

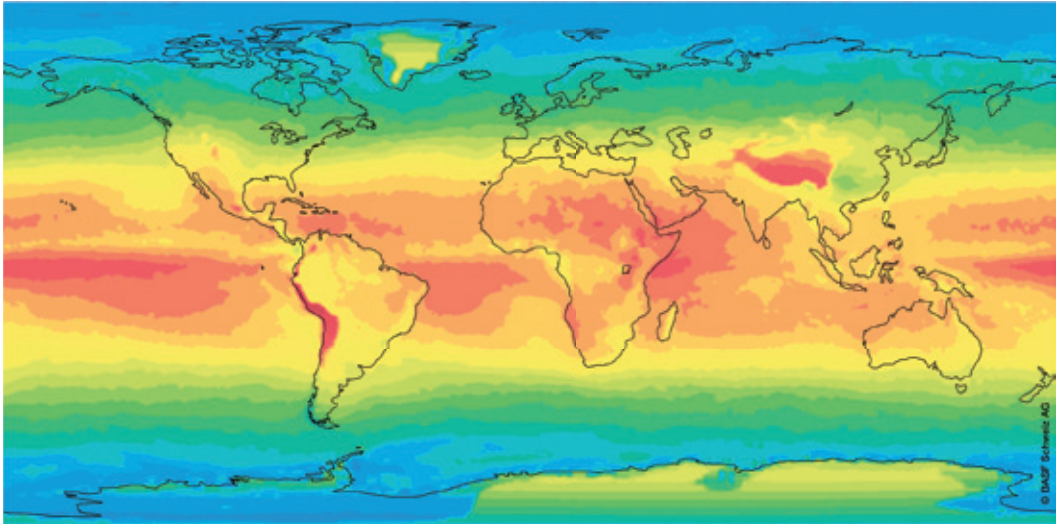
Additives for polyolefins

Plastic Additives

 **BASF**
The Chemical Company

UV protection of plastics

Global solar irradiance



Yearly average solar irradiance [kLy]
0 20 40 60 80 100 120 140 160 180 200

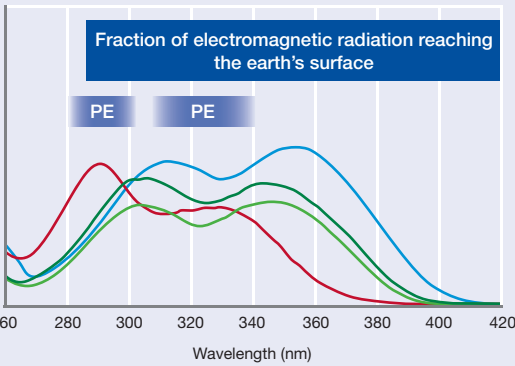
1 kLy = 41.84 MJ/m², Data provided by the Ozone Processing Team at the NASA Goddard Space Flight Center.

This map depicts the global variation of average irradiation energy reaching the earth's surface. UV irradiation energy is responsible for light induced deterioration of plastics and other materials. Therefore, light stabilizer formulations must consider the global location where the final article is used and its expected service life.

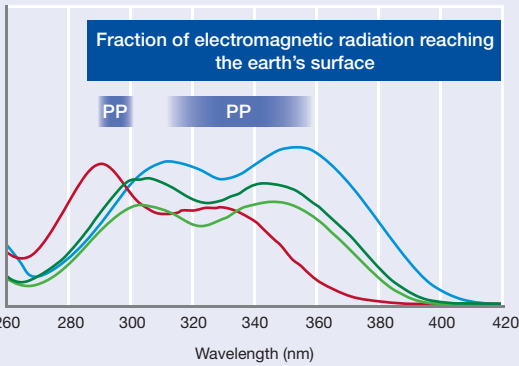
Absorption characteristics of UV absorbers

Individual polymers are affected by different wavelengths. Choosing the most effective light stabilizer for a given substrate depends upon matching the right UV absorber with the susceptible wavelength range of the polymer.

UV sensitivity and UV absorbers for PE



UV sensitivity and UV absorbers for PP



— Tinuvin® 326 — Tinuvin® PA 328 — Tinuvin® 231 — Chimassorb® 81

Product form	PP molding		PP extrusion					PE molding		PE extrusion				
	General	Filled	Pipe /sheet/ profiles	Yarn, BCF	Nonwoven	Tapes/ monofilaments	Film	HD-, LLD-PE general	LLD-PE rotomolding	Pipe	PE, PE-x cable	Tapes/ monofilaments	HDPE film	LD-/EVA , LLD-PE film

Processing & thermal stabilizers

Irgafos® 126	P	□	□	□	□	□	□	□	□	□	□	□	■	□	□
Irgafos® 168	P, FF	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Irgafos® 38	P	□	□	□	□	□	□	□	□	□	□	□	■	■	■
Irganox® 1010	P, FF	■	■	■	□	□	■	■	■	■	■	■	■	□	□
Irganox® 1035	P, FF	□	□	□	□	□	□	□	□	■	□	□	□	□	□
Irganox® 1076	P, FD, M	□	□	□	□	□	□	□	□	□	□	□	□	■	■
Irganox® 1330	P	□	□	■	□	□	■	□	□	□	□	□	□	□	□
Irganox® 1425 WL	P	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Irganox® 3114	P, FF	□	■	□	□	□	□	□	□	□	□	□	□	□	□
Irganox® B 215	P, FF	■	■	■	□	□	■	■	■	■	□	■	■	□	□
Irganox® B 225	P, FF	■	■	■	□	□	■	■	■	□	■	■	■	□	□
Irganox® B 501 W	P, FF	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Irganox® B 561	P, FF	□	□	□	□	□	□	□	■	□	□	□	■	□	□
Irganox® B 900	P, FF	□	□	□	□	□	□	□	□	□	□	□	□	■	■
Irganox® E 201	L	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Irganox® MD 1024	P, FF	□	□	□	□	□	□	□	□	■	■	□	□	□	□
Irganox® PS 800	M, FL	□	□	□	□	□	□	□	□	□	■	□	□	□	□
Irganox® PS 802	FL	■	■	■	□	□	□	□	□	□	□	□	□	□	□
Irganox® XT 500	P	□	□	□	□	□	□	■	□	□	□	□	□	□	□
Irgastab® FS 210	FF	□	□	□	□	■	□	□	□	□	□	□	□	□	□
Irgastab® FS 301	FF	□	■	□	■	■	□	□	□	□	□	□	□	□	□
Irgastab® FS 410	FF	□	□	□	■	■	□	□	□	□	□	□	□	□	□
Irgastab® FS 533	P, FF	□	□	□	■	■	□	□	□	□	□	□	□	□	□
Irgastab® FS 811	FF	■	■	□	□	□	□	□	□	□	□	□	□	□	□
Irgastab® RM 68	FF	□	□	□	□	□	□	□	■	□	□	□	□	□	□
Hycite® 713	P	□	□	□	□	□	□	□	□	□	□	□	□	□	□

Food Contact Approval (FCA)

- no FCA, can be used
- no FCA, recommended
- FCA in at least one country, can be used
- FCA in at least one country, recommended

HALS not recommended for PP pressure pipes

Product form

- AD Aqueous Dispersion
- AR Attrition Resistant
- DD/ED Durable Dust Free
- DF Dust Free, Free Flowing
- FB Free Flowing Beads
- FD/FDL Free Flowing Dust Free (large)
- FF Free Flowing
- FL Flakes
- L Liquid
- LD Low Dust
- M Melt
- P Powder
- SF Solid Flowable
- G Granules

Key attributes

High performance, highly compatible phosphite; low color

Hydrolytically stable phosphite, maintains color properties

High performance, highly compatible phosphite with low melting point and low melt viscosity

High molecular weight, phenolic antioxidant (AO); extends long-term thermal stability (LTTS)

Phenolic AO for cross-linked or carbon black containing systems (i.e. cable compounds)

Highly compatible, low-color phenolic AO

High molecular weight extraction resistant phenolic AO

Phenolic AO with high extraction resistance; polyethylene wax carrier

Non-discoloring phenolic AO; high extraction resistance

Synergistic phenol/phosphite blend for a balanced stabilization

Synergistic phenol/phosphite blend with extended LTTS

Synergistic phenol/phosphite blend for PP fiber

Synergistic phenol/phosphite blend for demanding process conditions

Synergistic phenol/phosphite blend with high phosphite level

Vitamin E, a high efficiency phenolic AO with consumer appeal and excellent MF stability

High performance phenolic AO and metal deactivator (Cu passivator)

Synergist extending the LTTS of phenolic AOs

Synergist extending the LTTS of phenolic AOs

Stabilization system for BOPP films

Phenol-free process/light stabilizer; low color; gas fade resistant

Phenol-free process stabilizer; low color; gas fade resistant

Phenol-free process/light stabilizer; low color; gas fade resistant

Phenol-free stabilization system; gas fade resistant

Light-stabilizer system, phenol-free process stabilizer

Stabilization system for rotomolded applications

Acid scavenger

Product form	PP molding		PP extrusion					PE molding		PE extrusion					
	General	Filled	Pipe/sheet/profiles	Yarn, BCF	Nonwoven	Tapes/monofilaments	Film	HD-, LLD-PE general	LLD-PE rotomolding	Pipe	PE, PE-x cable	Tapes/monofilaments	HDPE film	LD-/EVA, LLD-PE film	LD-, LLD-PE, EVA agro

Light stabilizers (HALS)

Chimassorb® 2020	FDL	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Chimassorb® 944	FDL, LD	■	■	■	□	□	□	□	■	□	■	□	□	□	□
Tinuvin® 111	FDL	□	□	□	□		□	□				□		○	■
Tinuvin® 494	AR														●
Tinuvin® 622	SF	□	□	□	□	□	□	□	□	□	■	□	□	□	□
Tinuvin® 770	DF	○	○	○			○	○							
Tinuvin® 783	FDL	□	□	□	□	□	□	□	■	■	□	□	□	□	■
Tinuvin® 791	FB	●	●	●			○	○							
Uvinul® 4050	FF	■	■	■			□	□							
Uvinul® 5050 H	G	□	□	□	□	□	■	□	□	□		■	■	■	□
Tinuvin® NOR™ 371	FF					●									●
Tinuvin® XT 200	FF					○									●
Tinuvin® XT 850	FF	○	○	○											

Light stabilizers (UV absorbers)

Chimassorb® 81	P, FL	○		○			○	○	○		●		○	●	●	●
Tinuvin® 234	P, FF				○	●		○					○			
Tinuvin® 326	P, FL	●	○	●			●	●	●	●	●	●	●	●	●	●
Tinuvin® PA 328	P, FF	○	○					○	○				○	○	○	○

Flame retardants

Flamestab® NOR™ 116	FF				○	●		●					○	○	○	○
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Clarifiers/nucleating agents

Irgaclear® DM	P	■		□				□								
Irgaclear® XT 386	P	■		□				■								
Irgastab® NA 11	P	■	■	□				□								
Irgastab® NA 287	P	■	■	□				■	□							

Charge control agents

Irgastat® P range	G	■	■	■	□	□	■	■	■	■	□		■	■	■	
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Antiscratch agent

Irgasurf® SR 100	G	●	●													
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Rheology modifier

Irgatec® CR 76	G					●										
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Optical brightener

Tinopal® OB	P	□	□	□	□	□		□	□	□			□	□		
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Key attributes

High molecular weight HALS with superior light/thermal stability

High molecular weight HALS with low volatility for a wide range of applications

Synergistic blend of high molecular weight HALS, intermediate chemical resistance

Synergistic, pesticide resistant light stabilizer blend for agriculture films

High molecular weight HALS with low volatility and minimal migration

Low molecular weight HALS, particularly for thick section applications

Synergistic blend of high molecular weight HALS with broad food contact clearance

Synergistic blend of high and low molecular weight HALS

Low molecular weight HALS, particularly for thick section applications with food contact clearance

High molecular weight HALS suitable for water quenching process

Light stabilizer with very high resistance to agro-chemicals

Light stabilizer with high resistance to agro-chemicals

Non-interacting light stabilizer system particularly for automotive applications

Benzophenone with excellent compatibility

Benzotriazole with low volatility

Benzotriazole

Benzotriazole

Nitrogen based flame retardant and light stabilizer

High performance, sorbitol-based clarifying/nucleating agent

High efficiency clarifier

High performance nucleating agent

Superior nucleating agent

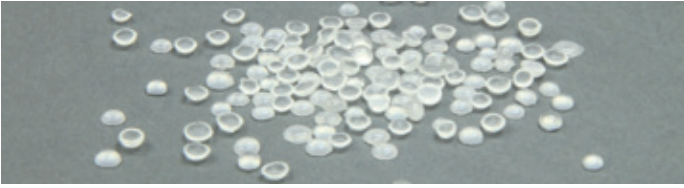
Permanent antistatic agents

High performance antiscratch agent

High-performance polymer modifier for PP

General purpose optical brightener

Typical examples of BASF product forms



FD Free Flowing Dust Free



FF Free Flowing



DD Durable Dust Free



ED Durable Dust Free



G Granules



P Powder



SF Solid Flowable



FL Flakes

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