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Magnesium Carbonate – Oldie but Goldie

Physiology and requirements

Without the vitally important element Magnesium, it is impossible for living cells to fulfill their manifold physiological functions. Magnesium is of central importance in almost all metabolic processes and essential for the neuromuscular and cardiovascular system. A sufficient supply of Magnesium is important throughout lifetime – especially during pregnancy, childhood and old age. People in these phases of life and people with certain diseases have an increased need for Magnesium.

The fortification of foods with Magnesium Carbonate or the use of food supplements can prevent a deficiency. With a Magnesium content of approx. 25 %, Magnesium Carbonate is an ideal source of Magnesium. It can be a good option for the prevention and therapy of a variety of different diseases. In Europe, the Nutrient Reference Value

(NRV) for the daily intake of Magnesium is 375 mg/d for adults. It is advantageous to have a continuous supply with Magnesium throughout the day.

Magnesium Carbonate is an inorganic Magnesium Salt and is also known as the Magnesium Salt of carbonic acid. The natural form of Magnesium Carbonate (magnesite/bitter spar/magnesia alba) is beside Dolomite the most important Magnesium mineral on earth.

Described and mostly naturally occurring forms of Magnesium Carbonate are, among others:

Variations	Chemical Formula	Assay
Magnesite	$MgCO_3$	28.8 % Mg, 71.2 % Carbonate
Barringtonite	$MgCO_3 \cdot 2H_2O$	20.9 % Mg, 51.6 % Carbonate, 27.5 % Water
Nesquehonite	$MgCO_3 \cdot 3H_2O$	18.4 % Mg, 45.4 % Carbonate, 36.3 % Water
Lansfordite	$MgCO_3 \cdot 5H_2O$	14.8 % Mg, 36.5 % Carbonate, 48.7 % Water
Artinit	$Mg_5(OH)_2(CO_3)_4 \cdot 3H_2O$	27.5 % Mg, 54.4 % Carbonate, 18.1 % Water/Hydroxide
Hydromagnesite	$Mg_5(OH)_2(CO_3)_4 \cdot 4H_2O$	26.6 % Mg, 52.5 % Carbonate, 21.0 % Water/Hydroxide
Dypingite/Giorgiosite	$Mg_5(OH)_2(CO_3)_4 \cdot 5H_2O$	25.7 % Mg, 50.7 % Carbonate, 23.7 % Water/Hydroxide
Prokovskite	$Mg_2CO_3(OH)_2$	34.6 % Mg, 42.7 % Carbonate, 22.8 % Hydroxide

Dr. Paul Lohmann® produces a high-purity and extremely versatile Magnesium Carbonate for miscellaneous applications. It meets the purity requirements of Ph. Eur., USP, FCC and E 504 and offers an excellent stability. Customized requirements can be taken into account during production, as well.

purity and nutritional value. Dr. Paul Lohmann® has developed qualities that meet extra low heavy metal limits. Of course, our Magnesium Carbonate is also Kosher/Halal.

The high quality standards and the focus on approval in pharmaceutical applications have proven their worth: Dr. Paul Lohmann® was one of the first manufacturers of Magnesium Carbonate to receive the

General properties and documentation

Name:	Magnesium Hydroxide Carbonate; Magnesium Carbonate, basic
Formula:	approx. $4\text{MgCO}_3 \cdot \text{Mg}(\text{OH})_2 \cdot 5\text{H}_2\text{O}$
Molecular weight:	approx. 485 g/mol
Appearance:	white powder
Odor:	neutral
Flavor:	sandy, neutral
Solubility (20 °C):	< 1 g in 100 ml water
pH (1 % Suspension):	approx. 10 (basic)
Assay Magnesium (Mg):	approx. 25 %

Monographs of the European and American Pharmacopoeias (Ph. Eur., USP) describe Magnesium Carbonate as a basic Magnesium Carbonate containing crystalline water, which contains a certain amount of alkaline earth oxide, calculated as Magnesium Oxide. The Ph. Eur. also distinguishes a light and a heavy quality of Magnesium Carbonate. It is a white powder or granules.

certificate of suitability (CEP/CoS) for its product as an active pharmaceutical ingredient (API) according to the European Pharmacopoeia from the European Directorate for the Quality of Medicines (EDQM).

For the submission of pharmaceuticals to the health authorities, a detailed documentation of the active ingredient is required. In order to simplify this for customers, Dr. Paul Lohmann® provides the corresponding CEPs (Certificate of Suitability to the European Pharmacopoeia) for both light and heavy quality.

The bioavailable Magnesium Salt is almost insoluble in water but easily soluble in combination with acids, releasing CO_2 . In contrast to soluble Magnesium Salts, an up to five times lower amount of the Mineral Salt is needed to obtain the same amount of Magnesium in the final product. This minimizes costs and enables various positioning possibilities in the field of food supplements, at the same time.

Manufacturing

Seventy percent of the world's supply of Magnesium raw material is mined and processed in China. However, due to its sustainable orientation and extremely high purity requirements, Dr. Paul Lohmann® has always used sources from European regions. Partnerships with mining companies, responsible mining and an active recultivation and renaturation program are the focus of attention.

Magnesium Carbonate is a fine white powder and available in different types. Depending on the application, an extra light (approx. 65 g/l) or extra heavy quality (500 g/l) can be used. As granules, it is ideal for direct compression to tablets.

Environmental protection and the certainty to process raw materials of the highest quality requirements, allow us to guarantee that Magnesium Carbonates with the highest quality are produced in a unique synthesis process.

In the GMP and DIN EN ISO certified production facilities, Magnesium Carbonates are produced which meet the highest possible quality criteria in terms of product safety,

In a special manufacturing process, different grades of Magnesium Carbonate are produced at the two production sites in northern Germany under strict safety and quality requirements. This is a continuous process with maximum precision. The Magnesium Carbonate basic ensures the highest purity in the final product.

By varying the manufacturing conditions, products with very different bulk densities can be obtained, and the purity of the individual



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qualities is adjusted during the manufacturing process. In addition, customized services can be offered at the end of the manufacturing process. Directly compressible granules with different binding agents are examples of this. Due to their special properties, Dr. Paul Lohmann® Magnesium Carbonates are in demand worldwide.

Advantages of Dr. Paul Lohmann® Magnesium Carbonate:

- Known and constant Magnesium content, as defined
- Constant composition
- Controlled purity (absence of other elements)
- Consistent, application-optimized density (filling volume/bulk density)
- Reliable structure (grain size, morphology)
- Assured solubility (e.g. effervescent tablets)
- Uniform crystal structure

Application areas

With its high Magnesium content of about 25%, Magnesium Carbonate is an extremely versatile product. Magnesium Carbonate is generally approved in the EU for food fortification and for the use in food supplements.

For more information, please contact

Dr. Paul Lohmann GmbH & Co. KGaA
Hauptstr. 2
31860 Emmerthal, Germany
sales@lohmann4minerals.com
www.lohmann4minerals.com

Health Claims

Magnesium contributes to maintenance of important body functions:

- Normal teeth and bones
- Reduction of fatigue/tiredness
- Normal muscle function
- Functioning nervous system
- Normal mental function
- Energy metabolism
- Protein synthesis
- Normal electrolyte balance

Magnesium Carbonate is classically used to supplement Magnesium ions in e.g. effervescent tablets. Due to the multitude of physiological functions that Magnesium performs in the body, manufacturers of food and food supplements have the opportunity to market the Magnesium Carbonate contained therein with correspondingly effective health claims. This becomes possible if the minimum requirements for a Magnesium source are met in accordance with the claim for the final product listed in the Annex to Regulation (EC) No 1924/2006.

Magnesium Carbonate is harmless to health and therefore has no maximum level restriction as food additive E 504. As an acidity regulator, separating agent or filler, it is approved for all foods that may contain additives. This includes organic products as well. For example, it can show its pH-value stabilizing function in beverages and serve as a filler in tablet production.

In the pharmaceutical sector, Magnesium Carbonate is used in pharmaceuticals for the regulation of gastric acidity (antacids), as a mild laxative or as a phosphate binder for the treatment of hyperphosphatemia.

Due to its unique properties, Magnesium Carbonate is not only valued as a raw material in the pharmaceutical and food industries. It also shows technical advantages in the sports sector. Here Magnesium Carbonate is also sold under the names magnesia or chalk. It is used by apparatus gymnasts, strength athletes and climbers to absorb the sweat produced by their hands and thus increase the grip of their hands and the sliding ability on the apparatus spars. It can also be used in thermal insulation materials and as a filler in plastics, paper, paints and rubber, as well as in cosmetics in powder form.

References

¹Commission Regulation (EU) No 432/2012 establishing a list of permitted health claims made on foods, other than those referring to the reduction of disease risk and to children's development and health

²Regulation (EC) No 1924/2006 of the European Parliament and of the Council on nutrition and health claims made on foods