

Product Bulletin

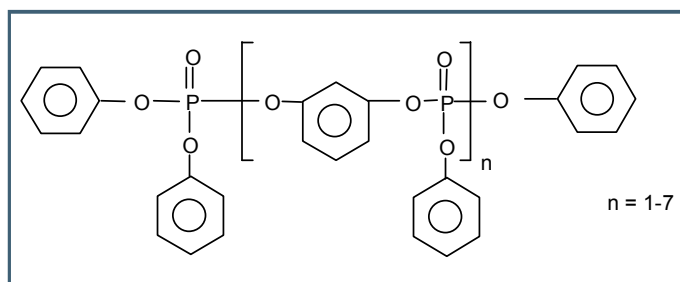
supresta™
BUILT-IN DEFENSE

Fyrolflex® RDP

Fyrolflex®
Engineered Resins

Chemical Name: Resorcinol bis (diphenyl phosphate)

CAS #: 125997-21-9



Overview

Fyrolflex® RDP, an oligomeric phosphate ester flame retardant, 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® RDP 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, RDP is used at 8 to 15 phr to provide flame retardancy in a variety of resins. When used as a processing aid, 1

to 3 phr of RDP is added to thermoplastics to improve melt flow characteristics with minimal loss of dimensional stability.

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

Fyrolflex® RDP also has the advantage over other bis-phosphates with its low viscosity. This allows for ease of handling and better and safer management of resources (lower heat storage).

Because the reason to use flame retardants is to effect flame retardancy, Fyrolflex® RDP, on a pound for pound basis, has a higher phosphorus content than bis-phenol A bis phosphates which means lower use levels.

Phosphorus content

Triphenyl phosphate	9.5%
Bis-phenol A bis-phosphate	8.9%
Fyrolflex® RDP	10.7%

Key Applications

Typical Formulation: (FR-PC/ABS)

Polycarbonate	60 – 80%
ABS	10 – 30%
Fyrolflex® RDP	8 – 9.5%
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® RDP	12 – 15%
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 downstream 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

Latent Heat of Vaporization	6.73 Kcal/mole (calculated from vapor pressure data)
Thermal Conductivity	4.86×10^{-4} cal/sec.cm ² •°C per cm at 0° to 50°C
Autoignition Temperature	>620 °C (1688°F)
Decomposition Temperature	370°C (700°F) as determined by DSC

Viscosity (Centistokes)

°F	10	20	30	50	68	100	210
°C	-12.2	-6.7	-1.1	10	20	37.8	98.8
C _{st}	49635	17328	9203	1449	588	137	11.3

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
*C _p	.372	.374	.377	.382	.384	.388	.396	.399	.403	.415

*BTU/lb/°F

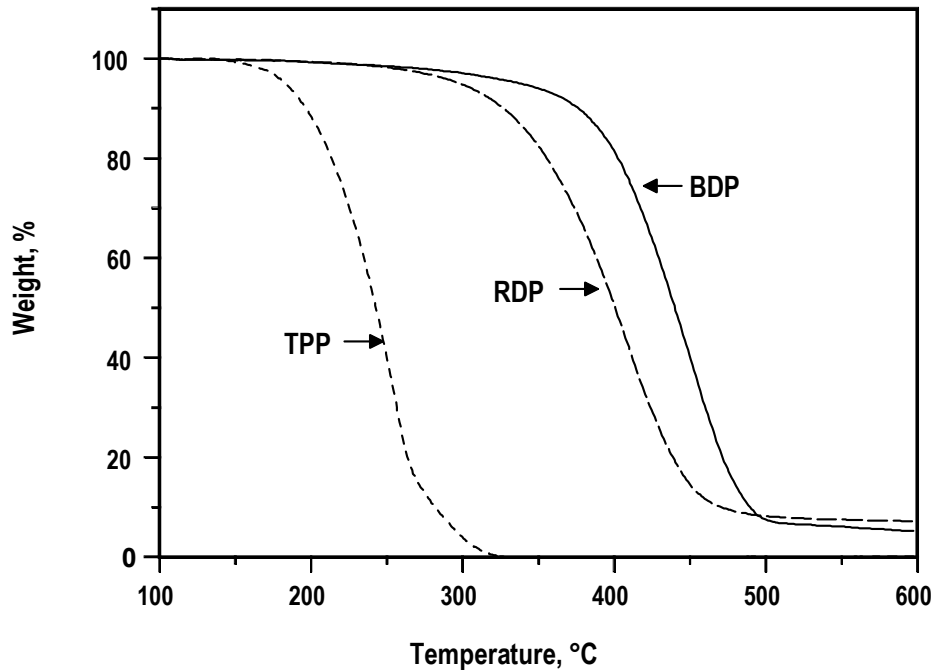
Typical Properties

Physical appearance	Clear, transparent liquid
Phosphorus content, wt. %	10.7
Specific gravity, 25°C/25°C	1.318
Density @ 25°C, lbs/gal (kg/m ³)	10.83 (1.298)
Viscosity @ 25°C, CPS	600
Acidity, mg KOH/g	0.12 max.
Water content, wt. %	0.10 max.
Color, APHA	≤ 100
Pour Point	10°F (-12°C)
Boiling Point	>572°F (>300°C)
Solubility (water)	Insoluble
Refractive Index (@ 20°C)	1.5773
Viscosity @ 25°C (centipoise)	
Triphenyl phosphate	solid
Bis-phenol A bis-phosphate	12450 cps
Fyrolflex® RDP	600 cps

Vapor Pressure

°F	°C	mm/Hg
50	10	0.096
100	37.8	0.28
150	65.5	0.73
200	93.3	1.60
250	121.1	3.1
300	148.9	5.5
350	176.7	9.3
400	204.4	14.5
450	232.2	21
500	260	31
550	287.8	33
600	315.5	30
650	343.3	33
700	371.1	60
750	398.9	125

TGAs of Various Phosphate Esters



Fyrolflex® RDP
2% wt. loss 288°C
5% wt. loss 325°C
10% wt. loss 360°C

Safety & Handling

Consult the Material Safety Data Sheet for this product.

Shipping Information

Available in bulk tank trucks, isocontainers, 2,800 lb totes, and 590 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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