



DHT-4A[®] - ACID SCAVENGER FOR POLYMERS



UNIQUE PRODUCTS THROUGH UNIQUE TECHNOLOGIES





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 ₂ O ₃)	19 w/w%
Mg (as MgO)	34 w/w%
Molar Ratio MgO/Al ₂ O 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

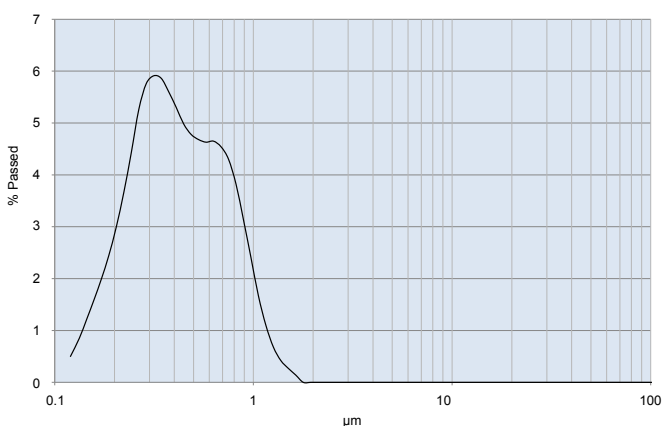
Hydrotalcites produced by our parent company Kyowa Chemical Industry are being used as antacids in the pharmaceutical industry worldwide, which exemplifies the health and safety status of DHT-4A[®]. Therefore, it is no coincidence that DHT-4A[®] is registered as a positive material in polyolefins used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



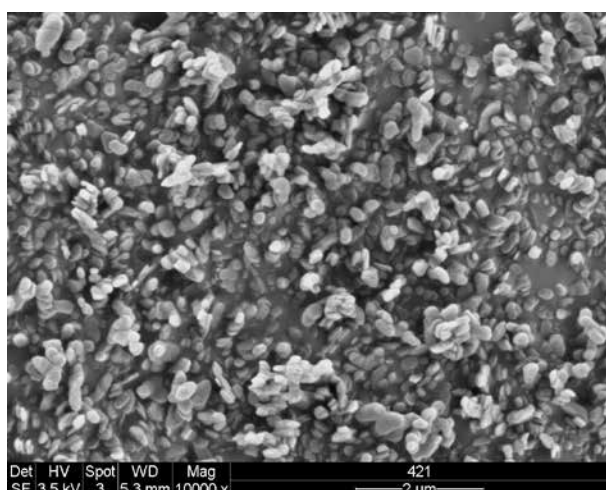
DHT-4A[®] Product and Safety Information

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

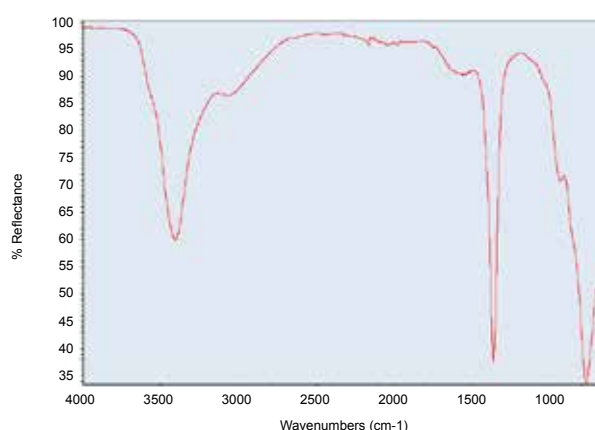


Advantages of DHT-4A[®]

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




1. DHT-4A[®] can adsorb anions equivalent 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



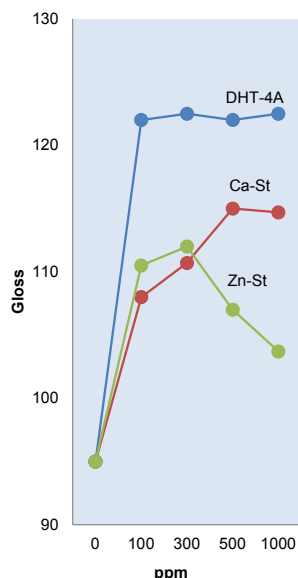
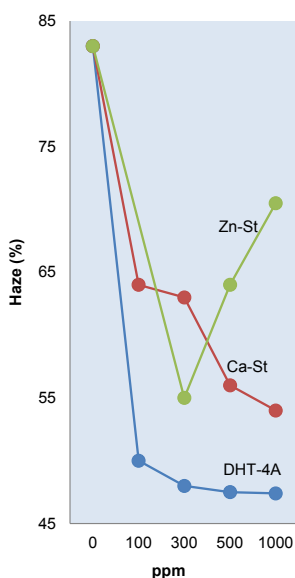
Anti-corrosion test

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.

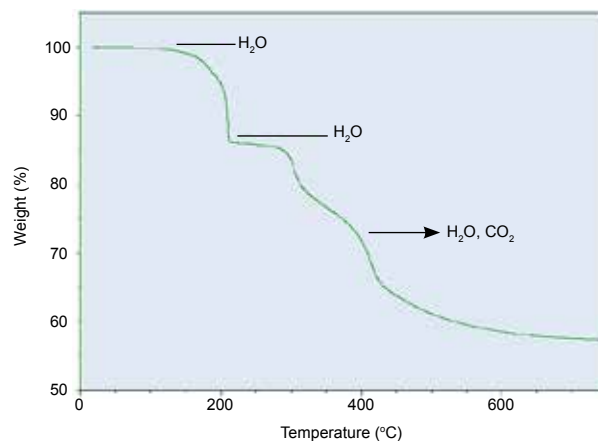


Alternative Product Grades

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 which 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-Al₂O₃ 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 MgAl₂O₄.



Polypropylene Formulation

H-PP (CI: 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

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.



The data presented in this brochure are not guaranteed values and do not constitute the agreed contractual quality of our products. It is the responsibility of the recipient of our products to ensure that proprietary rights, laws and regulations are observed and to perform their own investigations and tests to verify the suitability of our products for a specific purpose.



Continuity Through Innovation

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