

QUALITY PERFORMS.



Functional Tire Additives
Product catalog

QUALITY WORKS.

LANXESS
Energizing Chemistry

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INTRODUCTION

QUALITY PERFORMS.

As the world's largest supplier of rubber additives the LANXESS Rhein Chemie business unit offers individual and innovative product solutions: rubber chemicals, specialty chemicals and processing aids for the rubber industry. With LANXESS solutions, high-performance rubber products such as tires, treads, seals or drive belts are produced.

Functional Tire Additives – solutions for the tire industry

As a strong partner to the tire industry, we offer the right additive for all steps of rubber production from a single source and thus also have a broad product range for the manufacture of high-performance tires. Antioxidants (**Vulkanox®**) protect rubber products from the harmful effects of oxygen and ozone. Accelerators (**Vulkacit®**) facilitate the crosslinking of rubber, noticeably reducing vulcanization times. The DBD-**Renacit®** product line also supports and facilitates production in rubber processing.

Zinc oxides and zinc carbonates (**Zinkoxyd aktiv®**, **Bayoxide® Z** and **Zink oxide transparent**) complete our portfolio as performance products for various applications and markets.

We quickly and flexibly deliver the rubber industry worldwide with solutions for increasing regulatory requirements and a constantly growing pressure to innovate within our industry.



■ LANXESS corporate headquarters in Cologne

A BRIEF INTRODUCTION INTO OUR ACCELERATORS AND ANTIDEGRADANTS

LANXESS has driven innovation in the rubber industry since the days of the invention of synthetic rubber. Over decades LANXESS has developed a broad spectrum of rubber polymers as well as rubber chemicals. This range includes all major polymers and rubber chemicals used in tire and automotive technology, and also additional specialties for technical rubber goods. Our broad portfolio of high quality rubber chemicals helps our customers meet their individual performance requirements.

Our complete portfolio consists of accelerators, antioxidants and mastication agents. Our range of products is designed to meet the demands of our customers today.

Vulkacit®

Vulcanization is the conversion of a high-molecular material from the plastic to the elastic state. One of the key chemical reactions in this process is that of rubber with sulfur. Sulfur vulcanization, widely used in the rubber industry, requires the use of vulcanization accelerators such as **Vulkacit®**.

Vulcanization accelerators are not catalysts because they are part of the chemical reaction. The great variety of accelerators available is a result of their different influences on the vulcanization kinetics (scorch and cure time) and on physical properties such as tensile strength, elasticity or resistance to aging. In many cases, accelerators are combined to supply optimal processing and physical properties.

Key Properties

- **Merkapto accelerators** very fast accelerators are very broad plateau and good aging resistance.
- **Sulfenamide accelerators** are fast but very safe accelerators providing a steep slope on the rheometer curve.

Vulkanox®

Aging processes, which are caused by oxygen or heat, change the properties of the vulcanizates. Rubbers generally are subject to such changes that occur in the course of time and can lead to partial or complete destruction. Possible consequences are depolymerization, fatigue, brittleness, cracks and even disintegration. The resistance of a rubber article to oxygen, ozone and other reactive substances is determined mainly by the elastomer on which the compound is based and by the chemicals that are added to retard the destructive processes.

Unsaturated groups in the rubber molecule are the reason for the rubber's sensitivity to oxygen, which increases with temperature. If catalysts of oxidation (known as rubber poisons) are present, aging is rapid. The results are hardening and embrittlement, crazing effects and fatigue. Ozone or dynamic stress (fatigue) lead to cracking on the surface of the rubber article.

Antidegradants such as **Vulkanox®** are chemicals which protect the vulcanizates against damaging external influences. Depending on the chemical structure, they act against one or more of the aging processes mentioned. None of the antidegradants is universally effective, each has a definite spectrum of activity and characteristic effectiveness, and a definite propensity to discolor the goods if they are exposed to light. Staining antidegradants are generally more effective than non-staining ones.

A special quality of **Vulkanox® HS** was developed for the application in semi-conductive layers of medium to high voltage cables. Our "salt free" quality ensures that the water permeability is significantly lower compared to standard competitive grades.

Key Properties

- **Protection against** oxidation, ozone, heat and rubber poisons
- **Protection against** dynamic stress

PRODUCT OVERVIEW AND DATA

From research to service: All our processes are programmed for the success of our customers.

The different supply forms

LANXESS rubber chemicals are supplied in various forms to meet the requirements of our customers. The available supply forms are chosen to provide optimal handling and processability as well as work safety profile. Therefore many products are available in low dust versions as oil coated or granule type material.

Here is an overview on the different supply forms of rubber chemicals form LANXESS:

Product	Description
...	ground powder (or flakes or liquid; – depending on physical condition)
.../C	ground powder, oil coated (1–2% Oil)
.../C5	ground powder, oil coated (4–5% Oil)
.../MG	micro granules
.../MG-C	micro granules, oil coated (1–2% Oil)
.../EG	extruded granules
.../EG-C	extruded granules, oil coated (1–2% Oil)
.../LG	lentile shaped granules
.../WG	wax granules

(... = product name)



Vulkacit® Merkapto MG-C



Vulkacit® CZ/EG-C



Vulkanox® HS/LG



Renacit® 11/WG



PREMIUM PRODUCTS FOR TIRES AND TECHNICAL RUBBER GOODS

Rubber chemicals portfolio for the tire industry

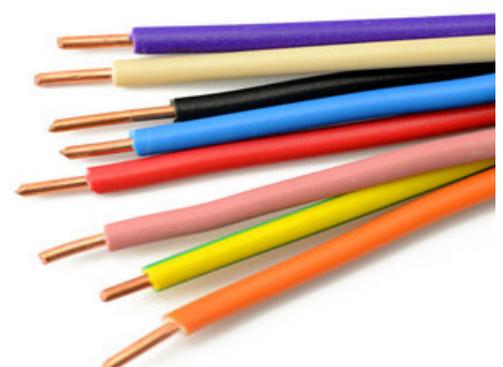
Rubber chemicals	Technical name	High performance silica	Passenger car carbon black	Light truck	Heavy truck	Earth mover	Tread	Subtread Sidewall	Cord adhesion
Merkapto accelerators									
Vulkacit® Merkapto	MBT	■	■	■	■	■	■	■	■
Vulkacit® DM	MBTS	■	■	■	■	■	■	■	■
Sulfenamide accelerators									
Vulkacit® CZ	CBS	■	■	■	■	■	■	■	
Vulkacit® NZ	TBBS	■	■	■	■	■	■	■	
Vulkacit® DZ	DCBS								■
Staining antioxidants with antiozonant effect									
Vulkanox® 4020	6PPD	■	■	■	■	■	■	■	
Vulkanox® 4030	77PD	■	■	■	■	■	■	■	
Staining antioxidant									
Vulkanox® HS	TMQ	■	■	■	■	■	■	■	■
Activator									
Zinkoxyd aktiv®	ZnO	■	■	■	■	■	■	■	■
Peptizing agents									
Renacit® 10	DBD	■	■	■	■	■	■	■	■
Renacit® 11	DBD	■	■	■	■	■	■	■	■



PREMIUM PRODUCTS FOR TIRES AND TECHNICAL RUBBER GOODS

Rubber chemicals portfolio for technical rubber goods

Rubber chemicals	Tech. name	NR/IR	BR	CR	CSM	EPDM	EPM	EVA	HNBR	NBR	HIIR	IIR	SBR
Merkapto accelerators													
Vulkacit® Merkapto	MBT	■	■	■	■	■			■	■	■	■	
Vulkacit® DM	MBTS	■	■	■	■	■			■	■	■	■	
Sulfenamide accelerators													
Vulkacit® CZ	CBS	■	■			■			■	■		■	■
Vulkacit® NZ	TBBS	■	■			■			■	■		■	■
Vulkacit® DZ	DCBS	■	■			■			■	■		■	■
Staining antioxidants with antiozonant effect													
Vulkanox® 4020	6PPD	■	■						■	■			■
Vulkanox® 4030	77PD	■	■						■	■			■
Staining antioxidant													
Vulkanox® HS	TMQ	■	■	■		■	■		■	■	■	■	■
Non staining antioxidants													
Vulkanox® SP*	SPH	■		■		■			■	■	■	■	
Activators													
Zinkoxyd aktiv®	ZnO	■	■	■		■	■	■	■	■	■	■	■
Zink oxide transparent	ZnO	■	■	■		■	■	■	■	■	■	■	■
Peptizing agents													
Renacit® 10	DBD	■											
Renacit® 11	DBD	■											



ACCELERATORS

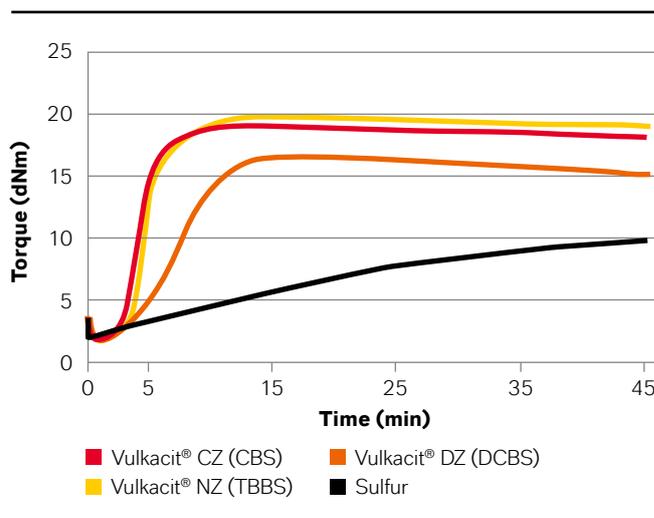
Sulfenamide accelerators

Characteristics

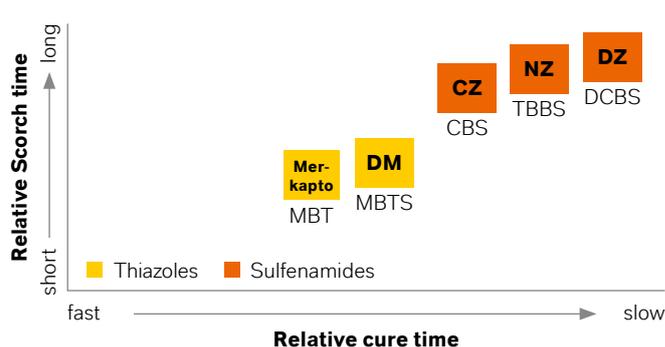
- Fast, yet very safe accelerators giving a much delayed onset of cure (long flow compounds possible), i.e. steep vulcanization curves.
- **Vulcanization characteristics:**
 - Long scorch time
 - Steep vulcanization curves
 - High plateau
- Particularly suitable for efficient vulcanization (low sulphur level)
- Low melting point, easy to dispers
- Vulcanizates are characterized by a high level of mechanical properties (elasticity, fatigue resistance) but a lower ageing resistance than those vulcanizates with merkaptotype accelerators

Applications

Used mainly for tires. Also suitable for dynamically stressed technical goods, e.g. buffers and conveyor belting, and for technical moldings and extrudates in general, e.g. seals, hoses, profiles, footwear, cable sheathing and insulation.



Overview on core characteristics of several accelerators



Product range and typical properties

Product	Vulkacit® CZ/C	Vulkacit® CZ/EG-C	Vulkacit® NZ/EG-C	Vulkacit® DZ/EG-C
Chemical composition	N-cyclohexyl-2-benzothiazyl sulfenamide		N-tert. butylbenzothiazyl sulfenamide	N,N-dicyclohexyl-2-benzothiazyl sulfenamide
Technical name	CBS		TBBS	DCBS
CAS Number	95-33-0		95-31-8	4979-32-2
Structure				
Density (g/cm³)	1.3		1.3	1.2
Initial melting point (°C)	≥ 98		≥ 106	≥ 96
Physical form	white to grayish powder, low dust	light gray granules, low dust	white to grayish granules, low dust	beige granules, low dust
Standard packaging	20kg paper bags and FIBC			

Merkapto accelerators

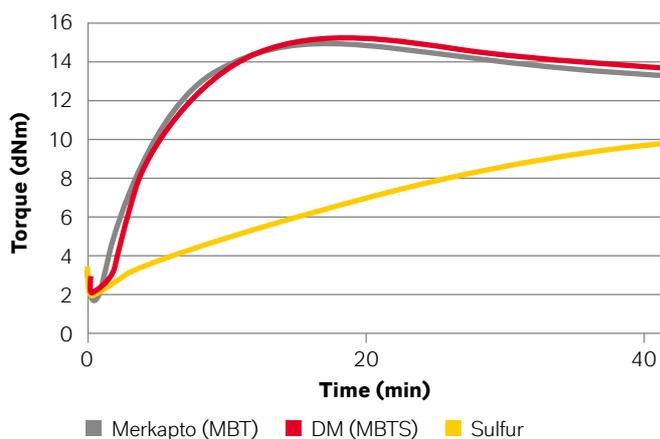
Characteristics

Versatile and fast accelerators

- Easily dispersible
- Melting points are not reached while incorporation in the compound
- Sensitize latex compounds
- Offer best resistance of the vulcanizate to aging
- Show excellent resilience values to manufacture dynamically stressed goods
- **Vulkacit® Merkapto** and **Vulkacit® DM** have a favourable effect on rubber-to-metal bonding
- In general suitable for all vulcanization methods, **Vulkacit® DM** in particular for applications that require longer flow times
- Used alone or in conjunction with other accelerators, giving a very broad plateau and good aging resistance:
 - With sulfenamides (**Vulkacit® CZ, NZ, DZ**) longer scorch and equal curing time are possible (steep curing characteristic with a delayed onset of cure).
- In CR **Vulkacit® DM** and **Vulkacit® Merkapto** show a retarder effect.

Applications

Rubber footwear and other hot-air cured goods, moldings and technical goods of all types, e.g. roll covers, conveyor belting, transmission belting, footwear soles and heels, hose, profiles, cables, bicycle and tires, cellular rubber goods.



Product range and typical properties

Product	Vulkacit® Merkapto/C	Vulkacit® Merkapto/MG-C	Vulkacit® DM/C	Vulkacit® DM/MG-C
Chemical composition	2-mercapto-benzothiazole		di(benzothiazol-2-yl) disulfide	
Technical name	MBT		MBTS	
CAS Number	149-30-4		120-78-5	
Structure				
Density (g/cm³)	1.4		1.5	
Initial melting point (°C)	≥174		≥168	
Physical form	yellowish white powder, low dust	yellowish micro-granules, low dust	cream-colored powder, low dust	
Standard packaging	20 kg paper bags and FIBC			

ANTIDEGRADANTS

Vulkanox® – antidegradants

LANXESS offers a wide range of antidegradant products for various applications. Depending on the chemical nature of the antidegradant it offers either antioxidative, antifatigue or antiozonant properties. The group of paraphenylenediamines even combines all these properties. Nevertheless, staining antidegradants can not be used in all applications, the portfolio is therefore complemented by a number of non-staining grades.

Vulkanox® – para-phenylenediamine products

- Outstanding protection from dynamic stress, oxidation, heat, ozone and rubber poisons
- Severe staining and contact staining
- Easy incorporation
- Minor influence on compound viscosity
- No influence on mechanical properties of the vulcanizate
- Vulkanox® 4020 is an excellent stabilizer for polymers, especially for oil-extended E-SBR

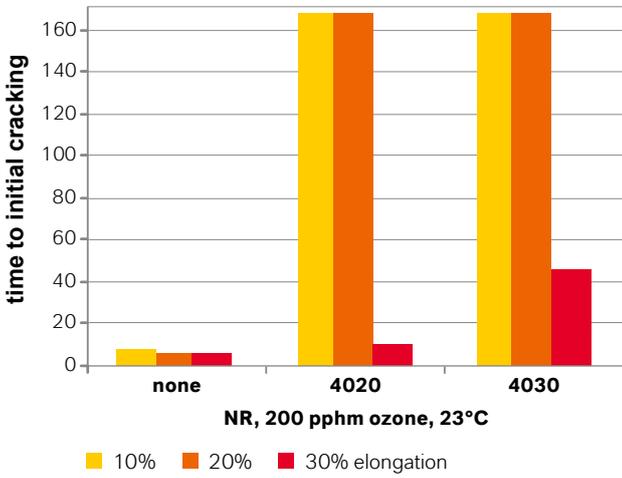
Vulkanox®	Para-phenylenediamines		Amin HS
	4020	4030	
antioxidant	■	■	■
anti fatigue	■	■	
antiozonant	■	■	

Vulkanox® – antidegradants: Product range and typical properties

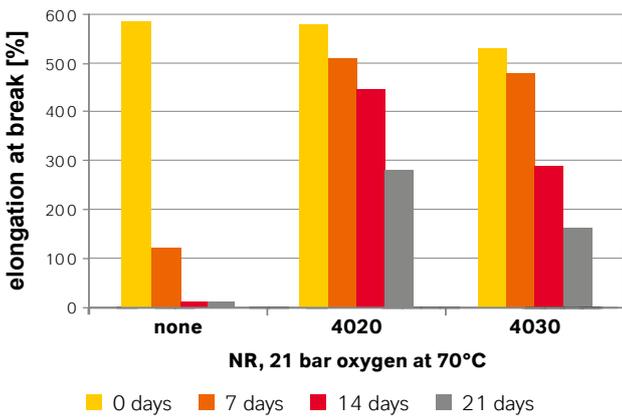
Product	Vulkanox® 4020 / LG	Vulkanox® 4020 liquid	Vulkanox® 4030
Chemical composition	N-(1,3-dimethylbutyl)-N'-phenyl-p-phenylenediamine		N,N'-bis-(1,4-dimethylpentyl)-p-phenylenediamine
Technical name	6PPD		77PD
CAS Number	793-24-8		3081-14-9
Structure			
Staining ¹⁾	5–6	5–6	5
Density (g/cm³)	0.995 (at 50 °C)	0.995 (at 50 °C)	0.9
Initial melting point (°C)	≥ 45	solidification point ≥ 45	–
Physical form	brownish lentil-shaped granules	dark brown liquid	dark red liquid
Standard packaging	25 kg paper bags and FIBC	road or rail tanker	180 kg rolling channel drums and ISO tank
Remarks	anti-flex cracking effect, slightly less effective compared to NA, good anti-aging properties, good ozone protection		optimum ozone protection, anti-aging properties less effective compared to Vulkanox® 4020

ANTIDEGRADANTS

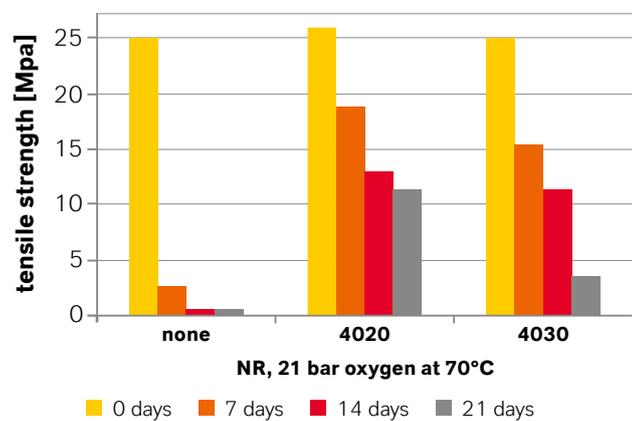
Extended time to initial crack formation



Improved elongation properties



Tensile strength significantly improved



Applications Vulkanox® (4020, 4030)

Car, truck, motorcycle, off-road and bicycle tires; technical goods subjected to dynamic stress; spring components, conveyor and transmission belting, hoses, seals; cable sheathings and insulations, inner tubes, roll covers.

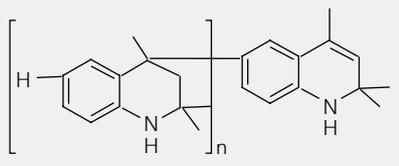


Vulkanox® HS/LG

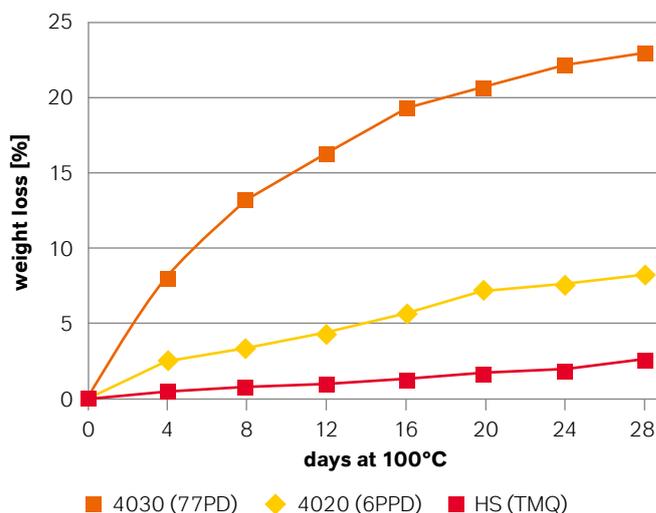
Characteristics

- Excellent protection from oxygen and heat
- Good protection from rubber poisons
- Slight anti-flex cracking effect
- Medium staining and little contact staining
- Low volatility and low migration tendency
- In some cases antiozonant activity

Typical properties

Product	Vulkanox® HS/LG
Chemical composition	2,2,4-trimethyl-1,2-dihydroquinoline, polymerized
Technical name	TMQ
CAS Number	26780-96-1
Structure	
Staining ¹⁾	3
Density (g/cm ³)	1.04
Softening point (°C)	90
Physical form	yellow to brownish lentil-shaped granules
Standard packaging	25 kg paper bags and FIBC
Remarks	affords very good heat protection, improves the heat resistance of EPDM; also suitable for latex

Low volatility of TMQ compared to PPDs John et al., Kautsch. Gummi Kunstst. 36, 363 (1983)



Applications

Used in conjunction with p-phenylenediamines for heavily stressed technical goods and tires. Used for technical goods in general, e.g. roll covers, buffers, conveyor and transmission belting, hoses, profiles, seals. Also suitable for boots and footwear soles and heels. Usable as well in peroxide and adiation crosslinked vulcanizates.

A special quality of Vulkanox® HS was developed for the application in semi-conductive layers of medium- to high-voltage cables. Our “reduced salt” quality ensures that the water permeability is significantly lower compared to standard competitive grades.

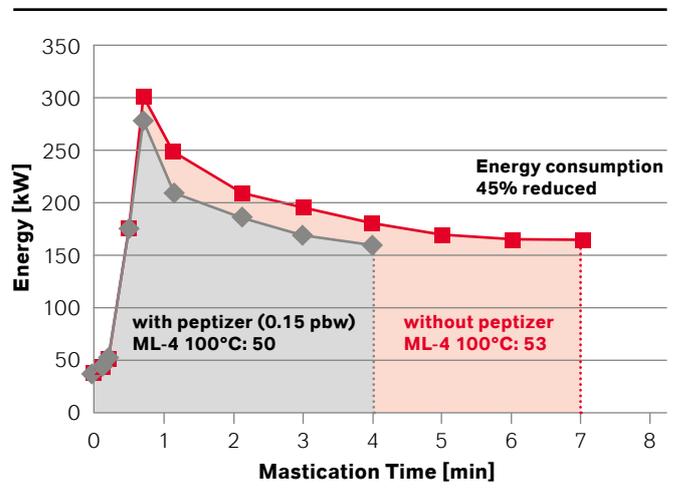
Renacit® – peptizing agents

Characteristics

- Highly effective polymer mastication agent
- Substantially reducing mastication times, thus increasing mixing capacity
- Reduction of energy consumption to reduce costs
- Non-dusting chemical formulation and supply forms
- Reduction of molecular weight of natural rubber

Applications

Renacit® 10, 11 or 11/WG are particularly recommended as peptizers for NR but are also suitable for synthetic rubber. Renacit® 10, 11 or 11/WG are mainly used for mastication in internal mixers and mixing mills.



Products and typical properties

Product	Renacit® 10	Renacit® 11/WG	Renacit® 11
Chemical composition	2,2'-dibenzamido-diphenyldisulfide	2,2'-dibenzamido-diphenyl-disulfide with activating additive and binder	2,2'-dibenzamido-diphenyl-disulfide absorbed on clay, low dust
Technical name	DBD (>90%)	DBD (40.5%)	
CAS Number	135-57-9		
Structure			
Density (g/cm³)	1.35	1.4	–
Physical form	light gray to beige powder	blue-greenish wax granules	grayish powder
Standard packaging	20 kg paper bags		

TAILOR-MADE SOLUTIONS FOR VARIOUS APPLICATIONS

Based on the long history in the production of high-performance chemicals, today LANXESS business unit Rhein Chemie is offering a wide portfolio of additives and intermediates to numerous industries. In addition, our portfolio contains certain special grades of products, tailor made for specific applications.

Merkapto products for pharma and agro applications

With its nitrogen and sulphur functionality, **Vulkacit® Merkapto** is a very versatile molecule and used across several industries. Mercaptobenzothiazole (MBT) as well as benzothiazole (BT) are important intermediates in the synthesis of several active ingredients such as for pharmaceutical and agricultural use.

For example in the production of 3rd and 4th generation of cephalosporin antibiotics MBT is used in the synthesis of the intermediate GCLE based on penicillin G. The synthesis route via GCLE offers several advantages compared to other routes like

- Higher recovery yield
- Simple process
- Cost advantage

For cephalosporin synthesis based on MICA acid as raw material, **Vulkacit® DM** (MBTS) is used as a protection group.

Mercaptobenzothiazole products for biocides

Mercaptobenzothiazole and its sodium salt are the major raw materials for the synthesis of 2-(thiocyanomethylthio) benzothiazole (TCMTB). TCMTB is a micro biocide, an active ingredient of fungicides and an antifouling agent used as a substitute for chlorophenols in industrial applications.



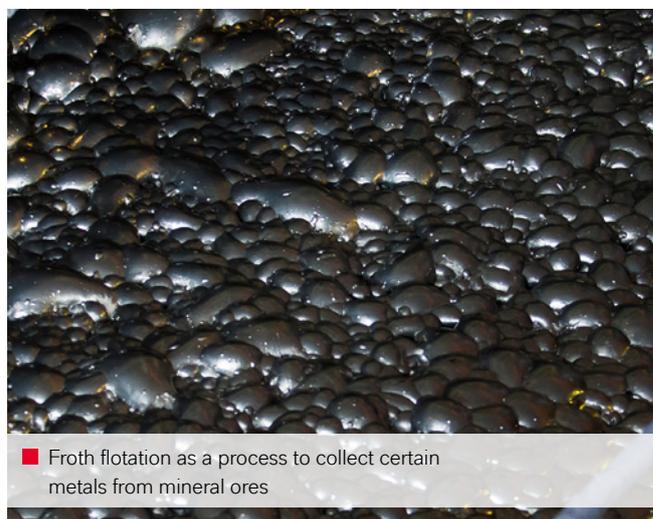
■ MBT as raw material for leather protection

Mercaptobenzothiazole products in froth flotation

Flotation is a separation process that clarifies a water phase by the removal of suspended matter such as oil or solids. The removal is achieved by dissolving air in the water or waste water under pressure and then releasing the air at atmospheric pressure in a flotation tank or basin. The released air forms tiny bubbles which adhere to the suspended matter causing it to float to the surface of the water where it may then be removed by a skimming device. Flotation is very widely used in treating the industrial waste water from oil refineries, petrochemical and chemical plants, natural gas processing plants, and paper mills.

The chemical functionality makes MBT an excellent flotation agent used in the processing of mineral ores. MBT gets ionized in alkaline media and consists of a neutral (-hydrophobic) part and an ionic part. In NaMBT, the MBT is already ionized. The ionic part will cover ionic parts as metals, whereas the hydrophobic part will bond to hydrophobic gas bubbles. The gas bubbles used in flotation processes will float these up.

Vulkacit® Merkapto and sodium mercaptobenzothiazole from LANXESS are excellent collectors for the flotation of many precious metals like gold, lead, molybdenum, platinum, silver, copper, nickel and zinc.



■ Froth flotation as a process to collect certain metals from mineral ores

NaMBT mercaptobenzothiazole

Characteristics

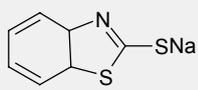
- Aniline-based chemical intermediate and flotation agent
- NaMBT protects mainly copper and copper alloys from corrosion by creating a thin film on the metal surface
- Dissolution of these metals is inhibited (no metal ions in the water)
- Prevents oxidation of cooling water additives like glycol
- Forms a smooth, non greasy, adhesive and colorless layer on the metal surface
- As the protective film is very thin, the heat exchange between metals and coolants is not impaired

- Works synergistically with other corrosion inhibitors like sodium benzoate, borax, silicate, nitrite, molybdate, phosphate and organic phosphorus compounds

Applications

NaMBT mercaptobenzothiazole serves as a flotation agent for the mining industry and as additive in various fluids. Some examples are cooling circuits, waste water treatment and gas compression stations. It is also used as a major chemical intermediate for biocide production.

Sodium-2-mercaptobenzothiazole

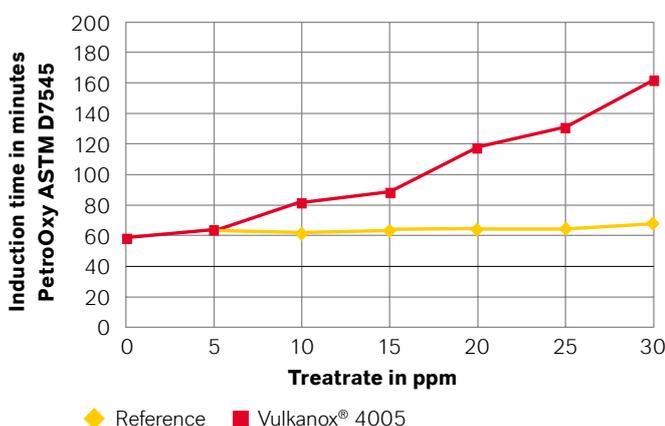
Technical Name	CAS Number	Structure	Property	Nominal value	Unit
NaMBT	2492-26-4		Content of NaMBT	50.25 ±1.25	%
			Free alkaline as NaOH	≤ 0.6	%
			Color number (Gardner)	≤ 18	–
			Dilution in water 1:10	no turbidity	–



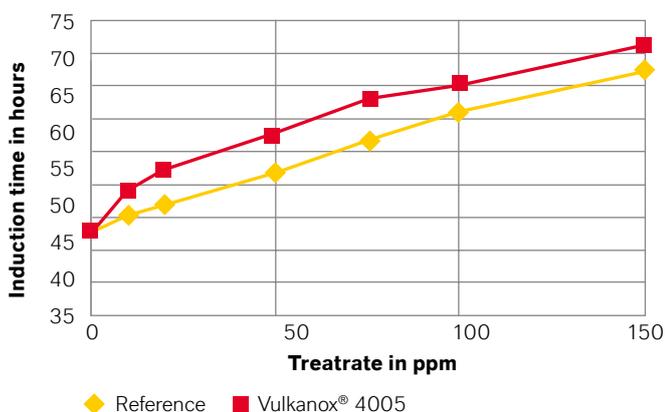
Characteristics

- Vulkanox® 4005 is a stabilizer and antioxidant
- is used in the refining process to prevent gum formation in gasoline and as a short-term stabilizer
- is used at refineries and fuel terminals storage tanks to increase the oxidation stability of fuels
- is used for biodiesel production to increase oxidation stability
- is used for blending mineral diesel with biodiesel to increase oxidation stability
- is used as part of additive packages to meet fuel specification. It is also used to bring off-spec gasoline, diesel and heating oil into specification
- is very effective in unstabilized biodiesel B100 and mineral diesel/biodiesel blends B20 and B7 (7% FAME)

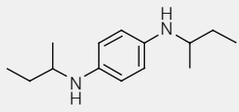
Performance Vulkanox® 4005 in Test Gasoline E10



Performance Vulkanox® 4005 in Diesel B 7



Typical properties

Product	Vulkanox® 4005
Chemical composition	N,N'-di-sec-butyl-p-phenylendiamin
Technical name	44PD
CAS Number	101-96-2 HHNN
Structure	
Density (g/cm³)	(25°C) 0,9
Assay	≥ 96.0%
Ash content	≤ 0.10%
Volatile matter	≤ 0.50%
Viscosity	(25°C) 45 mPa.s
Packaging	180 kg rolling channel drums and ISO tank

Applications

Vulkanox® 4005 is used at different stages in the supply chain of the fuel industry. Vulkanox® 4005 is used during the gasoline manufacture process as a short-term stabilizer preventing gum formation due to the oxidation of gasoline components.

In the storage of fuel products Vulkanox® 4005 has proven its effectiveness as an anti-oxidant to increase the oxidation stability of diesel and biodiesel blends as well as for the long-term storage stability of strategic gasoline and diesel supplies. Also in diesel with a significant amount of bio-components Vulkanox® 4005 prevents oxidation of these bio-components otherwise resulting in fouling of fuel tanks and modern engine fuel injection systems.

LANXESS holds a No-Harm Certificate from German "Arbeitsgemeinschaft Qualitätsmanagement Biodiesel e.V." for Vulkanox® 4005 in Biodiesel applications. It is a registered fuel additive per 40 CFR 79.21 with the United States Environmental Protection Agency.

Vulkanox® 4005 can be found on the published AGQM list which is named as a reference in the German fuel standard DIN 51628.

Polymer protection by Vulkanox® products

Vulkanox® 4030 is a liquid phenylene diamine antioxidant similar to **Vulkanox® 4005**, however, with larger carbon groups attached to it affecting its solubility in fuels and oils. **Vulkanox® 4030** is slightly more effective in group I base oils. Furthermore, **Vulkanox® 4030** can be used to reduce fouling of catalyst in crude cracking and as column antifoulant, as polymer stabilizer in E-SBR production, as polymer inhibitor in monomer processing (e.g. acrylate monomer) and as chain extender in the manufacturing of polyurea for coatings.

Vulkanox® HS shows excellent oxidation prevention even in peroxide-cured polymers. Besides rubber applications it can be used to protect e.g. crosslinked polyethylene (XPE). With our special reduced salt quality of **Vulkanox® HS**, LANXESS offers a valuable product to industries, where the highest purity standards are needed. In particular this product is widely used in the manufacturing of critical cable compounds.

■ Widely used for critical cable compounds:
Vulkanox® HS



■ LANXESS has profound expertise in the development and production of antioxidants

ZINC OXIDE

Zinkoxyd aktiv® – activators, fillers

Characteristics

- Precipitated, active type zinc oxide or zinc carbonate products
- Highly effective vulcanization activators
- Lower level of zinc oxide compared to standard grades could be achieved
- With increased loading, the activity of the vulcanization system and the degree of crosslinking are increased
- Small primary particle size and high BET surface
- Extremely low heavy metal content (typical values all < 3 ppm)
- Excellent dispersability in all kind of compounds
- Also used as light-colored reinforcing filler

Applications

Suitable for any kind of highly elastic or transparent vulcanizates, vulcanizates cured with metal oxides and without sulfur or food-contacting goods. Other applications comprise UV filter for sunscreen and cosmetics, polymer protection (PVC, PE etc.) as well as paints and coatings. Our zinc products also show excellent properties as acid and sulfide scavenger in adhesives, bitumen or gas purification systems.

Product range and typical properties

Product	Zinkoxyd aktiv®	Bayoxide® Z aktiv	Zinc oxide transparent	Bayoxide® Z transparent
Technical name	Zinc oxide		Caustic zinc carbonate	
Properties	<ul style="list-style-type: none"> ■ Precipitated zinc oxide ■ High BET surface ■ Very fine particle size 	<ul style="list-style-type: none"> ■ Precipitated zinc oxide ■ High BET surface ■ Very fine particle size ■ Very pure, minimum amount of side components 	<ul style="list-style-type: none"> ■ Precipitated caustic zinc carbonate ■ High BET surface ■ Best suited for translucent rubber articles 	<ul style="list-style-type: none"> ■ Precipitated caustic zinc carbonate ■ Small particle size for excellent performance in home and personal care applications
CAS Number	1314-13-2		3486-35-9	
Density	5.0		3.5	
BET surface (typical values)	45–70		50–60	
Physical form	White to slightly yellowish powder			
Standard packaging	20 kg paper bag on pallets, FIBC on request available for several grades			

Reduction of zinc content using Zinkoxyd aktiv® and Zinc oxide transparent

Reduction of the zinc content in latex compounds with Zinkoxyd aktiv®

Organic vulcanization accelerators nearly always require the addition of inorganic and/or organic activators. The most important inorganic activator is zinc oxide. For economic and especially environmental reasons, however, it is desirable to keep the zinc oxide content in latex compounds as low as possible. LANXESS offers two special zinc oxide grades for this application to meet this requirement.

Zinkoxyd aktiv® has particularly fine particles and contains a very high surface area as indicator for its activity. For this reason, an addition of 0.5 phr to natural latex, for example, is enough to help ensure that for many purposes vulcanization proceeds at an acceptable rate to give a sufficient degree of cure. With standard grade or coarser particle size products, higher additions or longer vulcanization times are required. Furthermore the articles obtained by curing with Zinkoxyd aktiv® are more transparent compared to those produced using other grades.

Zinc oxide transparent

Zinc oxide transparent is chemically a caustic zinc carbonate. It can be used as an alternative to zinc oxide if its higher solubility in rubber and a high transparency of light colored rubber article are desired. Due to its higher molecular weight and to achieve the same degree of vulcanization, however, it is necessary for stoichiometric reasons to use higher amounts of zinc carbonate than of standard zinc oxide. Zinc carbonate also has a higher stiffening effect than zinc oxide.

Support environmental and economic purposes

Both products, Zinkoxyd aktiv® and Zinc oxide transparent, can be easily incorporated into latex. During preparation of the vulcanization paste the amount of dispersing agent has to be increased to compensate for the larger surface area of these highly active products. Zinkoxyd aktiv® in particular has important benefits in the production of latex articles. Owing to its very fine particles, Zinkoxyd aktiv® can considerably lower the zinc content of a latex compound. At the same time, the large surface area of the zinc oxide particles prevents an increase in the number of zinc ions in the waste water. This considerably reduces the environmental impact and helps to save costs.

The concentration of zinc ions in waste water is regulated for example in the United States by the Clean Water Act. Even in countries where there are no such regulations, there is a need for a reduction of zinc ions in waste water streams in accordance with the Responsible Care initiative. Since the manufacturing of gloves requires several washing routines owing to the proteins, stabilizers and chemicals contained in natural latex, large amounts of waste water are generated. The use of finely divided, surface-active zinc oxide will reduce the likelihood of separate treatment measures being necessary in order to meet waste water standards.



■ For economic and especially environmental reasons, the zinc oxide content in latex compounds is kept as low as possible

ZINC OXIDE

Adhesives and coatings

For the production of transparent coatings and adhesive films, **Bayoxide® Z aktiv** gives you all the possibilities you need. With a high specific surface area of approximately 45m²/g (BET) **Zinkoxyd® aktiv** and **Bayoxide® Z aktiv** effectively act as acid scavengers in e.g. CR adhesive systems. Because of the well-controlled particle size, **Bayoxide®** products provide a maximum of transparency to the final product.

Not only transparency but also excellent UV protection is achieved with **Bayoxide® Z aktiv** e.g. in coating materials for outdoor use.



■ Transparent adhesive tapes manufactured with Zinc oxide transparent



■ **Bayoxide® Z provides significant higher transparency in coatings:** Compared to standard zinc oxides, **Bayoxide® Z** products provide maximum transparency for coating applications

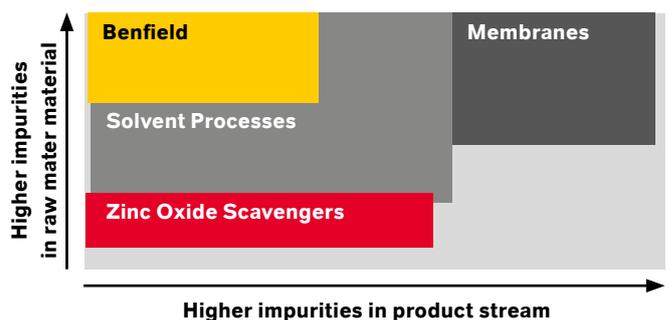
Polymer and material protection with Bayoxide® Z

The zinc oxide product **Bayoxide® Z aktiv** is a highly effective mineral UV filter. Due to its very small primary particle size of 20–40 nanometers, **Bayoxide® Z aktiv** shows excellent transparency once incorporated in the material matrix. **Bayoxide® Z aktiv** has a long term UV shielding effect, so its use with UV stabilizers like HALS amines is complementary. **Bayoxide® Z aktiv** particles can be easily incorporated into liquids like plasticizer by high shear mixing for the use in e.g. PVC compounds. For polyethylene compounds, **Bayoxide® Z aktiv** is fed into the extruder.

Bayoxide® Z products in catalyst and scavenger technology

Zinc oxide and zinc carbonate are well-known scavengers for the purification of gas streams from sulfide components. **Bayoxide® Z aktiv** and **Z transparent** are precipitated zinc oxide/carbonate products. The LANXESS production technology results in nano-sized particles with a very high BET surface which qualifies these materials for scavenger applications. The high purity of **Bayoxide® Z** products ensures safe operation in catalyst near applications like in Gas to Liquid (GTL) process.

Bayoxide® Z products are also efficient in liquid phase applications. In the production of polymer bound bitumen or all kind of drilling muds **Bayoxide® Z** products are able to bind hydrogen sulfide before it is released to the environment. With the LANXESS production process, we are able to adjust various parameters like carbonate/oxide ratio or bulk density of **Bayoxide® Z**. We offer **Bayoxide® Z** to the specific requirements of our customers application. Please get in contact with us for any technical needs.





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