S-14 Bio, Scale and Corrosion Inhibitor
Biodegradable water treatment Building Block
Patented

PRODUCT DESCRIPTION
S-14 Bio is a unique green building block designed for cooling towers and other open-loop, recirculating cooling systems. S-14 Bio is a rare combination of a powerful scale inhibitor and excellent multi-metal corrosion protection. It is comprised of non-toxic, non-hazardous, and readily biodegradable ingredients. Its main component is a low molecular weight natural polymer. The other components are GRAS (Generally Recognized as Safe) substances and food approved preservatives.

S-14 Bio has been certified as a USDA Certified biobased product and has been awarded USDA BioPreferred™ designation (www.biopreferred.gov)

In contrast to phosphonates, polyacrylates, and polyaspartic acid which provide only antiscalant treatment, S-14 Bio also protects a variety of metals from corrosion. For example, galvanized steel, aluminum, copper, and ferrous metals are all protected while S-14 Bio simultaneously prevents scale by a sequestering process.

FEATURES
- USDA certified biobased product containing 84% biobased content
- Readily biodegradable
- GRAS (Generally Recognized As Safe by CFR) approved
- Scale & corrosion inhibitor
- Protects multiple metals including galvanized steel, copper, aluminum, & ferrous metals
- Easy to formulate in variety of open loop formulations
- Compatible with common water treatment programs
- Economical

APPLICATION
S-14 Bio provides complete corrosion and scale protection in an open loop cooling system.

TYPICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Tan viscous liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Grain-like</td>
</tr>
<tr>
<td>Density</td>
<td>9.1-9.3 lb/gal (1.09-1.11 kg/l)</td>
</tr>
<tr>
<td>Non-volatile (weight)</td>
<td>20-30%</td>
</tr>
<tr>
<td>ph</td>
<td>8.5-9.5(neat)</td>
</tr>
</tbody>
</table>

DOSAGE
S-14 Bio should be added to the make-up water at the rate 100-200ppm (20-50ppm of active ingredients). S-14 Bio is effective at a pH range of 6.0-9.0.

PACKAGING AND STORAGE
S-14 Bio is packaged in 5 gal (19 liters) pails, 55 gal (208 liters) drums, and totes. Product should be stored in a tightly closed container. Shelf life is 12 months.
TEST RESULTS

The multimetal corrosion protection offered by the different scale inhibitors in half-immersion solutions; results after 72 hours, room temperature, at 4000ppm of S-14 Bio (1000ppm of active ingredients)

<table>
<thead>
<tr>
<th>Material</th>
<th>Carbon Steel</th>
<th>Galvanized</th>
<th>Aluminum</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-14Bio</td>
<td>No Visible Corrosion</td>
<td>No Visible Corrosion</td>
<td>No Visible Corrosion</td>
<td>No Visible Corrosion</td>
</tr>
<tr>
<td>Phosphonates</td>
<td>Corrosion</td>
<td>Corrosion</td>
<td>Corrosion</td>
<td>Corrosion</td>
</tr>
<tr>
<td>Polyacrylates</td>
<td>Corrosion</td>
<td>Corrosion</td>
<td>Severe Corrosion</td>
<td>Severe Corrosion</td>
</tr>
<tr>
<td>Polysapartic Acid</td>
<td>Corrosion</td>
<td>Severe Corrosion</td>
<td>Slight Corrosion</td>
<td>Slight Corrosion</td>
</tr>
<tr>
<td>Control</td>
<td>Corrosion</td>
<td>Corrosion</td>
<td>Corrosion</td>
<td>Corrosion</td>
</tr>
</tbody>
</table>

Scale Inhibitor ability was evaluated using NACE Standard TM0374-2001*, ASTM D 1126** (to evaluate Calcium Carbonate [CaCO₃] and Calcium Sulfate [CaSO₄] scale inhibition).

Scale inhibitor ability was evaluated using NACE Standard TM0374-2001* "Laboratory Screening Test to determine the Ability of Scale Inhibitors to Prevent the Precipitation of Calcium Sulfate and Calcium Carbonate from Solution".

** ASTM D 1126 "Test Method for Hardness in Water"

FOR INDUSTRIAL USE ONLY
KEEP OUT OF REACH OF CHILDREN
KEEP CONTAINER TIGHTLY CLOSED
NOT FOR INTERNAL CONSUMPTION
CONSULT SAFETY DATA SHEET FOR MORE INFORMATION

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