

## Benefos<sup>®</sup> 1680 Phosphite Stabilizer

**Introduction:** Benefos<sup>®</sup> 1680 is a phosphite type antioxidant of low volatility and extremely resistant to hydrolysis. This secondary antioxidant provides excellent heat stability and antioxidation, with good compatibility with resins and excellent extraction resistance. Benefos<sup>®</sup> 1680 performs best when combined with a primary antioxidant (i.e. BNX<sup>®</sup> 1010 or BNX<sup>®</sup> 1076).

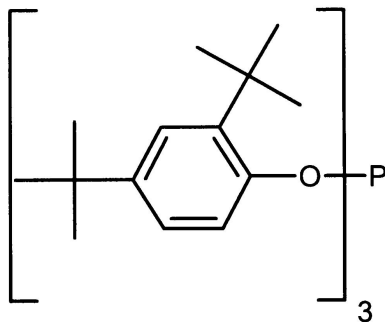
**Material Description:** Phosphite Stabilizer

**Chemical Name:** Tris(2, 4-di-tert-butylphenyl)phosphite

**Empirical Formula:** C<sub>42</sub>H<sub>63</sub>O<sub>3</sub>P

**CAS #:** 31570-04-4

**Chemical Structure:**



<b>Physical Properties:</b>	Molecular Weight:	647
	Melting Range	183 - 187 °C
	Assay:	99% Min.
	Volatile Matter:	< 0.3% Max
	Specific Gravity (20°C):	1.03 g/m <sup>3</sup>
	Vapor Pressure (20°C):	1 x 10 <sup>-10</sup> mm Hg
	Solubility (10 g/100ml Toluene):	Clear (25°C)
	Decomposition Temperature:	> 300°C
	% Transmittance:	425nm – 97% Min 500nm – 98% Min

**Solubility at 20°C (g/100ml solvent):**

Solvent	Solubility
Acetone	1.8%
Benzene	34%
Chloroform	36%
Cyclohexane	16%
Ethyl Acetate	4%
n-Hexane	11%
Methanol	< 0.01%

Methylene Chloride	36%
Toluene	40.5%
Water	< 0.01%

**Applications:**

This secondary antioxidant when combined with Mayzo's antioxidants, address a broad range of stabilization needs. Benefos<sup>®</sup> 1680, is an organophosphite of low volatility and particularly resistant to hydrolysis and provides excellent protection to organic polymers which are prone to oxidation. It is particularly useful in polyolefins and olefin-copolymers such as polyethylene, polypropylene, polybutene and ethylene vinyl acetate copolymers as well as polycarbonate and polyamides. Other applications include use in linear polyesters, high impact polystyrene, ABS, SAN, adhesives, natural and synthetic tackifier resins, elastomers such as BR, IR, and other organic substrates. Benefos<sup>®</sup> 1680 can also be used in combination with UV absorbers and light stabilizers to provide enhanced performance.

**Advantages:**

- Extends performance of primary antioxidants (i.e. BNX<sup>®</sup> 1010 or BNX<sup>®</sup> 1076)
- Highly compatible with a wide range of organic substrates
- Improvement of long-term stability
- Low volatility
- Maintenance of original melt flow
- Prevents discoloration
- Protects polymers from chain scission and crosslinking
- Resistant to hydrolysis

**Loading****Instructions:**

The loading data and results are based on laboratory work (and field testing) under controlled conditions and do not necessarily indicate the result that the buyer or user will attain. For this reason we strongly recommend testing of your own system under the actual conditions of processing and end-use prior to full scale testing. The recommended loading concentrations range between 0.05% and 0.25% when combined with the appropriate levels of antioxidants. The specific loading concentration of Benefos<sup>®</sup> 1680 in polyolefins range between 0.1% and 0.25% when combined with the appropriate levels of other additives. Loading levels will vary depending on substrate and processing conditions. Exact loading must be determined by compositions of the specific polymer system.

**Packaging:**

Benefos<sup>®</sup> 1680 is available in powder form in a 50 kg (110.2 pound) fiber drum, net weight, with an inner PE liner.

**Storage:**

This product may be stored up to two years in a sealed container. Containers should be stored in a cool, dry area. Extended storage at elevated temperatures or exposure to direct heat or sunlight could reduce product life. Keep containers sealed when not in use.

**Toxicity & Safety:**

This material is not intended for use in products for which prolonged contact with mucous membranes or abraded skin, or implantation within the human body is specially intended, unless the finished product has been tested in accordance with the Food and Drug Administration and/or other applicable safety testing requirements. Because of wide range of such potential uses, Mayzo, Inc. is not able to recommend this material as safe and effective for such uses and assumes no liability for any such uses. Read and understand the Material Safety Data Sheet before using or handling this product. Benefos<sup>®</sup> 1680 is considered to be a hazardous chemical under the OSHA Hazard Communication (29 CFR 1910.1200).

**FDA Regulations: Supplement**

<u>Existing Regulations</u>	<u>Maximum Concentration</u>	<u>Thickness</u>	<u>Food Allowed</u>	<u>Temperatures Allowed</u>
Stabilizer for polymers, <b>178.2010</b> Tris (2,4-di-tert-butylphenyl) phosphite				
Olefin polymers complying with <b>177.1520</b> (c), item 1.1, 1.2, or 1.3	0.25%	no restrictions	no restrictions	no restrictions
Olefin polymers complying with <b>177.1520</b> (c), item 2.1, 2.2, or 2.3, where the density of such polymers is $\geq 0.94$ g/cc	0.2%	$\leq 2$ mil	no restrictions	no restrictions
Olefin polymers complying with <b>177.1520</b> (c), item 2.1, 2.2, or 2.3, where the density of such polymers is $< 0.94$ g/cc	0.2%	$> 2$ mil	no restrictions	room temperature or below fill and storage
Olefin polymers complying with <b>177.1520</b> (c), item 3.1 or 3.2	0.2%	no restrictions	no restrictions	no restrictions
Olefin copolymers complying with <b>177.1520</b> (c), item 3.3	0.5%	no restrictions	no restrictions	250°F
Olefin polymers complying with <b>177.1520</b> (c), item 4	0.2%	$\leq 2$ mil	no restrictions	no restrictions
Olefin polymers complying with <b>177.1520</b> (c), item 4	0.2%	$> 2$ mil	no restrictions	room temperature or below fill and storage
Polycarbonate resins complying with <b>177.1580</b>	0.3%	no restrictions	no restrictions	no restrictions
Elastomers used in rubber articles complying with <b>177.2600</b>	0.5%	no restrictions	no restrictions	no restrictions
Nylon resins complying with <b>177.1500</b>	1%	no restrictions	no restrictions	room temperature or below fill and storage
Polystyrene and rubber modified polystyrene complying with <b>177.1640</b>	0.2%	no restrictions	no restrictions	212°F max.
Ethylene-vinyl acetate copolymers complying with <b>177.1350</b>	0.2%	no restrictions except for fatty foods for fatty foods <i>The average thickness of such polymers in the form in which they contact fatty foods shall not exceed 4 mls</i>	no restrictions except for fatty foods	Room temperature or below fill and storage
Poly-1-butene resins and butene ethylene copolymers complying with <b>177.1570</b>	0.15%	no restrictions	no restrictions	212°F max
Acrylic and modified acrylic plastics, semi-rigid and rigid, complying with <b>177.1010</b>	0.5%	no restrictions	no restrictions	no restrictions
Isobutylene polymers complying with <b>177.1420</b>	0.1%	no restrictions	no restrictions	no restrictions
Adhesives complying with <b>175.105</b>	no restrictions	no restrictions	no restrictions	no restrictions
Pressure sensitive adhesives complying with <b>175.125</b>	0.5%	no restrictions	no restrictions	no restrictions
Can end cements complying with <b>175.300</b> (b) (3) (xxxii)	0.5%	no restrictions	no restrictions	no restrictions
Side seam cements complying with <b>175.300</b> (b) (3) (xxxii)	0.5%	no restrictions	no restrictions	no restrictions
Petroleum alicyclic hydrocarbon resins complying with <b>175.320</b> (b) (3)	0.5%	no restrictions	no restrictions	no restrictions
Petroleum alicyclic hydrocarbon resins or their hydrogenated products complying with <b>176.170</b> (b) (2)	0.5%	no restrictions	no restrictions	no restrictions
Resins and polymers complying with <b>176.180</b>	0.5%	no restrictions	no restrictions	no restrictions
Rosins and rosin derivatives complying with <b>176.210</b> (d) (3)	0.5%	no restrictions	no restrictions	no restrictions
Closures with sealing gaskets complying with <b>177.1210</b>	0.5%	no restrictions	no restrictions	no restrictions
Petroleum hydrocarbon resins, rosins, and rosin derivatives complying with <b>178.3800</b> (b)	0.5%	no restrictions	no restrictions	no restrictions

<u>Existing Regulations</u>	<u>Maximum Concentration</u>	<u>Thickness</u>	<u>Food Allowed</u>	<u>Temperatures Allowed</u>
Reinforced wax complying with 178.3850	0.5%	no restrictions	no restrictions	no restrictions

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