Formulating Successes with Diacid 1550

2018 STLE Commercial Forum
Diacid 1550 chemical composition
Diacid 1550 chemical composition

5(or 6)-Carboxy-4-hexyl-2-cyclohexene-octanoic acid containing about 10% oleic and other fatty acids

CAS-No. 53980-88-4
EINECS-No. 258-897-1
ECL Serial No. 9212-1059
Listed under TSCA, DSL and AICS

<table>
<thead>
<tr>
<th>Properties</th>
<th>Min</th>
<th>Max</th>
<th>Method</th>
<th>Typical Values</th>
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<tbody>
<tr>
<td>Acid Number</td>
<td>265</td>
<td>277</td>
<td>ASTM D 465-92</td>
<td>271</td>
</tr>
<tr>
<td>Color Gardner</td>
<td>-</td>
<td>9</td>
<td>ASTM D 1544-68</td>
<td>7+</td>
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</tbody>
</table>
Diacid 1550 Viscosity Profile

![Viscosity Profile Graph]

Temperature [°C]

Viscosity (cps)

27 33 37 43 48 54 59 65 71 77 82 88 93 99 105
Why is Diacid 1550 so useful?

- Derived from a **bio-renewable** resource (TOFA)
- **Multi-functional** specialty additive
- Resistant to bioactivity, yet still **biodegradable**
- **Proven value** over more than 40 years
What can Diacid 1550 do?
Multifunctional additive with key benefits:

- **Co-emulsification**
  It’s the best additive on the market for tightening emulsions

- **Corrosion Inhibition**
  It’s a great addition to a corrosion inhibition package

- **Lubrication**
  It’s a great lubricity additive, especially in aluminum forming applications
Co-emulsification

Diacid 1550 is the best additive for tightening emulsions.

Bringing everything together...

See for yourself...
Co-emulsification with Diacid 1550

Before

After
Corrosion Inhibition

Diacid 1550 is a great addition to a corrosion inhibition package.

- Great cast iron chip performance
- Boron–free
Corrosion CIC test picture in formulation

<table>
<thead>
<tr>
<th></th>
<th>2.0%</th>
<th>1.5%</th>
<th>1.0%</th>
<th>0.5%</th>
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<tbody>
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<td><img src="image7.png" alt="Picture C" /></td>
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<td><img src="image14.png" alt="Picture B" /></td>
<td><img src="image15.png" alt="Picture C" /></td>
<td><img src="image16.png" alt="Picture D" /></td>
</tr>
</tbody>
</table>
Corrosion CIC test picture in formulation
Lubrication

The long chain of Diacid 1550 provides added lubricity, particularly in aluminum forming applications.

Smoothing things over...
Lubricity
Aluminum can drawing trial

TEA salt formulation

Load (lbs force)

Degrees Crank Rotation

Diacid 1550
Isostearic Acid

RD 1D 2D 3D DM

0 102.5 205

Formulating Successes with Diacid 1550
Lubricity

Diacid 1550 vs. Corfree M1
Synthetic MWF
1:20 Dilution With 300 ppm H₂O

Torque

Ref. Load

Diacid 1550
Corfree M1
Supplementary Benefits

Diacid 1550 can also increase hard water tolerance and wetting properties.

Helping out in tough environments...
Hard water tolerance

500 PPM Ca$^{+2}$

**w/ Diacid 1550**

Surfactant available

**w/o Diacid 1550**

Surfactant consumed

Formulating Successes with Diacid 1550
There are a variety of factors to consider when formulating for multi-metal applications...
How to formulate with Diacid 1550

Diacid 1550 is oil-soluble or lipophilic. When neutralized with an appropriate base (sodium or potassium hydroxide, or an alkanolamine such as TEA), the resulting salt is water soluble.

- Easiest to formulate with when added into the oil phase of a semi-synthetic or soluble oil.
- From there, the water soluble components and bases can be added later, effectively neutralizing Diacid 1550 and allowing it to function.
- Once the effects of Diacid 1550 in a particular system are realized, the formulator can adjust the percentage to optimize the benefits.
- Minimize foam by reducing the non-ionic emulsifier dose and increasing Diacid 1550.
Neutralization of Diacid 1550

The production of salts is readily accomplished by the addition of Diacid 1550 to the appropriate neutralizing reagent.

### Commonly used neutralizing agents:

<table>
<thead>
<tr>
<th>Neutralizing Agent</th>
<th>Neutralization Weight (grams/gram of Diacid 1550)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monoethanolamine</td>
<td>0.29</td>
</tr>
<tr>
<td>Triethanolamine 99.5%</td>
<td>0.71</td>
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<tr>
<td>Potassium Hydroxide</td>
<td>0.27</td>
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<tr>
<td>Sodium Hydroxide</td>
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</table>
Future of Diacid 1550
Metal finishing chemicals

Exploration in the following markets:

- Multi-metal corrosion inhibition
- Metal cleaning and protection
- Hydro-trope
Summary

• Diacid 1550 is a unique product offering superior multifunctional performance.
• Diacid 1550 provides co-emulsification, corrosion inhibition, lubrication and more!
• The multifunctionality of Diacid 1550 can facilitate streamlined formulations, ultimately saving time and money.
• Ingevity can provide formulating tips to help with Diacid 1550, and achievement of lower foam.
• Ingevity is exploring metal cleaning and protection applications.
Special thanks to our team

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Global Business Development Manager

Monica Ford
Business Development Technical Lead

Jim Cancila
Sales and Account Manager

Jim Collette
Senior Account Manager

Caitlin Ramsey
Marketing Communications Coordinator