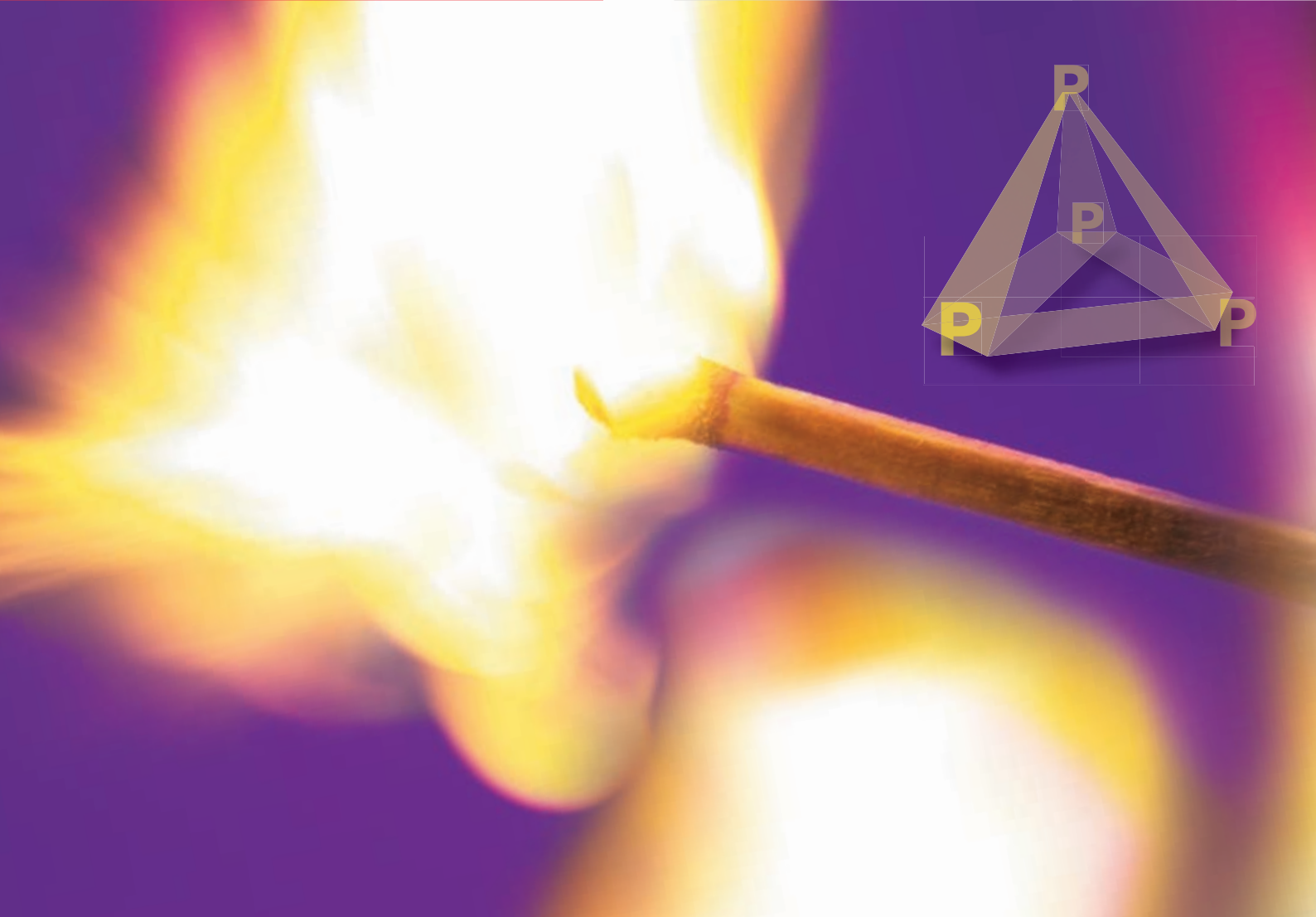
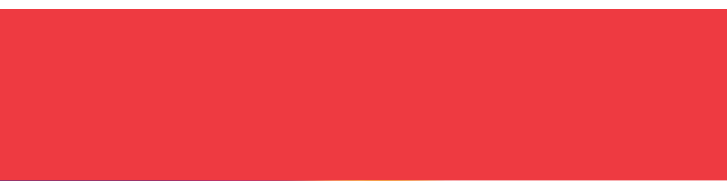


PHOSPHOROUS CHEMICALS





LANXESS was formed in 2004 through the carve-out of major portions of the chemicals activities of the Bayer Group and parts of its polymer operations. This means it has many years of experience to look back on, with roots going all the way back to the founding of Bayer in 1863. This is the basis on which LANXESS now develops, produces and markets a portfolio consisting of plastics, rubber, intermediates and specialty chemicals. In doing so, LANXESS provides reliable solutions worldwide for a wide range of different applications.

LANXESS has the experience and sound market knowledge of an established global player, combined with the commitment of a new, young enterprise. This is a combination that makes LANXESS strong and active. We are ready to break new ground, when and wherever our customers ask us to go.

Phosphorous Means Life!

It makes up a considerable part of the human body, the metabolic process is based on phosphorous chemistry and it is a major component of genetic information.

LANXESS is a leading supplier of organic phosphorous derivatives.

LANXESS runs one of the largest integrated production facilities for organic phosphorous downstream chemistry.

LANXESS starts from elemental phosphorous and produces a variety of derivatives which have applications in many industries, including pharmaceutical intermediates, water treatment, fine chemicals, agrochemicals and flame retardants.

LANXESS **Phosphorous Chemicals** stands for professional customer service, experienced technical support, creative researchers and products of consistently high quality.

Intermediates

LANXESS produces two groups of Intermediates used as basic building blocks in the production of phosphorous compounds. Their main property is their phosphorylating effect. The production of agrochemicals and flame-retardants account for the major part of the synthesis chemicals consumption.

Flame Retardants

The product portfolio includes the product lines Disflamoll® and Levagard®, which offer highly-efficient fire protection and other advantages like easy processability or high elasticity. Under the trade name Bayfomox®, LANXESS offers a reactive two-component polyurethane system that is used to manufacture extremely flame-retardant articles for fire stop applications.

Specialties

The LANXESS portfolio of phosphorous specialties includes a variety of organic phosphorous compounds. These phosphorous specialties are used as liquid-liquid metal extractants, antifoam agents, solvent substitutes, viscosity depressants and catalysts for chemical synthesis.

Water Treatment

A business focused on phosphorous chemicals designed to control scale and corrosion across a wide range of water management applications. The Bayhibit® range includes products with very high stability in the presence of oxidizing agents and of ozone.



Intermediates

Phosphorous halides

PCl_3 , POCl_3 and PSCl_3 are important chlorinating agents. The first two are characterized by a high degree of purity (active content: 99.7 %) and are used, among other things as intermediates for the production of pharmaceutical active ingredients, crop protection agents, phosphates used as flame-retardants, antioxidants and textile processing chemicals.

PSCl_3 is a reactive intermediate with a thiophosphorylating action used mainly in the production of different insecticides.

Phosphites

Dimethyl phosphite (DMPI) and Diethyl phosphite (DEPI) are clear, colorless low viscosity liquids. They are known as reactive intermediates with phosphorylating and reducing potential in the production of various phosphonates and diethyl chloro phosphates.



Product	Description	Applications
PCl₃	Phosphorous trichloride Reactive chlorinating and phosphorylating intermediate product	Base stock in the production of organic phosphites, phosphates and phosphonates which are used to make a variety of end products such as stabilizers, flame retardants and antioxidants.
POCl₃	Phosphorous oxichloride Reactive chlorinating and phosphorylating intermediate product	Base stock in the production of organic phosphites, phosphates and phosphonates which are used to make a variety of end products such as stabilizers, flame retardants and antioxidants.
PSCl₃	Phosphorous sulfochloride Reactive chlorinating and thiophosphorylating intermediate product	Manufacture of thiophosphoric acid ester derivatives which are used in the production of different insecticides.
DEPI	Diethyl phosphite Phosphorylating and reducing agent for chemical synthesis	Manufacture of various phosphonates, diethyl chloro phosphonates and derived mixed phosphoric acid esters for flame retardants, textile auxiliaries and agrochemicals.
DMPI	Dimethyl phosphite Phosphorylating and reducing agent for chemical synthesis	Manufacture of various phosphonates, dimethyl chloro phosphonates and derived mixed phosphoric acid esters for agrochemicals, pharmaceuticals and flame retardants for textiles.



Flame Retardants

Disflamoll® range

LANXESS offers with its Disflamoll® range aromatic phosphate esters which combine flame retardancy with plasticizing properties. They show an excellent compatibility with polar polymers.

Levagard® range

LANXESS offers with its Levagard® range halogenated and halogen-free phosphate esters, primarily suited for the production of flame-retarded polyurethane foam.

Bayfomox® range

Under the trademark Bayfomox®, LANXESS offers a reactive polyurethane system which is used to manufacture extremely flame-retardant articles for fire protection. Articles made of Bayfomox® show intumescence when exposed to fire or heat and can resist open fire for a long time.

Product	Chemical composition	Form supplied
Disflamoll® DPK	Cresyl diphenyl phosphate	almost colorless clear liquid
Disflamoll® TKP	Tricresyl phosphate	almost colorless clear liquid
Disflamoll® TKP-P	Tricresyl phosphate	almost colorless clear liquid
Disflamoll® TP	Triphenyl phosphate	almost colorless melt or pellets
Disflamoll® DPO	2-Ethylhexyl diphenyl phosphate	almost colorless clear liquid
Disflamoll® TOF	Tris-(2-Ethylhexyl) phosphate	almost colorless clear liquid
Disflamoll® TP LXS 51036	Phosphate blend	almost colorless clear liquid
Levagard® PP	Tris-(2-chloroisopropyl)-phosphate	almost colorless clear liquid
Levagard® TEP- Z	Triethyl phosphate	almost colorless clear liquid
Levagard® DMPP	Dimethylpropane phosphonate	almost colorless clear liquid
Levagard® 4090 N	N,N- Dihydroxyethylamino-methan phosphonic acid ester	brownish liquid
Bayfomox® PA	Polyol formulation, based on nitrogen and phosphorous	red or gray liquid
Bayfomox® P	Isocyanate component	brown liquid
Bayfomox® WMP Mix VP AI 4072	Nitrogen and phosphorous based intumescent additive	yellowish gray powder



P content [%]	Viscosity at 20 °C [mPa.s]	Applications
9.1	46	High efficiency, hydrolysis-resistant flame retardant for PVC, PUR, NBR, CR, PF and other polar polymers.
8.4	69	Flame retardant for PVC, PUR, NBR, CR, PF and other polar polymers. Good gelling plasticizer for PVC applications.
8.4	75	Flame retardant for PVC, PUR, NBR, CR, PF and other polar polymers. Carrier for photo chemicals.
9.5	11 at 50 °C	Flame retardant for PF, PC/ABS blends, cellulosic esters or other plastic materials.
8.6	22	Smoke suppressant, flame retardant with plasticizing properties for PVC, NBR and other polar polymers. Imparts low temperature resistance and light fastness to PVC compounds. Cellulose lacquering.
7.1	14	Plasticizer with outstanding low temperature flexibility and flame-retardant properties for PVC, PUR, NBR, EPDM and other synthetic rubber. Can be used as wetting agent for pigments and dyestuffs.
8.8	30	Flame retardant with plasticizing properties for PVC. Specially designed for the production of synthetic leather.
9.5	95	Flame retardant for polyurethane foams, thermosets and coatings.
17	2	Flame retardant for polyurethane rigid foams and thermosets. Viscosity decreaser for polyol formulations and prepolymers.
20	2	Highly-effective flame retardant for rigid polyurethane foams and thermosets.
12.1	175	Reactive flame retardant for polyurethane foams, phenolic resins and thermosets.
	2000	Raw material for the production of flame-retardant molded polyurethane articles.
	1000	Raw material for the production of flame-retardant molded polyurethane articles.
		Additive for sealants and coatings with improved fire resistance.

Specialties

Metal Extractants

LANXESS offers two liquid-liquid extractions for purification, enrichment, separation and recovery of rare earths and platinum metals.

Antifoam Agents

Tributyl phosphate and Triisobutyl phosphate are strong polar and aprotic solvents used in the production of concrete, textiles and paper-coating compounds. They are used as antifoam additives in various aqueous systems, where they have the ability to both destroy foam and act as a foam inhibitor.

Catalysts for Chemical Synthesis and Processing Agent

Levagard® TEP-Z is used as a catalyst in ketene synthesis for the production of acetic anhydride according to the Wacker procedure.

In the synthesis of water peroxide, Disflamoll® TOF is used as a component in the solvent mixture for the oxygen transfer system anthrachinone/anthrahydrochinone.

Lubricants and Oil Additives

Properties which determine phosphorous based compounds to be used as oil additives are inflammability, good thermal and oxidation resistance. They show lubricating effect as well as good cold resistance.

Product	Chemical composition	Form supplied
Tributyl phosphate	Tributyl phosphate	almost colorless clear liquid
Baysolvex® D2EHPA	Di-(2-ethylhexyl)-phosphoric acid	almost colorless clear liquid
Tributyl phosphate	Tributyl phosphate	almost colorless clear liquid
Triisobutyl phosphate	Triisobutyl phosphate	almost colorless clear liquid
Dibutyl phosphate	Dibutyl phosphoric acid	almost colorless clear liquid
Levagard® TEP- Z	Triethyl phosphate	almost colorless clear liquid
Disflamoll® TOF	Tris-(2-Ethylhexyl)-phosphate	almost colorless clear liquid
Tributyl phosphate	Tributyl phosphate	almost colorless clear liquid
Disflamoll® TKP-P	Tricresyl phosphate	almost colorless clear liquid
Disflamoll® DPO	2-Ethylhexyl diphenyl phosphate	almost colorless clear liquid
Disflamoll® TOF	Tris-(2-ethylhexyl) phosphate	almost colorless clear liquid



Viscosity at 20 °C [mPa.s]	Applications
3.8	Separation and isolation of numerous rare earth and platinum group metals, for the recovery and concentration of Ur, As, Cr and Pt as well as for the purification of phosphoric, nitric and hydrofluoric acids.
46	Liquid-liquid extraction processes for purification, enrichment, separation and recovery of metal salts. Separation of Ur, Zn, Fe, Ca, Be, Co or Mo.
3.8	Additive for liquefying concrete, textile auxiliaries, paper-coating compounds.
5	Additive for liquefying concrete, textile auxiliaries, paper-coating compounds.
75	Precursor for antistatics, release agents in polyurethane applications, acidic catalyst in organic synthesis.
2	Synthesis of ketenes.
14	Solvent in the production of hydrogen peroxide.
4	Fire resistant hydraulic fluid.
75	Extreme pressure/anti wear additive for hydraulic, gear and engine oils.
22	Hydraulic fluid, cooling lubricant.
14	Cooling lubricant.



Water Treatment Chemicals

LANXESS offers for water treatment procedures a range of products based on the active substance 2-phosphono-butane-1,2,4-tricarboxylic acid (PBTC). Developed in the early 1970s, its market success is largely attributed to the following technical advantages:

- Particularly effective scale-inhibition, even under very demanding conditions (high temperatures, pH, water hardness) in cooling water.
- Good anti-corrosive effect for normal steel, especially in compounds and under 'all-organic' conditions in cooling water.
- In cleaners particularly effective inhibition of incrustations at pH 10 to 13, even under high temperature conditions.

The three products belonging to the Bayhibit® range show very high stability in the presence of oxidizing biocides/disinfectants such as hypochlorite solution chlorine, bromine or ozone and low tendency to precipitation as calcium phosphonate. The products are easy to formulate and no labelling is required under Germany's regulations on hazardous substances and equivalent EU Directives.

Product	Chemical composition
Bayhibit® AM	Solution of 2-phosphonobutane-1,2,4-tricarboxylic acid in water
Bayhibit® N	Solution of 2-phosphonobutane-1,2,4-tricarboxylic acid tetrasodium salt in water
Bayhibit® S	2-phosphonobutane-1,2,4-tricarboxylic acid salt



Form supplied	Active substance [%]	Applications
clear colorless to light yellowish liquid	50	Water treatment, alkaline cleaning.
clear colorless to light yellowish liquid	41	Water treatment, alkaline cleaning.
white to yellowish granulate	90	Water treatment, alkaline cleaning.



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