



HIGH-PERFORMANCE MAGNESIUM SULPHATE

**for Industrial Applications
and beyond**



K+S

K+S Minerals and Agriculture - A reliable partner for many industries

We produce, refine, and supply, natural raw materials for numerous industrial applications. Our products and services keep your production running.

Everything from a single source

We want to help you get the most out of your industrial processes. With 130 years of experience, we deliver not only Potassium, Magnesium and Sodium products, but also effective solutions. This makes us a unique partner in the industry. Would you like to know how we can be a benefit to your production with our minerals?

Reliable partner with global logistics network

Every year, we transport an average of more than 50 million tonnes of goods, using various modes of transportation.



Want to learn more?

Detailed information on all K+S fields of expertise can be found at: www.kpluss.com

Or feel free to get in touch:

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Magnesium Sulphate - always the right quality: Heptahydrate (Epsom Salt tech.) or anhydrous (CMS 98 Industrial)

With our Epsom Salt (Magnesium Sulphate heptahydrate), we offer a high-performance product with excellent properties and that is friendly to the environment due to its natural origin. It is available in standard and fine crystalline grain sizes. The production process involves crystallisation.

Epsom Salt (Magnesium Sulphate heptahydrate) is used as coagulant in the production of thermoplastics such as ABS or EPS. It is the most commonly used mineral worldwide and has the advantage of low corrosiveness compared to other salts.

As an ingredient in heavy-duty detergents, Magnesium Sulphate has a fibre-friendly effect and neutral behaviour towards wastewater. Magnesium Sulphate is also used in liquid soaps, detergents and rinsing agents to regulate viscosity.

In the production of viscose fibres from cellulose, Magnesium Sulphate and Epsom Salt are important components of the

spinning baths. Furthermore, they improve the suppleness of leather and promote the binding of tanning agents.

Epsom Salt is especially suitable in the production of cellulose fibre insulation materials. As it contains a significant amount of bound water it is ideal to give insulating materials the necessary flame retardancy.

Magnesium Sulphate anhydrous typ. 98 % $MgSO_4$, calculated with reference to the anhydrous substance, is easily soluble in water, developing heat. It binds up to 100 % of its own weight in water and is less corrosive than other salts. The production process involves calcination.

With our Magnesium Sulphate anhydrous we offer a high-performance product with excellent properties and that is friendly to the environment due to its natural origin.

Our Product Qualities

Product: Magnesium Sulphate ($MgSO_4$) 49.2%, water (H_2O) 50.7 %
Epsom Salt technical

Granulometry: <1 mm: 70 %

Appearance: White crystals

Bagging: 25 kg Bags, Big Bags, Bulk



Magnesium Sulphate heptahydrate, granulometry: <1 mm

Product: Calcinated Magnesium Sulphate, the anhydrous alternative
Magnesium Sulphate anhydrous typ. 98 % $MgSO_4$

Granulometry: <0.8mm: 98 %

Appearance: Nearly white salt, hygroscopic

Bagging: 25 kg Bags, Big Bags, Bulk



Magnesium Sulphate anhydrous

Magnesium Sulphate - Product features in general

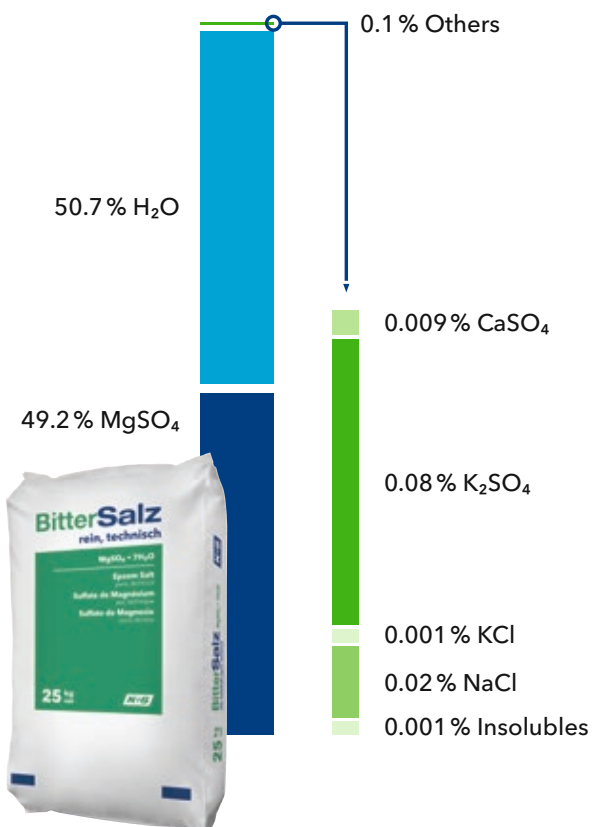
Magnesium Sulphate heptahydrate (Epsom Salt tech.)

- Natural product with seven moles of bound crystal water
- Low content of secondary salts and heavy metals
- Fully soluble in water, colour-neutral and less corrosive than chloride compounds
- Certified according to DIN ISO 9001
- Mined in Germany

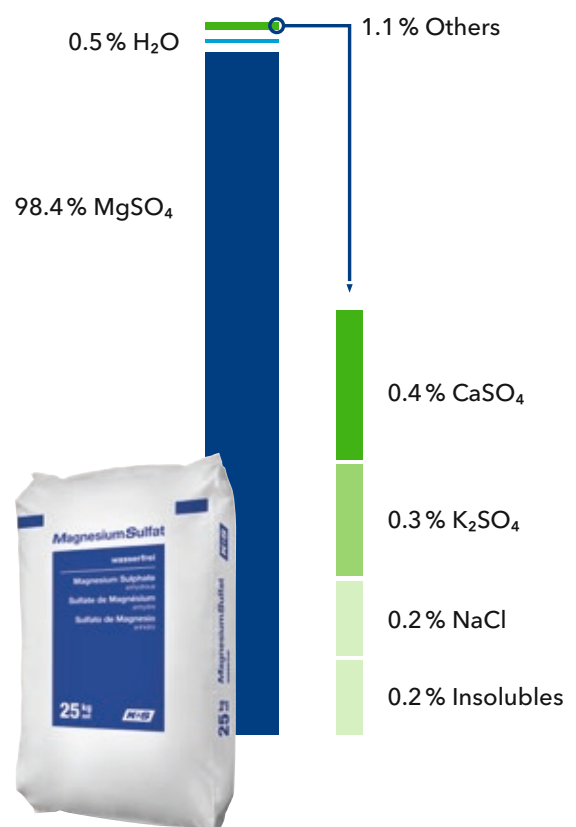
Magnesium Sulphate anhydrous (CMS 98 Industrial)

- Natural, concentrated source of Magnesium and Sulphur
- Quickly soluble in water with the development of heat
- Binds water up to 100% of its own weight
- Certified according to DIN ISO 9001
- Mined in Germany

Mineral composition



Mineral composition



Choose the right Magnesium product for your application

Epsom Salt is preferred to be used in such applications where release of crystal water under high temperature is required (e.g. in flame retardants). It is readily soluble without any residuals and therefore particularly suitable for applications where solid residuals in the brine are not tolerated. For other

applications CMS can be the better choice due to much higher content of Magnesium. Both products are not intended for anti-dust treatment and cannot be used as an anti-caking agent.

Characteristics	Calcinated Magnesium Sulphate (CMS)	Epsom Salt
Chemical declaration	MgSO ₄	MgSO ₄ × 7 H ₂ O
Mineral name	Magnesium Sulphate anhydrous	Magnesium Sulphate heptahydrate
Mg content / [%]	20	9.9
MgSO ₄ content / [%]	98.4	49
H ₂ O content [%]	0.5	51
Bulk density / [g/cm ³]	1.3	0.98
Average grain size - d50 [mm]	0.33	0.8
Solubility (MgSO ₄) in water (20°C)	Max 26.3%	Max 26.3%
Rate of dissolution in water	Quickly soluble (if slowly mixed into stirred water) with solvent residue	Very quickly soluble without solvent residue
Slowly soluble compounds	~1.5% after 15 min. stirring at 20°C (CaSO ₄ , Langbeinite, Kieserite)	~0%
Insoluble compounds	~0.1-0.2% after 30 min. stirring at 100°C (clay and silicates with basaltic origin)	~0.001%
Thermal effects during dissolution in water	Exothermic reaction in water with temperature increase of 60-75°C at the saturation point	Slight cooling of solution
Hygroscopicity	Very hygroscopic. It tends to adsorb and bind water.	Not hygroscopic
Caking during storage and transport	Free flowing and normally not susceptible to caking. Only sensible to high quantities of water.	Prone to caking at temperatures >35°C with temperature fluctuations, high pressure or high humidity
Stability	Stable up to ~700°C	Decomposition at >48°C (release of water)
Storable in		
Bunker	Yes	Limited (caking)
Silo	Yes	For limited period
Big Bag	Yes	Yes
Transport		
Vessel	Yes	Very questionable
Silo truck	Yes	Yes
Packaged	Yes	Yes
Dust formation	Limited	No

We produce, refine, and supply, natural raw materials - for numerous industrial applications

Our Magnesium Sulphate is characterized by high quality and excellent effectiveness as well as a low content of secondary salts and heavy metals. We produce with completely natural minerals from our own raw material base.

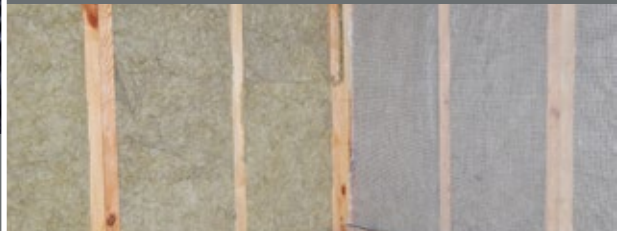


ABS PLASTICS

Magnesium Sulphate anhydrous is used as production accessory in the production of thermoplastics such as ABS plastics (acrylonitrile butadiene styrene) or EPS (expandable polystyrene), which are used across the globe. The big advantage is the lower corrosion level compared to other salts.

BUILDING AND INSULATING MATERIALS

Magnesium Sulphate anhydrous serves as a basic material for various processes in industrial and commercial applications.



LEATHER

Magnesium Sulphate prevents leather from drying out and makes it more supple. It also promotes the binding of tanning agents.



DRY SOLVENTS

Magnesium Sulphate anhydrous is used in the production of organic solvents as a basic chemical, e.g. for alcohols, nitrile, ethylene carbonate, etc. The undesired water is bound and thus the water content in organic solvents can be reduced to approx. 1% (drying).

RAYON

Magnesium Sulphate anhydrous is essential for the spin baths conducted in the process of making rayon fibers.



SOREL CEMENT

Magnesium Sulphate is required for the production of sorel cement in magnesia screed floors or OSB boards for interior construction. Together with Magnesium Dioxide and water, Magnesium Sulphate forms sorel bonds that act as a mineral adhesive.

BIOTECHNOLOGY

Magnesium Sulphate, Potassium Chloride and Potassium Sulphate are used as micronutrients in biotechnological procedures. Typical areas of application are yeast production as well as fermentation reactions for the production of proteins, enzymes, ethanol, vitamins, etc.



DETERGENTS AND CLEANING AGENTS

As an ingredient of heavy-duty detergents, Magnesium Sulphate leads to a fibre-friendly effect and a neutral behaviour towards waste water. Magnesium Sulphate is used in liquid soaps, detergents and rinsing agents to regulate viscosity. Industrial salt is used as the basic material for detergent processing.



TITANIUM DIOXIDE

Magnesium Sulphate can be used as an auxiliary in the production of titanium dioxide. The high quality of this additive has a positive effect on the quality of the titanium dioxide in terms of particle size and whiteness.



PULP & PAPER

Magnesium Sulphate anhydrous has proven to be beneficial in the production of pulp. As stabilizers it prevents browning. The product has also shown its effectiveness in the subsequent refinement procedure, so-called alkaline bleaching.

REFRACTORY PRODUCTS

Magnesium Sulphate anhydrous is needed in the processing of refractory materials. It is used to stabilize the green body during the drying and sintering process.



FURTHER PROCESSES (MAGNESIUM SULPHATE)

Magnesium Sulphate serves as a basic material for various processes in industrial and commercial applications.



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