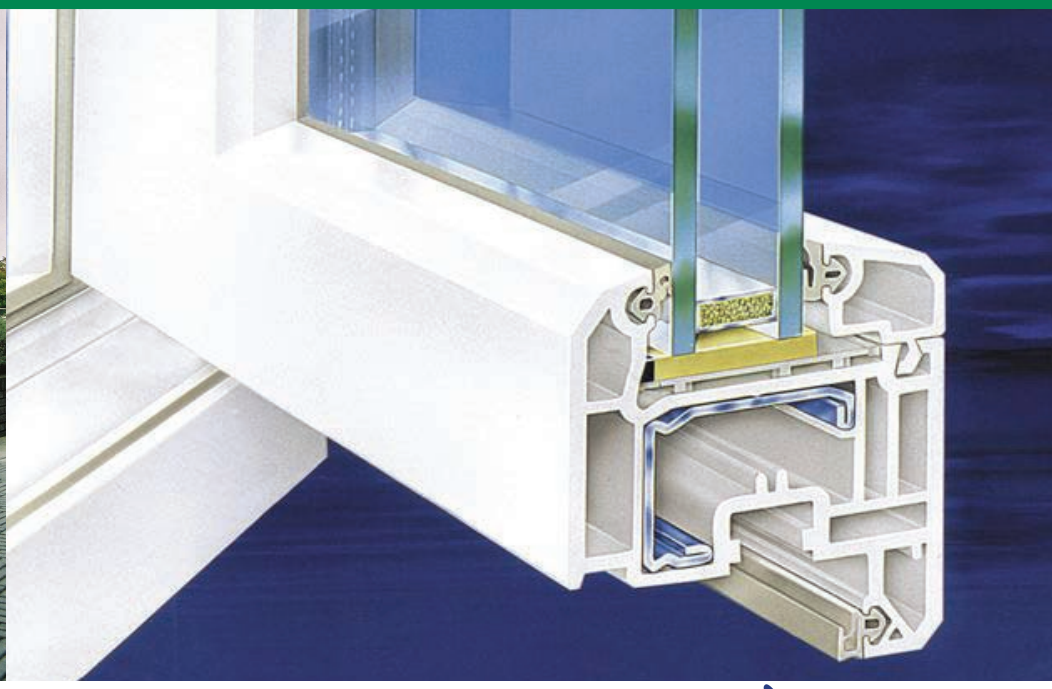
ALCAMIZER® - HEAT STABILIZER FOR PVC



UNIQUE PRODUCTS THROUGH UNIQUE TECHNOLOGIES

KISUMA

ALCAMIZER® - UNBEATABLE NON-TOXIC HEAT STABILIZATION FOR PVC

Non-Toxic Heat Stabilization for PVC

ALCAMIZER® is the brand name for our range of hydrotalcite products specifically designed for PVC. These environmentally friendly materials are halogen scavengers in heavy metal-free stabilizer systems for PVC. ALCAMIZER® products are generally considered to be the best of their kind.

The Inventors of Synthetic Hydrotalcite

Kyowa Chemical Industry was the first company in the world to succeed in the industrial synthesis of hydrotalcite, introduced as an antacid for the pharmaceutical industry in 1966. Since then, Kyowa and its subsidiary Kisuma Chemicals have continuously worked on product optimization and development to ensure that our quality and expertise are still unrivalled in the market today.

Product Description

Hydrotalcites are layered double hydroxides that contain positively charged hydroxide layers and charge balancing anions located in the interlayer region. The hydrotalcites produced by our proprietary and unique technology are highly pure compounds of magnesium and aluminium with optional zinc. The substantial anion-exchange capacity of our hydrotalcites make them excellent halogen scavengers in many polymer systems.

Modern Factory in the Netherlands

Our factory was built in 1999, but expansion work practically never stopped. Today, we produce up to 30,000 tonnes of magnesium compounds per year. The plant is strategically located near raw material suppliers and logistic infrastructure, allowing us to transport our products efficiently all over the world.

The World's Local Supplier

We are a financially secure and reliable business partner that can supply products anywhere in the world, at any time and in any quantity. Most of our products are readily available, because we choose to supply from stock. This allows us to provide optimal support and flexibility to our customers.

Environmentally Friendly Heat Stabilizers

Throughout the European PVC Industry's voluntary commitment to non-heavy metal heat stabilization systems, we have pioneered the development of optimized halogen scavenging hydrotalcites for use in lead-free systems. Our state-of-the-art factory in the Netherlands is the single largest production facility for synthetic hydrotalcites in the world. All products coming from this fully automated manufacturing plant are of the highest available quality.

Designed for Performance

The exceptional stabilizing effect of ALCAMIZER® in PVC originates from its capability to effectively scavenge chloride ions that are released during thermal degradation of the polymer. ALCAMIZER® will exchange the carbonate in its crystal structure for available chloride ions. Since chloride ions bind strongly to the inorganic host, they are rendered harmless, preventing further acceleration of PVC degradation.

Advantages of ALCAMIZER®

- ALCAMIZER® can be used in both Calcium Organic and Tin stabilizing systems for PVC
- ALCAMIZER® promotes excellent thermal stability and color hold for PVC applications
- ALCAMIZER® complies with all standard requirements for safety and handling
- ALCAMIZER® has outstanding properties for transparency because its refractive index is similar to that of PVC
- ALCAMIZER® has superior characteristics for dispersion, weatherability and compounding with high dosage levels
- ALCAMIZER® is suitable for all types of PVC resin including suspension, emulsion, co-polymers and mixed polymers

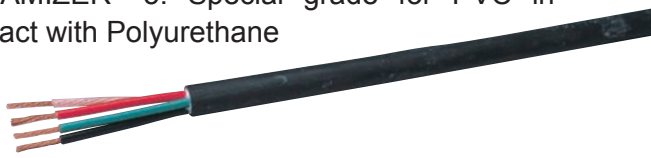
Peace of Mind Included

The performance properties of hydrotalcites depend mainly on their chemical composition, so precise process control over Mg, Al and Zn content, crystallization and removal of residual moisture are vital to ensure consistently high quality. ALCAMIZER® products are produced using automated processes that are carefully monitored by our quality control system to ensure your products retain superior heat stability and transparency. In addition, we always have sufficient ALCAMIZER® in stock to guarantee continuity and reliability for our customers around the world.

Available Product grades

Many years of fruitful collaborations with industry leaders has resulted in our current portfolio of ALCAMIZER® products. We are sure that we have a solution for your specific needs.

- ALCAMIZER® 1: The industry standard
- ALCAMIZER® Plus: Improved heat stability
- ALCAMIZER® P93: Improved early coloring and weatherability due to implemented zinc in the hydrotalcite structure
- ALCAMIZER® WP: Special grade for window profile applications
- ALCAMIZER® CP: High transparency grade for clear PVC solutions
- ALCAMIZER® 2 / P93-2: Suitable for higher processing temperatures (e.g. CPVC)
- ALCAMIZER® 5: Special grade for PVC in contact with Polyurethane



Having trouble to determine the appropriate grade for your product? Contact us today and get inspired by the wide variety of PVC applications for which ALCAMIZER® has already worked wonders. Our experienced product managers are ready to support you with all your enquiries.

Continuity Through Innovation

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DHT-4A® - ACID SCAVENGER FOR POLYMERS

UNIQUE PRODUCTS THROUGH UNIQUE TECHNOLOGIES

KISUMA

DHT-4A® - UNRIVALLED PERFORMANCE.

Outstanding Acid Scavenging

DHT-4A® is the flagship product of our branded range of hydrotalcite-like materials that have been developed specifically for irreversible acid scavenging in polymer production and processing systems. DHT-4A® is on the approval list of practically all polyolefin technology providers globally.

The Inventors of Synthetic Hydrotalcite

In 1966, Kyowa Chemical Industry was the first company to succeed in the industrial synthesis of hydrotalcite, which was introduced as an antacid for the pharmaceutical industry. Since then, Kyowa and its daughter Kisuma Chemicals have continuously worked on product optimization and development to ensure that our quality and expertise are still unrivalled in the market today.

Product Description

Hydrotalcites are layered double hydroxides that contain positively charged hydroxide layers and charge balancing anions located in the interlayer region. The hydrotalcites produced by our proprietary and unique technology are highly pure compounds of magnesium and aluminium with optional zinc. The outstanding anion-exchange properties of hydrotalcites make them excellent halogen scavengers in many polymer systems.

Modern Factory in the Netherlands

Our factory was built in 1999, but expansion work never stopped. Today, we produce close to 30,000 tonnes of magnesium compounds per year. The plant is strategically located near raw material suppliers and logistic infrastructure, allowing us to transport our products efficiently all over the world.

The World's Local Supplier

We are a financially secure business partner that can supply products anywhere in the world, at any time and in any quantity. Our products are always available, because we plan our production on forecast rather than by order. This ensures optimal support and flexibility to our customers.

The Industry Standard Acid Scavenger

Already for more than 30 years, DHT-4A® is considered to be the industry standard for deactivation of catalyst residues in polyolefins. The product is environmentally harmless and is generally acknowledged to be the best of its kind. Our factory in the Netherlands is the single largest production facility for synthetic hydrotalcites in the world. Stringent quality control procedures are applied to ensure all our products are of the highest available quality.

Designed for Performance

The superiority of DHT-4A® as compared to other products results from its particular mechanism of adsorbing acids based on anion exchange. In the presence of acidic substances like chloride ions, DHT-4A® will exchange the carbonate ions from the interlayer of its crystal structure and replace them with the chloride ions, which are rendered harmless.

Applications of DHT-4A®

- DHT-4A® deactivates residual acidic substances that originate from catalytic polymerization processes used to produce polyolefins and comparable polymers and elastomers. This will significantly reduce corrosion damage of process equipment and of the polymer itself.
- DHT-4A® scavenges free halogen ions deriving from radicals in halogenated flame retardants in various polymers.
- DHT-4A® is used to render acidic residues in engineering plastics inert in order to prevent corrosion damage of molding equipment.
- DHT-4A® is the acid acceptor of choice for halogenated rubber where high water resistance is required.
- DHT-4A® is used as corrosion inhibitor in polymer-based coating systems and adhesives, which increases protection of metallic surfaces against corrosive anions.
- DHT-4A® provides long term weatherability when used in combination with HALS.

Physical and Chemical Properties

DHT-4A® is a highly pure and uniform powder that has a sub-micron particle size. Our proprietary technology ensures a consistently narrow particle size distribution. After synthesis, the particles are treated with a surface active agent to increase their affinity with polymers. Consequently, DHT-4A® has excellent dispersibility properties. It is suitable for a wide range of applications, including ultra-thin films or fiber resins, without affecting the texture or appearance of the respective product.

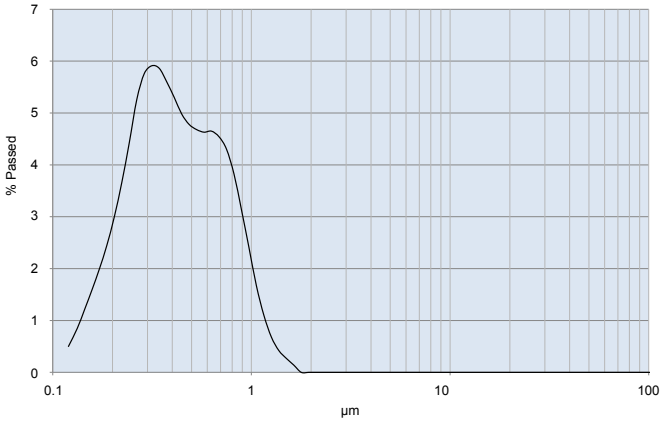
DHT-4A® Typical Properties	
Al (as Al_2O_3)	19 w/w%
Mg (as MgO)	34 w/w%
Molar Ratio MgO/Al_2O_3	4.3
Loss on Drying (105 °C 1 hr)	0.3 w/w%
Specific Surface Area (BET)	11 m^2/g
Particle Size Distribution	Average: 0.5 µm
	< 1 µm: min. 85%
	> 5 µm: 0.0%
Heavy Metals	5 ppm
Fe	40 ppm
Hardness (Mohs)	2.0-2.5
Density	2.1
Refractive Index	1.5
Apparent Specific Gravity	400-500 g/L

Safety Information

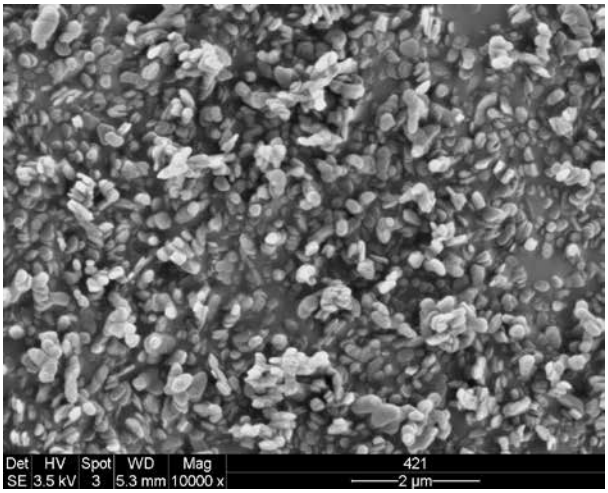
Hydrotalcites produced by our parent company Kyowa Chemical Industry are being used as antacids in the pharmaceutical industry worldwide, which exemplifies the health and safety status of DHT-4A®. Therefore, it is no coincidence that DHT-4A® is registered as a positive material in polyolefins used for food packaging in many countries.

DHT-4A® Product and Safety Information	
Chemical Formula	$Mg_{4.3}Al_2(OH)_{12.6}CO_3 \cdot mH_2O$
Chemical Description	Magnesium Aluminium Hydroxide Carbonate (Hydrate)
Product Appearance	White, odorless, fine powder
CAS Number	11097-59-9
Packaging	20 kg PE bag
REACH Reference Number	01-2119489902-26-0000
Food contact materials (EU)	PM/REF Number 34690
FDA status (USA)	GRAS in plastics in food contact applications
Food contacting packaging (Japan)	Registered
GB9685 (China)	Registered

Particle Size Analysis by Laser Diffraction



Scanning Electron Micrograph

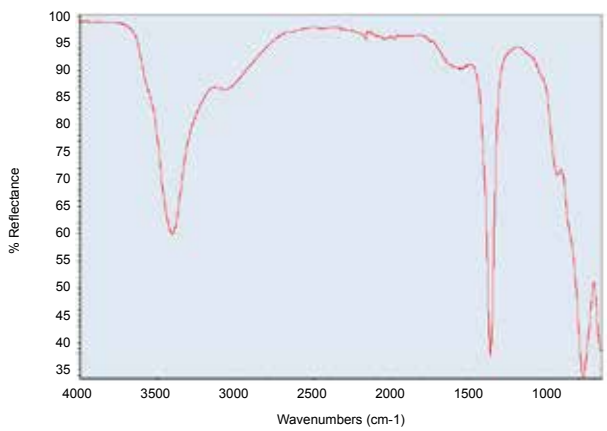


Advantages of DHT-4A®

Compared to alternative additives, such as Calcium Stearate (Ca-St), DHT-4A® is superior for the following reasons:

1. DHT-4A® can adsorb anions equivalant to about 10% of its weight. The significantly higher capacity compared to alternatives minimizes the loss of physical properties of polymers.
2. With DHT-4A®, superior haze, gloss and transparency properties can be achieved.
3. By using DHT-4A®, stearic acid vapors can be eliminated.
4. With DHT-4A®, the amount of water carry-over is significantly less than with Ca-St.

Fourier Transform Infrared Spectroscopy



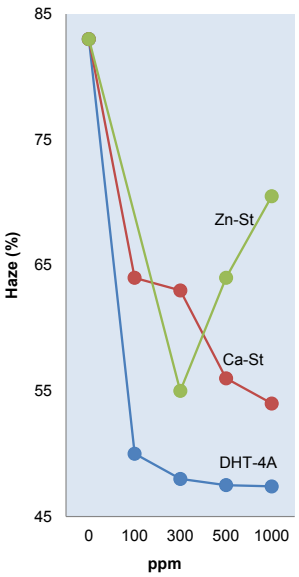
Anti-corrosion test

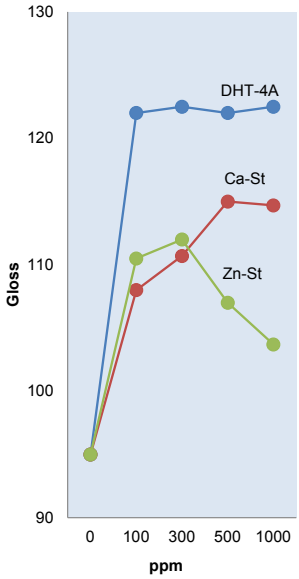
The pictures below are the result of a demonstration of the functionality of DHT-4A®. In the test, soft iron plates were put into PP pellets and placed in an oven for 20 hours. The plates were then hung from the cap of a glass bottle (500 ml), which contained a small amount of water. The plates were kept at 20 °C for 7 days and then checked visually. The lack of rust formation when using small amounts of DHT-4A® is obvious.

DHT-4A® dosage	Steel Appearance
0	
800 ppm	
1000 ppm	

Effect of DHT-4A® on Polymers

The two graphs below demonstrate the effect of DHT-4A® on haze and gloss of the PP formulation described in the table below.





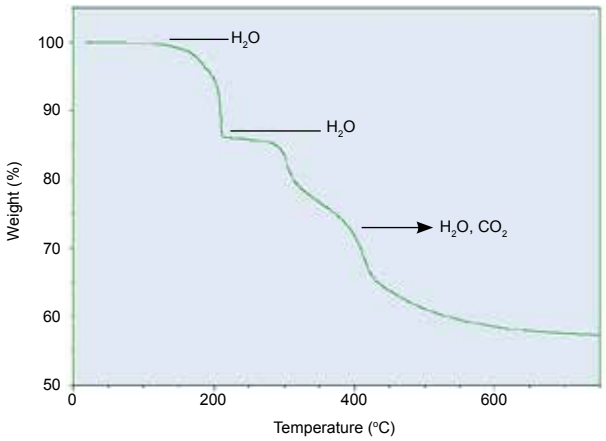
Polypropylene Formulation		
H-PP (Cl: 20 ppm)		100 phr
Halogen Scavenger		See graph
Irganox 1010		500 ppm
Irgafos 168		500 ppm
DBS		3000 ppm
	Extruder	230 °C
	Press	230 °C / 3 minutes
	Thickness	3 mm

Alternative Product Grades

Our extensive experience with the implementation of DHT-4A® in a wide range of applications, has resulted in the development of a variety of alternative products that may fit your specific needs.

- DHT-4V: Standard grade with a vegetable based surface active agent, instead of tallow.
- DHT-4A-2: Coated and Dehydrated grade for higher heat stability.
- DHT-4C: Uncoated and Calcined grade.
- ZHT-4V: Product in wich Zinc has been incorporated for improved color.
- KW2200: Uncoated and highly calcined grade.

An important consideration in the selection of the most suitable product is the required thermal stability. As can be seen in the TGA below, the crystal water of DHT-4A® (≈ 12 w/w%) starts to dehydrate at approximately 180 °C. The typical hydrotalcite structure remains intact until about 350 °C. At higher temperatures, a $MgO\text{-}Al_2O_3$ mixed metal oxide is formed which is stable up to 800 °C. Interestingly, this material has a memory effect. The hydrotalcite lattice can be redeemed by hydration. This effect is lost during calcination above 800 °C, which eventually leads to the formation of MgO and $MgAl_2O_4$.



Innovation Partner

Having trouble to determine the appropriate grade for your product based on the information in this brochure? Contact us today! We operate sophisticated R&D facilities in our factory from which innovation projects are coordinated. If you have suggestions for product improvements or requirements for custom-made hydrotalcites, we have the resources to help you explore the feasibility. We are ready to support you.

KISUMA CHEMICALS

Continuity Through Innovation

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KISUMA® 5 - MAGNESIUM HYDROXIDE

UNIQUE PRODUCTS THROUGH UNIQUE TECHNOLOGIES

KISUMA

KISUMA® 5 DRASTICALLY INCREASES BRAND QUALITY AND INTEGRITY

Halogen-Free Flame Retardants

KISUMA® 5 is the brand name for our range of highly pure magnesium hydroxide compounds that have been developed as halogen-free flame retardants for thermoplastics and rubbers. The products in this range are non-toxic and generally considered to be the best of their kind.

Leading Products since 1947

Our parent company, Kyowa Chemical Industry, has been involved in the development and production of highly pure, specialty magnesium compounds since 1947. We supply magnesium hydroxide and hydrotalcites to customers in pharmaceutical and industrial markets across the world from our factories in Japan and Veendam, the Netherlands.

Product Description

Magnesium hydroxides are environmentally friendly inorganic compounds with the formula $Mg(OH)_2$. These compounds are widely used as antacids in the pharmaceutical industry. The magnesium dihydroxides (MDH) produced by our proprietary and unique technology are highly pure white powders. This product can be used as a non-toxic flame retardant in high temperature processes due to its high endothermic decomposition temperature.

Modern Factory in the Netherlands

Our factory was built in 1999, but expansion work never stopped. Today, we produce close to 30,000 tonnes of magnesium compounds per year. The plant is strategically located near raw material suppliers and logistic infrastructure, allowing us to transport our products efficiently all over the world.

The World's Local Supplier

We are a financially secure business partner that can supply products anywhere in the world, at any time and in any quantity. Our products are always available, because we plan our production on forecast rather than by order. This ensures optimal support and flexibility to our customers.

Inorganic Flame Retardant 2.0

For halogen-free applications that require high heat stability, we recommend KISUMA® 5 as a high purity magnesium hydroxide flame retardant. When you are looking for the best non-toxic flame retardant to provide high temperature flame retardancy, Kisuma® 5 is what you need. Kisuma Chemicals is the European branch of Kyowa Chemical Industry, Japan. Products coming from our state-of-the-art factory in the Netherlands are of the highest available quality.

Designed for Performance

KISUMA® 5 starts decomposing endothermically at temperatures > 340 °C, resulting in the formation of magnesium oxide (MgO) and water (H_2O). When this occurs, KISUMA® 5 provides flame retardancy in three steps.

1. The release of water results in cooling and decreased pyrolysis of the polymer
2. The released water dilutes the fuel/oxygen ratio
3. The MgO that is generated works as a protective layer that provides a smoke suppressant effect

KISUMA® 5 does not generate poisonous or corrosive gas during this process.

Advantages of KISUMA® 5

- KISUMA® 5 is an excellent flame retardant and smoke suppressant that does not generate toxic fumes or corrosive gas
- KISUMA® 5 has excellent processability resulting from a special surface treatment and its extremely fine and consistent particle size
- KISUMA® 5 can be compounded to high concentrations in polymers
- KISUMA® 5 improves the arc and tracking resistance of polymers
- KISUMA® 5 improves the MFI and flexural modulus of polypropylene
- KISUMA® 5 has synergistic effects with red phosphorus and carbon black
- KISUMA® 5 is also effective as a heat stabilizer for resins containing halogen

Available Product Grades

Our highly pure magnesium hydroxide brand KISUMA® 5 comprises a comprehensive range of grades. We are sure that we have a KISUMA® 5 product that will fit your specific needs.

- KISUMA® 5A, the industry standard grade
- KISUMA® 5B for outstanding low temperature flexibility and mechanical properties
- KISUMA® 5B-1G for improved processability and mechanical properties
- KISUMA® 5J for extraordinary water- and acid-resistivity and wet electrical properties

Applications of KISUMA® 5

Having trouble to determine the appropriate KISUMA® 5 grade for your product based on the information in this brochure? Some applications for which KISUMA® 5 has already been implemented successfully might give you inspiration for your own products.

- Flame retardant in polyolefin cables
- Flame retardant in EPDM rubber
- Flame retardant in PVC
- Heat stabilizer in Ca-Zn systems for PVC

If you would like more information about these applications of KISUMA® 5, or if you have ideas for your own application, contact us today! Our experienced product managers are ready to support you with all your enquiries.

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