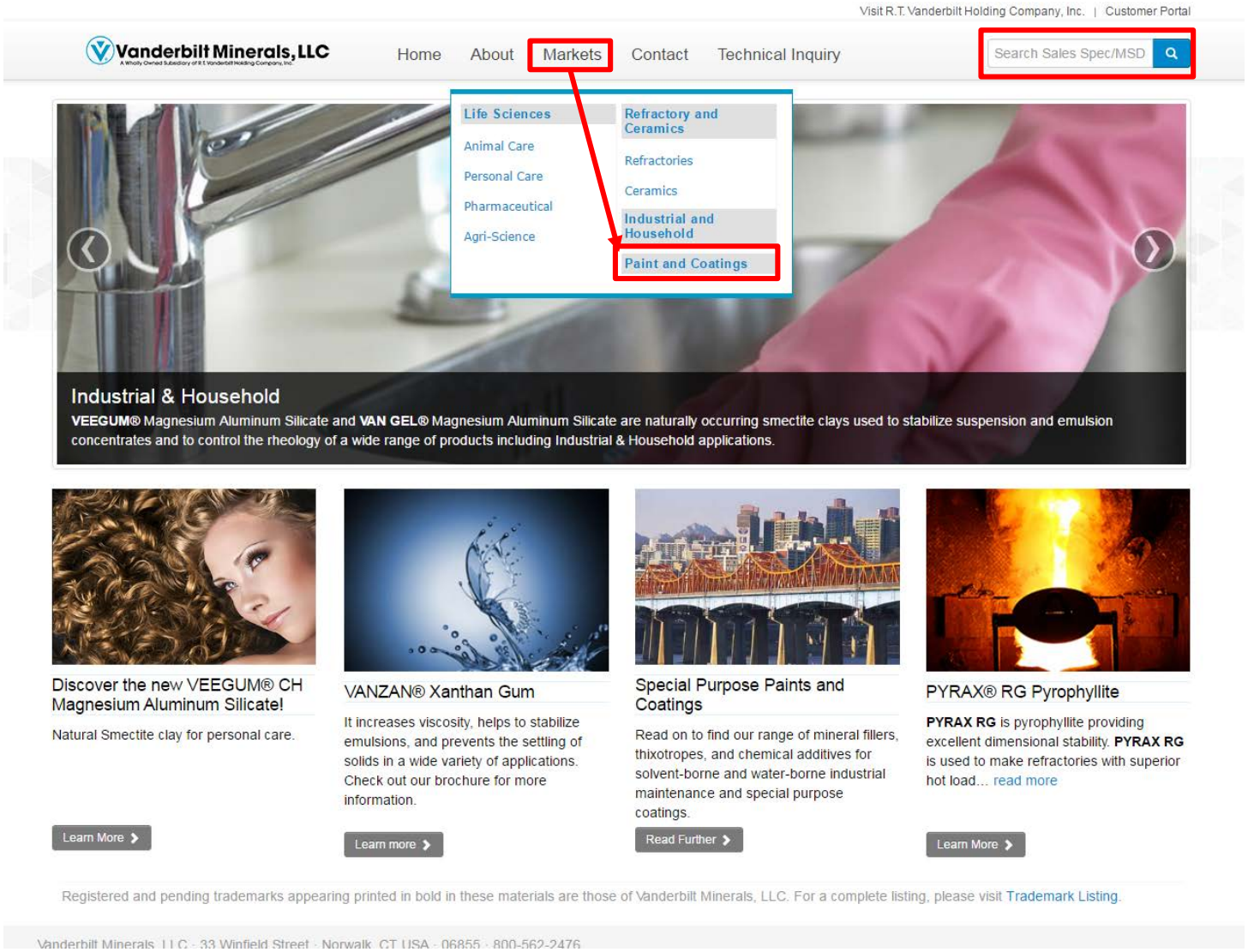
- **ACTIV-8®** is *NOT* a drier
- **ACTIV-8** is a drier accelerator
- Use **ACTIV-8** with cobalt or manganese
- For solvent-borne alkyds use 10 parts **ACTIV-8** per 1 part drier metal
- For water-reducible alkyds use 5 parts **ACTIV-8 HGL** per 1 part drier metal

More **ACTIV-8®** Resources

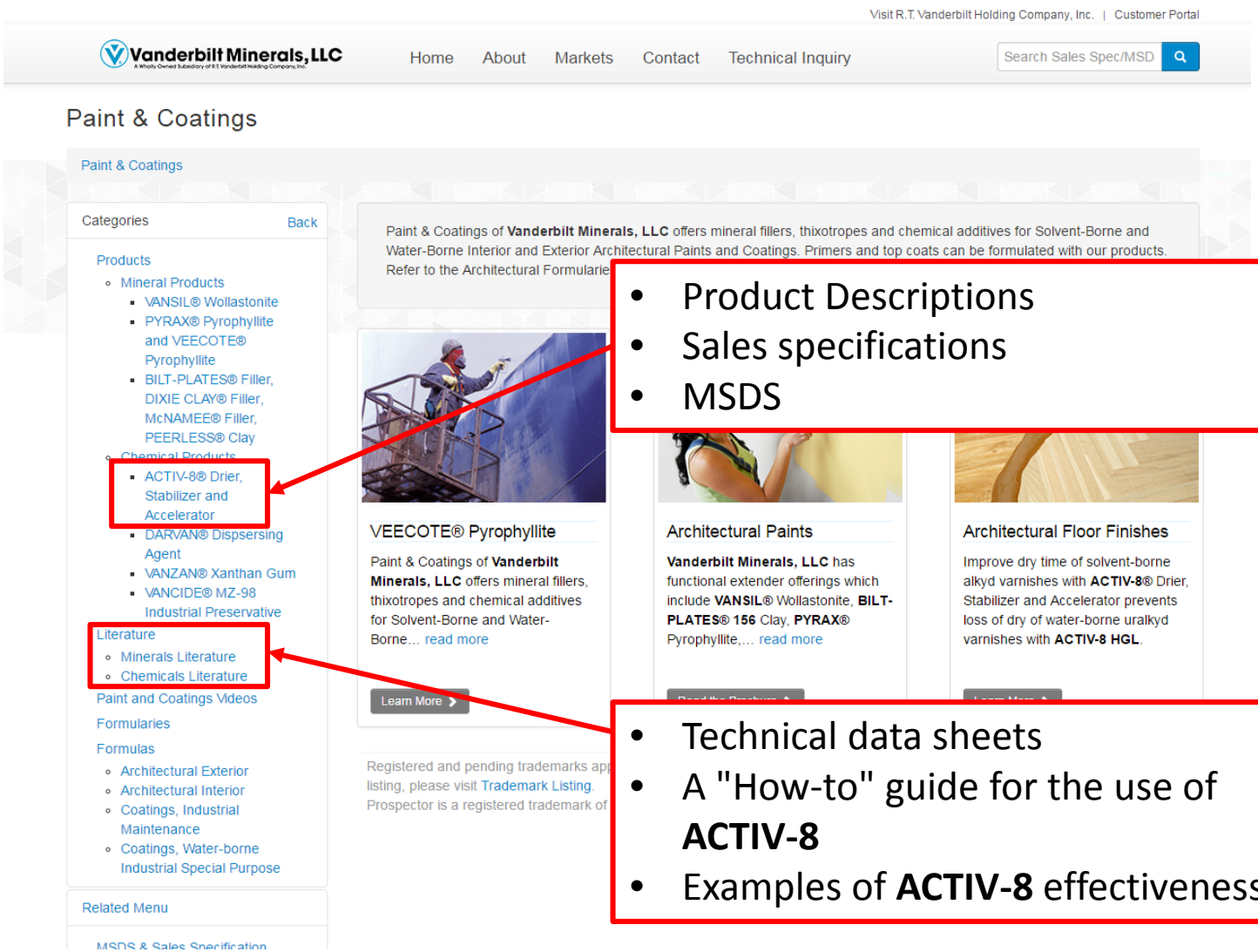
- Vanderbilt Minerals, LLC Website
  - www.vanderbiltminerals.com/paint

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

More **ACTIV-8®** Resources



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