Benefos® 1680
Phosphite Antioxidant and Processing Stabilizer

Overview
Benefos 1680 is a phosphite antioxidant used as a melt processing stabilizer in a wide range of organic substrates, including plastics, adhesives, sealants, tackifier resins, elastomers, and lubricants. Benefos 1680 often gives best results when combined with a primary antioxidant (for example BNX® 1010 or BNX® 1076).

Chemistry
Chemical Name: Phenol, 2,4-bis(1,1-dimethylethyl)-, 1,1',1''-phosphite
CAS Number: 31570-04-4
Chemical Structure:

![Chemical Structure Image]

Typical Properties
Product Form: Solid
Melting Range: 183 – 187°C
Molecular Weight: 646.9 g/mol

Solubility (percent by weight, 20°C)
<table>
<thead>
<tr>
<th>Solvent</th>
<th>Solubility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone</td>
<td>1.8</td>
</tr>
<tr>
<td>Benzene</td>
<td>34</td>
</tr>
<tr>
<td>Chloroform</td>
<td>36</td>
</tr>
<tr>
<td>Cyclohexane</td>
<td>16</td>
</tr>
<tr>
<td>Ethyl acetate</td>
<td>4</td>
</tr>
<tr>
<td>n-Hexane</td>
<td>11</td>
</tr>
<tr>
<td>Methanol</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>36</td>
</tr>
<tr>
<td>Toluene</td>
<td>40.5</td>
</tr>
<tr>
<td>Water</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Applications
Benefos 1680 is a highly effective processing stabilizer in polyolefins, including polyethylene, polypropylene, polybutene, and in olefin copolymers such as EVA. It is also recommended for use in other polymers such as polyamides, polycarbonates, polyesters, polyurethanes, styrenic polymers, elastomers, adhesives, sealants, lubricants, and many other organic substrates.
Advantages
• Extends performance of phenolic primary antioxidants (for example BNX 1010, BNX 1076)
• Highly compatible with a wide range of organic substrates
• Provides excellent melt stability and color control in polyolefins during processing
• Low volatility
• Protects polymers from chain scission and crosslinking
• Resistant to hydrolysis
• Extensive FDA clearances
• Compatibility with other stabilizers and additives

Guidelines for Use
Recommended loading concentrations range between 0.02% and 0.2% in polyolefins and between 0.05% and 0.25% in other substrates. Combinations of Benefos 1680 with phenolic primary antioxidants (BNX 1010, BNX 1076, and others) often show synergistic performance. Benefos 1680 is also suitable for use in combination with other antioxidants (for example thioethers) and light stabilizers, including hindered amine light stabilizers (HALS), UV absorbers, and benzoates. The exact formulation to be used is dependent on the substrate, performance requirements, and other factors, and should be determined by the user based on testing to simulate actual conditions of use. Please contact Mayzo for specific recommendations.

Storage
This product may be stored up to two years in a sealed container. Containers should be kept tightly closed when not in use and stored in a cool, dry place.

Safety
Please consult the Safety Data Sheet (SDS) prior to handling or using this product.

FDA Regulations
Benefos 1680 has extensive FDA clearances under 21 CFR §178.2010, including in elastomers used in rubber articles, nylon resins, polycarbonate resins, polystyrene and rubber-modified polystyrene polymers, olefin polymers and copolymers, ethylene-vinyl acetate copolymers, acrylic and modified acrylic plastics, adhesives, pressure sensitive adhesives, petroleum alicyclic hydrocarbon resins, rosins and rosin derivatives, and in many other applications. It has also been cleared for use in lubricants under 21 CFR §178.3570. Please contact your Mayzo representative for complete details, including restrictions of use.

The information contained herein is believed to be reliable. However, Mayzo, Inc. makes no warranty, whether expressed or implied, including warranties of merchantability or of fitness for a particular purpose, for the product or products referred to herein. No statements or recommendations contained herein are to be constructed as inducements to infringe any relevant patent, now or hereafter existence. Under no circumstances shall Mayzo, Inc. be liable for incidental, consequential, or other damages from alleged negligence, breach of warranty, strict liability, or any other legal theory, arising out of the use of handling of the product or products referred to herein. The sole remedy of the buyer and sole liability of Mayzo, Inc. for any claims shall be limited to the buyers purchase price of the product which is subject of the claim or the amount actually paid for each product, whichever is less. Technical advice furnished by seller shall not constitute a warranty, which is expressly disclaimed, all such advice being given and accepted at the buyers risk.