

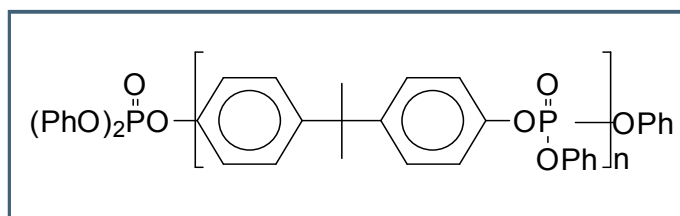
Product Bulletin

supresta™
BUILT-IN DEFENSE

Fyrolflex® BDP

Fyrolflex®
Engineered Resins

Chemical Name: Bis-phenol A-bis (diphenyl phosphate)
CAS #: 5945-33-5



Overview

Fyrolflex® BDP, an oligomeric phosphate ester flame retardant plasticizer, is designed for use in engineered resin applications such as polyphenylene oxide alloys and PC/ABS. Because of its low volatility and high heat stability, this non-halogen flame retardant can tolerate high temperature processing required of many engineered resins. In addition to its FR characteristics, Fyrolflex® BDP demonstrates improved processing characteristics in a number of thermoplastics including ABS and HIPS that benefits designs like thin wall moldings, and other high-performance, high flow plastic applications.

Typically, Fyrolflex® BDP is used at 8 to 15 phr to provide flame retardancy to a variety of resins. When used as a processing aid,

1 to 3 phr of BDP is added to thermoplastics for improving melt flow characteristics with minimal loss of dimensional stability.

Compared to other non-halogen FRs (phosphate esters), Fyrolflex® BDP is relatively stable with low volatility, well within the processing parameters of most engineered plastics (onset decomposition +300° C).

Fyrolflex® BDP also has the advantage over other bis-phosphates with its higher thermal and hydrolytic stability. This allows for a greater range of applications in thermoplastic resins.

Because the phosphorus content of Fyrolflex® BDP is slightly less than other compounds, a modest increased use level must be considered for bis-phenol A bis phosphates.

Phosphorus content

Triphenyl phosphate	9.5%
Fyrolflex® BDP	8.9%
Resorcinol bis (diphenyl phosphate)	10.7%

Key Applications

Typical Formulation: (FR-PC/ABS)

Polycarbonate	60 – 80%
ABS	10 – 30%
Fyrolflex® BDP	10 – 13%
Teflon powder	0.2 – 0.3%
Stabilizers/Antioxidants	0.2 – 0.5%

Typical Formulation for PPO based Alloys

Polyphenylene Oxide (PPO)	60 – 80%
HIPS	20 – 40%
Fyrolflex BDP	10 – 14%
Stabilizers	~0.5%

Fyrolflex Product Selector

	Key applications	Key characteristics
Fyrolflex® RDP	• Engineered resins — PC/ABS blends and polyphenylene oxide alloys	• Low volatility • Low viscosity
Fyrolflex® BDP	• Engineered polymers — PC blends	• Low volatility • High thermal and hydrolytic stability

Processing

To compound this flame retardant into thermoplastic resins requires some unique but readily available equipment for liquid injection. Usually premixing all the components will cause agglomerations and result in irregular material feed patterns and poor dispersion in most compounding systems. One common approach is to meter the FR into the mixer by use of a positive displacement feed system (gear pump injection for example) fitted with a pressure relief valve. In a typical operation, the solid components are metered into the mixer at a known rate and homogenized into a molten state. The liquid additive is delivered at a down-stream port to a non-compression area (such as a port situated just after a vent zone of an extrusion screw). Here the free volume of this screw section allows the liquid FR to be easily pumped into the extruder and dispersed into the polymer matrix. To facilitate the material pumping, the system can be heat traced to improve the flow of product into the compounding apparatus.

Physical Data

Density

°F	77	100	120
°C	25	50	70
kg/liter	1.2539	1.2209	1.1991

Viscosity

°C	°F	cP	cSt
10	50	584642	449344
20	68	33248	26265
37.8	100	2389	1965
98.8	210	45	38

Heat Capacity

°F	134	152	170	188	206	224	242	260	278	296
°C	56.8	66.8	76.8	86.8	96.8	107	117	127	137	147
kJ/kg K	1.626	1.648	1.670	1.692	1.714	1.736	1.758	1.780	1.802	1.824
*C _p	0.389	0.394	0.399	0.404	0.410	0.415	0.420	0.425	0.431	0.436

*BTU/lb/°F

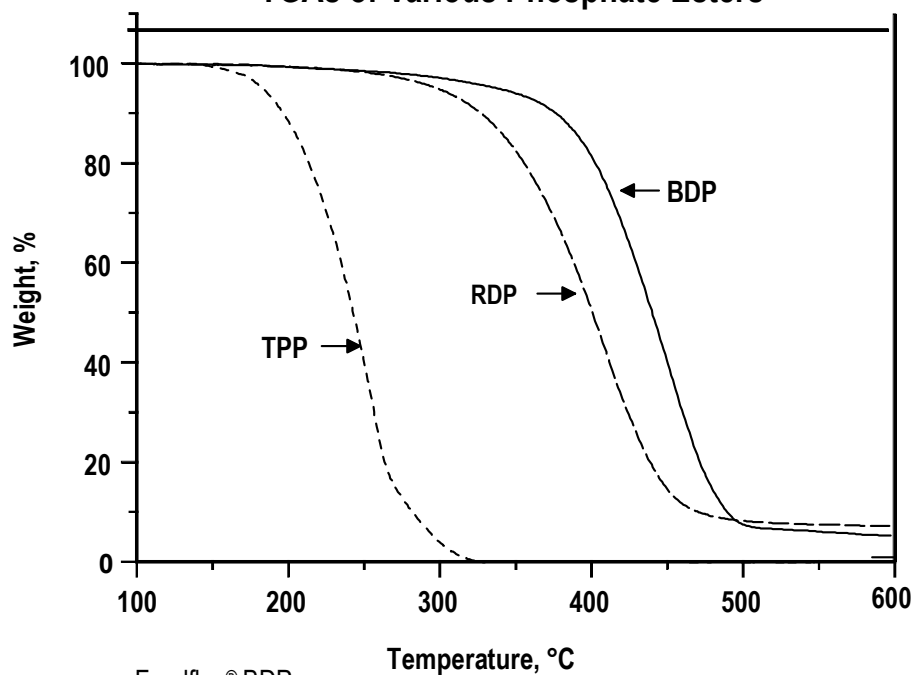
Typical Properties

Physical appearance	Colorless to light yellow liquid
Phosphorus content, wt. %	8.9
Specific gravity, 25°C/25°C	1.270
Density @ 25°C, lbs/gal (kg/m ³)	10.59 (1254)
Viscosity @ 158°F (70°C), CPS	220
Acidity, mg KOH/g	0.12 max.
Water content, wt. %	0.10 max.
Color, APHA	<100
Pour Point	47°F (8°C)
Boiling Point	>572°F (>300°C)
Solubility (water)	Insoluble
Refractive Index (@ 20°C)	1.5870
Viscosity @ 25°C (centipoise)	
Triphenyl phosphate	solid
Fyrolflex® BDP	12450 cps
Resorcinol bis (diphenyl phosphate)	600 cps

Vapor Pressure

°F	°C	mm/Hg
50	10	0.18
100	37.8	0.56
150	65.5	12.2
200	93.3	35

TGAs of Various Phosphate Esters



Fyrolflex® BDP
2% wt. loss 273°C
5% wt. loss 329°C
10% wt. loss 393°C

Safety & Handling

Consult the Material Safety Data Sheet for this product.

Shipping Information

Available in bulk tank trucks, isocontainers, 2,500 lb totes, and 560 lb drums.

For more information about our products and to place an order, please contact one of Supresta's regional sales offices.

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