



FLAME RETARDANT SOLUTIONS

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FLAME RETARDANTS SELECTION GUIDE

	POLYOLEFINS				PVC	STYRENICS				POLYURETHANE				THERMOSETS			ENGINEERING THERMOPLASTICS					
	PP	PE	TPO	EPDM	PVC	HIPS	ABS	PC/ABS	PPE/HIPS BLENDS	XPS	EPS	RIGID PU	FLEXIBLE PU	TPU	UPR	EPOXY	PHENOLICS	PA6	PA66	PBT	PET	PC
PRODUCT NAME																						
BROMINATED FR*																						
DBDPE	●	●	●	●		●	●	◐						●	●	●	◐	◐		●		◐
BPS																		●	●	●	●	
BDDP	●					◐																
FR-130X										●	●											
FR-130X MB*										●												
TBPA															●							
TBPA Diol												●		●								
FR-245						●	●	◐												◐	◐	
PHOSPHORUS FR*																						
IPPP 50					●							◐	●	●		●	◐					
IPPP 65					●							◐	◐	●		●	◐					
TCPP												●	●									
TEP												●	●		●							
RDP				◐				●	●					●		◐						
BDP				◐				●	●					◐		◐						
CDP					●								◐	●			◐					
CEPPA																					●	
INORGANIC FR*																						
ZB35	●	●	●	●	●	◐								●	●	●	◐	●	◐			
HALOGEN FREE FR*																						
MCA														◐				●	●	◐		
MPP																		●	●	◐		
HFNP	●	●												●								

FR* Flame Retardant MB* Masterbatch ● Recommended ▸ Applicable

▼ BROMINATED FLAME RETARDANT

Synonyms	Equivalent	Application	M.P./S.R. Viscosity	TGA
G'sol® DBDPE Decabromodiphenyl Ethane Cas No. 84852-53-9	Albemarle Saytex 8010 Lanxess Firemaster-2100R ICL FR-1410	PP, PE, HIPS, ABS, PBT, UPE, Epoxy.	M.P. 350 °C	1% @ 332°C 5% @ 365°C 10% @ 378°C
G'sol® BPS Brominated Polystyrene Cas No. 88497-56-7	Albemarle Saytex HP-7010 Albemarle Saytex HP-3010 ICL FR-803P	PA, PBT, PET.	S.R. 265-324°C	2% @ 340°C 5% @ 375°C 10% @ 384°C
G'sol® BDDP Tetrabromobisphenol A Bis(2,3-dibromopropyl ether) Cas No. 21850-44-2	Lanxess PE-68 ICL FR-720	PP, HIPS, ABS.	M.P. 113-117°C	1% @ 299°C 5% @ 312°C 10% @ 321°C
G'sol® FR-130X Tetrabromobisphenol A Bis (2,3-dibromo-2-methylpropyl ether) Cas No. 97416-84-7	DKS PYROGUARD SR-130	EPS, XPS, replaced HBCD.	M.P. 100°C	1% @ 237°C 5% @ 255°C 10% @ 263°C
G'sol® FR-130X Masterbatch Cas No. 97416-84-7 & 9003-53-6	XPS FRMB	XPS, HBCD Free.		
G'sol® TBPA Tetrabromophthalic Anhydride Cas No. 632-79-1	Albemarle Saytex RB-49 Lanxess PHT-4	Unsaturated Polyester Resin, PS, PE, PP, Rigid PU Foams, Epoxy Resin.	M.P. 280°C	1% @ 202°C 5% @ 228°C 10% @ 240°C
G'sol® TBPA Diol Tetrabromophthalate Diol Cas No. 77098-07-8 & 20566-35-2	Albemarle Saytex RB-79 Lanxess PHT4-Diol	Rigid PU Foams, Coating, Urethane Elastomers.	80000cP @ 25°C 20000-30000cP @ 25°C	1% @ 107°C 5% @ 165°C 10% @ 210°C
G'sol® BT-93W Ethylene Bis(Tetrabromophthalimide) Cas No. 32588-76-4	Albemarle Saytex BT-93W	Polyolefins, HIPS, PBT, PET, PC, Elastomers.	M.P. 460°C	1% @ 336°C 5% @ 417°C 10% @ 430°C
G'sol® FR-245 2,4,6-tris-(2,4,6-tribromophenoxy)-1,3,5-triazine Cas No. 25713-60-4	ICL FR-245 WOOJIN BTAC-245 DKS PYROGUARD SR-245	ABS, HIPS, PBT, PET, PC/ABS, PPO/HIPS.	M.P. 230°C	1% @ 351°C 5% @ 385°C 10% @ 400°C
G'sol® FR-370 Tris(tribromoneopentyl) Phosphate Cas No. 19186-97-1	ICL FR-370	PP, HIPS, ABS, XPS, Alloys, Adhesives.	M.P. 181°C	1% @ 297°C 5% @ 312°C 10% @ 329°C
G'sol® TBNPA Tribromoneopentyl Alcohol Cas No. 36483-57-5	ICL FR-513	Rigid and Flexible PU Foams.	M.P. 65°C	2% @ 126°C 5% @ 149°C 10% @ 162°C
G'sol® DBNPG Dibromoneopentyl Glycol Cas No. 3296-90-0	ICL FR-522	Rigid PU Foams, UPE.	M.P. 109.5°C	1% @ 196°C 5% @ 225°C 10% @ 245°C

▼ INORGANIC FLAME RETARDANT

Synonyms	Equivalent	Application	Purity %	TGA
G'sol® ZB35 Zinc Borate Cas No. 12767-90-7	Lanxess ZB 467 Borax Firebrake ZB	PVC, Rubber, Cable, Conveyor Belt.	99	1% @ 202°C 5% @ 248°C 10% @ 290°C
G'sol® ATH Aluminium Hydroxide Cas No. 21645-51-2		Wire and Cable, Electronic and Electrical Components.	99.5	
G'sol® ZS Zinc Stannate Cas No. 12036-37-2		Smoke Inhibitors, Plastic, Fiber, Foam Industry.	Sn 46 Zn 26	
G'sol® ZHS Zinc Hydroxy Stannate Cas No. 12027-96-2		Smoke Inhibitors, Plastic, Fiber, Foam Industry.	Sn 40 Zn 20	
G'sol® Dicumene 2,3-dimethyl-2,3-diphenyl butane Cas No. 1889-67-4	Interox-CCDOF Nofmer BC Perkadox 30	ABS/SAN, GPPS, HIPS, EPS.	96	
G'sol® ATO Antimony Trioxide Cas No. 1309-64-4		PE, PP, PS, PVC, PA, ABS, Rubber, Paint, Coating, Synthetic Resin, Paper.	99.8	

▼ PHOSPHORUS FLAME RETARDANT

Synonyms	Equivalent	Application	M.P./S.R. Viscosity	TGA
G'safe TCP Tris(2-chloropropyl) Phosphate Cas No. 13674-84-5	Clariant TCP Lanxess Levagard PP Aceto TCP	Rigid PU Foams, EVA, PVC.	64-70 @ 25°C	1% @ 110°C 5% @ 172°C 10% @ 208°C
G'safe TEP Triethyl Phosphate Cas No. 78-40-0	TEP	Rigid PU Foams, Unsaturated Polyester Resin, Adhesives, Coatings and Textiles.	1.6 @ 25°C	
G'safe IPPP Triaryl Phosphate Isopropylated Cas No. 68937-41-7	Lanxess Reofos 35/50/65/95	PVC, Rubber, PU Foams.	42-50 @ 25°C 53-64 @ 25°C 64-74 @ 25°C 95-114 @ 25°C	5% @ 216°C 10% @ 235°C 50% @ 284°C
G'safe BDP Bisphenol A Bis(diphenyl phosphate) Cas No. 5945-33-5	Albemarle NcendX P-30 Lanxess Reofos BAPP ICL Fyrolflex BDP	PC/ABS, PPO/HIPS Alloy.	100-120 @ 80°C	1% @ 255°C 5% @ 372°C 10% @ 398°C
G'safe RDP Resorcinol Bis(diphenyl phosphate) Cas No. 57583-54-7	Lanxess Reofos RDP ICL Fyrolflex RDP	PC/ABS Blends, PU Foams.	500-800 @ 25°C	2% @ 290°C 5% @ 325°C 10% @ 360°C
G'safe TPP Triphenyl Phosphate Cas No. 115-86-6	TPP	Phenolic resin-based Copper Clad Laminate, Cellulose Resin, Rubber, PPO.	M.P. 47-53°C	1% @ 198°C 5% @ 231°C 10% @ 247°C
G'safe CDP Cresyl Diphenyl Phosphate Cas No. 26444-49-5	Lanxess Kronitex CDP Lanxess Disflamoll DPK	PVC, PVB, PU Foams.	34-48 @ 25°C	5% @ 217°C 10% @ 236°C 50% @ 285°C
G'safe HF-4 Butylated Triphenyl Phosphate Esters		Flexible PU Foams.	65-75 @ 25°C	
G'safe FR-504L Chlorinated Phosphate Ester Mixture		Flexible PU Foams.	800-1200 @ 25°C	
G'safe TBEP Tris(2-butoxyethyl) Phosphate Cas No. 78-51-3		Flexible PU Foams, Water based adhesives, Inks, Coatings, Paints.		
G'safe TIBP Tri-isobutyl Phosphate Cas No. 126-71-6		Dyeing, Printing Ink, Construction, Oil Additives.		
G'safe CEPPA 3-Hydroxyphenylphosphinyl-propanic Acid Cas No. 14657-64-8	3-HPP HIRETAR-205 PHOSGARD PF100	PET Textile.	M.P. 158°C	5% @ 217°C
G'safe DOPO 9, 10-dihydro-9-oxa-10-phosphahenanthrene-10-oxide Cas No. 35948-25-5		Epoxy Resin, Liner Polyester, PA, Plastic, Circuit Board.	M.P. 117-120°C	
G'safe FR-PB100 Hexaphenoxycyclotriphosphazene	Otsuka SPB-100	PC, PC/ABS Resin and PPO, PA.	M.P. 110-112°C	

▼ HALOGEN FREE FLAME RETARDANT

Synonyms	Equivalent	Application	P, N %	Decomposition Temperature
G'safe APP Ammonium Polyphosphate Cas No. 68333-79-9	Budenheim Cros 484	Intumescent Coating, Sealant, PU, Wood.	31, 15	275°C
G'safe MCA Melamine Cyanurate Cas No. 37640-57-6	BASF Melapur MC 8/15/25/50	PA, EP, PBT, TPU.	48	440-450°C
G'safe MPP Melamine Polyphosphate Cas No. 218768-84-4	BASF Melapur 200	PP/PE, PA/PBT.	13, 43	330°C
G'safe HFNP Series Intumescent Halogen-Free FR		Polyolefin, Fiber, PP, TPE, PE, XLPE.		

OCEANCHEM GROUP LIMITED

- Since 1950s, The Leading Supplier of Flame Retardants from China

We, at the Flame Retardant business from 1990s, follow the global market demand based the abundant resources of Chinese bromine, which mined from Natural Underground Halogen Water. Since started to produce **Bromine based Flame Retardant**: DBDPO/DECA, then to produce the DBDPE, BDDP, BPS etc step by step.

Since 2003, with the development of our group, we started to produce the **Phosphorus-based Flame Retardant**: TCPP, TEP, DOPO etc, till today, we have more and more Phosphorus-based Flame Retardants and Halogen Free Flame Retardants.

We also supply additional **Halogen Free and Inorganic Flame Retardants** such as Melamine Cyanurate (MCA), Ammonium Polyphosphate (APP) and Intumescent Halogen Free Flame Retardant (HFNP series), Aluminium Hydroxide (ATH), Zinc Borate (ZB35) etc.

We, Offer the plastics industry the most effective Flame Retardants that help in enhancing consumer safety, while being committed to environmental concerns. We invite you to make benefit from our wide range of Flame Retardant solutions and contact us for current activities and future developments.

Top Quality Products that Provide the Ultimate in Customer Satisfaction

- Run strictly Quality Management System, during the whole process of raw materials purchase, production, sample evaluation, packing, storing, transportation.
- Annual audit by ourselves and customers, as a long term partner, as a new supplier qualification.
- Cooperated with Third Party to supervise the steady quality.



Follow the New Regulation of Different Countries and Regions.



REACH Full Registration.



Application to include products into the OEKO-TEX List of accepted products.

▶ FLAME RETARDANT MECHANISM

Flame Retardants (FR) are chemical compounds added to or otherwise incorporated into plastic compounds to provide varying degrees of flammability protection, to prevent fires from starting or to slow the spread of fire and provide additional escape time. Flame Retardants prevent or even suppress the process of combustion during a particular phase of the recycle: Heating, Decomposition, Ignition, AME Spread.



▼ MECHANISM

1 Halogen FR / Gas Phase

BrFRs are commonly used for electronics industry, textiles, construction products and coatings. It releases active bromine atoms into the gas phase before the material reaches its ignition temperature, which quenches the chemical reactions occurring within the flame. This can prevent the burning process from occurring or can slow it such that other measures can be taken to extinguish the fire.

2 Phosphorus FR / Solid Phase Char

Char is formed when the phosphorus compound is heated, thereby inhibiting the formation of combustible gas and inhibiting the pyrolysis process. The char hinders the release of combustible gas while also forming a protective layer that shields the polymer from the heat of the flame.

3 Inorganic FR / Water Vapor; Char; Energy Absorption

Many inorganic compounds are used as flame retardants or a catalyst within a flame retardant system. Such as Aluminum Hydroxide (ATH), Magnesium Hydroxide (MDH), Antimony Trioxide (ATO) etc. These compounds interfere with the burning process through the release of inert gas (like water vapor), creating a protective char layer, or energy absorption.

4 Halogen Free FR / Intumescent Coatings

The aim of systems incorporating intumescent coatings is to protect materials from fire by preventing burning. When exposed to heat these coatings expand to create a fire-resistant and insulating layer on the material. Common components of intumescent coatings include spumific compounds (chemicals that decompose when heated and produce large amounts of gases), a binder, an acid source and a carbon compound.

BRANDS TRUSTED FOR FIRE SAFETY

G'sal™ Series Flame Retardants enhance lives through improved fire safety, sustainable manufacturing, good stewardship practices and technological progress.

Plastics molders, wire and cable compounders, textile and foam manufacturers the world over rely on products and applications development to add life saving properties to their materials. And so can you.

You can count on **G'sal™** expertise in flame retardant chemistry and fire safety to bring you the most innovative, effective and environmentally sound solution or your life protection needs.



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