Imidazoline Based Corrosion Inhibitors

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# Product Architecture: Corrosion Inhibitors

## Corrosion Inhibitors

- **Acylamido-carboxylates**
  - Cola®Cor IT
  - Cola®Cor 372
  - Cola®Cor 186
  - Cola®Cor 298
  - Cola®Cor 215

- **Amine Carboxylates**
  - Cola®Cor 200
  - Cola®Cor 232
  - Cola®Cor 300
  - Cola®Cor 400
  - Cola®Cor 500

- **Fatty Alkanolamides**
  - Cola®Cor 600
  - Cola®Cor 600B
  - Cola®Cor 635
  - Cola®Cor AER

- **Imidazolines**
  - Cola®Cor 93
  - Cola®Cor 100
  - Cola®Cor C56
  - Cola®Cor V
  - Cola®Cor CIC
  - Cola®Cor CPB
  - Cola®Zoline O
  - Cola®Zoline T
  - Cola®Zoline LM
  - Cola®Zoline C

- **Amine Borates**
  - Cola®Cor BCI
  - Cola®Cor Cl-24
  - Cola®Cor RP
  - Cola®Cor EDP
  - Cola®Cor 700

- **Phosphate Esters**
  - Cola®Cor THE
  - Cola®Cor ACI
  - Cola®Cor KAT
Imidazoline Product Family

Polyamines
(AEEA, DETA, etc.)

Fatty Acids

+ Imidazolines
(Neutral)

- Fatty Acids
  - Oleic acid
  - TOFA
  - Coconut oil
  - Lauric acid
  - Mixed fatty acids

- Cola®Zoline O
- Cola®Zoline T
- Cola®Zoline LM
- Cola®Zoline C

...and more

Imidazoline Corrosion Inhibitors
(Cationic)

- Cola®Cor 93
- Cola®Cor 100
- Cola®Cor C56
- Cola®Cor V
- Cola®Cor CIC
- Cola®Cor CPB

- Salting
- Quaternizing

(Colonial Chemical)
## Chemistry & Performance Attributes

### Chemistry
- In neutral, salted, quaternized, or amphoteric forms
- Oil or water soluble
- Surface activity can be enhanced with other chemistries
- Mainly intended for ferrous protection

### Key Performance Attributes
- Corrosion protection
- Wetting
- Emulsification
- Detergency
- Thickening
- Moisture displacing
- Anti-static
Cola®Zolines C, O, LM, & T

<table>
<thead>
<tr>
<th>Cola®Zoline</th>
<th>C</th>
<th>O</th>
<th>LM</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatty acid</td>
<td>Coconut/Palm Kernel Oil</td>
<td>Oleic</td>
<td>Lauric/myristic</td>
<td>Tall oil</td>
</tr>
<tr>
<td>Appearance* @ 25°C</td>
<td>Amber Liquid</td>
<td>Amber Liquid</td>
<td>Amber Liquid</td>
<td>Amber Liquid</td>
</tr>
<tr>
<td>% Imidazoline (min)</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>pH (10% dispersion)</td>
<td>10.5 – 12.5</td>
<td>10.5 – 12.0</td>
<td>10.0 – 12.0</td>
<td>10.5 – 12.0</td>
</tr>
</tbody>
</table>

* Material may crystallize upon aging or exposure to low temperatures. Mild heat and agitation will restore to original uniform state.

- In the neutral form & can easily be converted to cationic.
- Readily soluble in polar solvents and in hydrocarbons but relatively insoluble in water.
- These functional properties are useful in agricultural emulsions, industrial cleaners, paint/coatings, plastics, and petroleum applications.
Cola®Cor 93

• Partial amine salt of a substituted di-carboxylic acid

• Ashless

• Oil soluble

• With long lasting rust protection, even under severe conditions
ColaCor 93 Offer Robust Corrosion Protection

- **Stack Test**
  - No staining for > 3 months in the standardized stack test on both galvanized and carbon steel panels

- **Turbine Oil Rust Test (ASTM-D665)**
  - Passed at 0.1 wt%

### Humidity Cabinet Test

<table>
<thead>
<tr>
<th></th>
<th>Weeks to Rust</th>
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</thead>
<tbody>
<tr>
<td>Competitor 1</td>
<td>4</td>
</tr>
<tr>
<td>Competitor 2</td>
<td>5</td>
</tr>
<tr>
<td>ColaCor 93</td>
<td>9</td>
</tr>
</tbody>
</table>

Corrosion Inhibition - 5% Additive in Pale Oil
Cola®Cor 93

Applications

• General rust preventatives
  - Shelf storage protection
• Rolling oils
• Drawing compounds
• Fuel additives
• Hydraulic oils
• Offshore corrosion protection for equipment
Cola®Cor 100

- Based on the short chain imidazoline
- **Amphoteric**
- Water soluble
- **Effective in both acidic and alkaline conditions.**
- Excellent tolerance for water hardness and contributes detergency in aqueous systems.
- Flash rusting in cleaning & metallic applications

**Applications**

- Metal cleaning
- Various metalworking fluids
- Detergent and aerosol applications
Cola®Cor V

- Long-chain fatty acid salted long-chain imidazoline
- Oil soluble
- Insoluble in water
- Specifically designed to provide excellent rust inhibition for greases

Applications
- Greases
Cola®Cor CIC

- Long-chain imidazolines
- Enhanced surface wetting properties by sulfosuccinates
- Highly effective at low concentrations in greases and oil-based lubricants
- Improves the water resistance of greases
- Stabilize emulsion in soluble oil formulations.

Applications
- Grease
- Soluble oil fluids
### Summary – Imidazoline-Based Corrosion Inhibitors

<table>
<thead>
<tr>
<th>Product Class</th>
<th>Product</th>
<th>Key Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imidazoline Corrosion Inhibitors</td>
<td>Cola®Cor 93</td>
<td>Robust ferrous protection for cleaning, metalworking, and general rust protection</td>
</tr>
<tr>
<td></td>
<td>Cola®Cor 100</td>
<td>Amphoteric; applicable for acidic &amp; alkaline conditions</td>
</tr>
<tr>
<td></td>
<td><em>Cola®Cor C56</em></td>
<td>Ready-to-use, quaternized imidazoline corrosion inhibitor concentrate; For oilfield equipment corrosion protection</td>
</tr>
<tr>
<td></td>
<td>Cola®Cor V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cola®Cor CIC</td>
<td>For grease applications</td>
</tr>
<tr>
<td></td>
<td><em>Cola®Cor CPB</em></td>
<td></td>
</tr>
<tr>
<td>Imidazolines</td>
<td>Cola®Zoline O</td>
<td>Precursors with different chain lengths</td>
</tr>
<tr>
<td></td>
<td>Cola®Zoline T</td>
<td>Based on AEEA</td>
</tr>
<tr>
<td></td>
<td>Cola®Zoline LM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cola®Zoline C</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Cola®Zoline OD1</em></td>
<td>DETA-based imidazoline; stay tuned…</td>
</tr>
</tbody>
</table>
Thank You!

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