



# Magnesium for Capsules



**Dr. Paul Lohmann<sup>®</sup>**

**High value mineral salts**

[www.lohmann-minerals.com](http://www.lohmann-minerals.com)

# Magnesium for Capsules

Filling of hard-shell capsules is a complex process with many challenges. Each capsule has a definite volume and achieving the maximum filling weight is one of the challenges. Apart from that, flowability is an indication of capsule filling performance just as avoiding dustiness. The right choice of ingredients is of utmost importance.

Especially in terms of Magnesium Salts, producers of capsule supplements are seeking for high value organic products with good bioavailability and tolerability on the one hand and best performing products on the other hand.

Dr. Paul Lohmann® manufactures a wide range of Magnesium Salts and is specialized in their chemical and physical modification as well as the development of tailor-made solutions. One of our goals is to produce best performing organic Mineral Salts for capsules. Whether you need them less dusty, with an optimized flowability to make the job of manufacturing such products much easier or simply seeking for an organic Mineral Salt also providing a high mineral content, our innovations and specialties help to get the best results.

Tests were performed to analyze and compare different organic Magnesium Salts for capsule applications. Based on the results of capsule filling as well as flowability and dustiness different Magnesium Salts for capsules can be recommend according to your needs.

## Technical setting

Powder properties are influenced by a number of variables including particle size as well as shape and particle interaction. A particle can “bond” to its neighbor and *cohesion* quantifies the particle-particle interaction. Cohesion is often the most influential property of powder and commonly associated with a certain flowability of powder.

Dust is generated among others during filling of powders. The dust number is a reference value for dust behavior of powders.



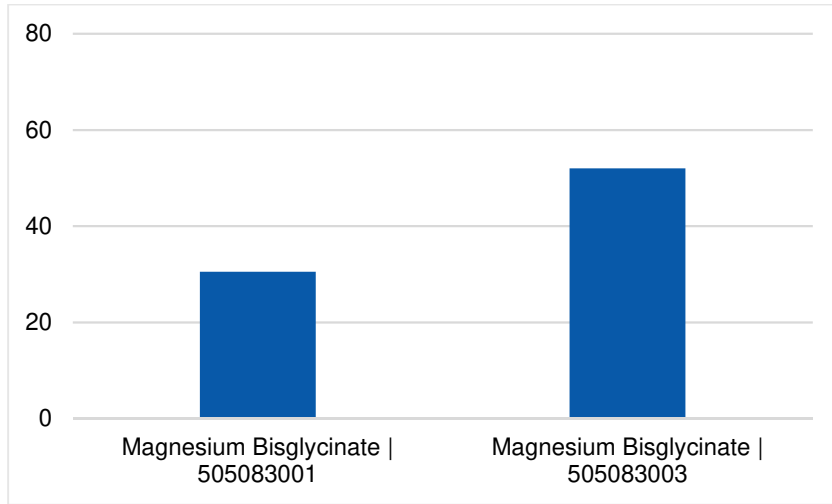
Capsules (size 00) were filled with a manual capsule filling equipment. The maximum filling content was determined after tapping and compression of the tapped content.

## Overview of the Tested Magnesium Salts and Magnesium Premixes

Product	Product no.	Metal content	Physical appearance
<b>Bisglycinate</b>			
<b>Magnesium Bisglycinate</b>	505083001	approx. 10.5 % Mg	powder
<b>Magnesium Bisglycinate</b>	505083003	approx. 10.5 % Mg	powder
<b>Citrate</b>			
<b>Trimagnesium Dicitrate, anhydrous</b>	503043009	approx. 15 % Mg	powder
<b>Trimagnesium Dicitrate, anhydrous DC 100</b>	503043007	approx. 15 % Mg	granules, directly compressible
<b>Magnesium Hydrogen Citrate</b>	503033004	approx. 8.5 % Mg	fine granules
<b>Magnesium Hydrogen Citrate</b>	503033001	approx. 8 % Mg	powder
<b>Malate</b>			
<b>Magnesium DL-Malate</b>	503090001	approx. 16 % Mg	powder
<b>Magnesium DL-Malate</b>	503090003	approx. 11.5 % Mg	powder
<b>Premixes</b>			
<b>Premix SiX MiX – Magnesium</b>	524011190	approx. 26 % Mg	powder
<b>Premix 5-Salt – Magnesium</b>	524011160	approx. 13 % Mg	powder

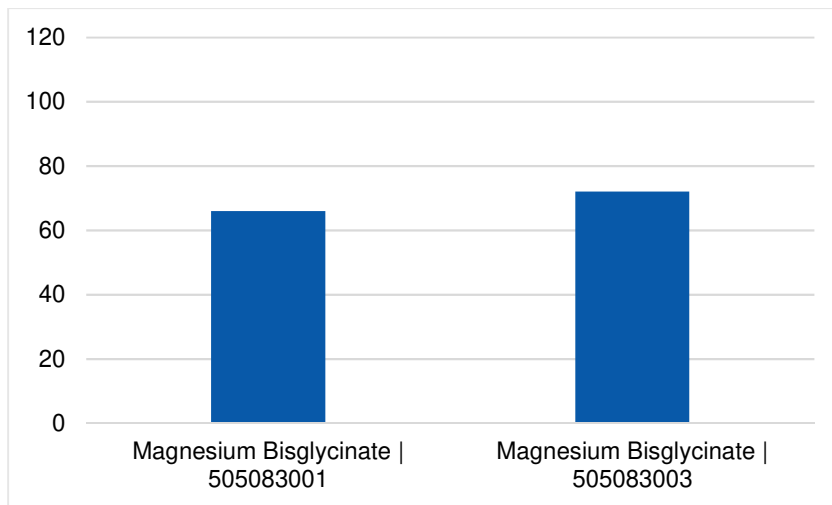
## Magnesium Bisglycinate – Test Results

### 1) Powder properties: Cohesion index



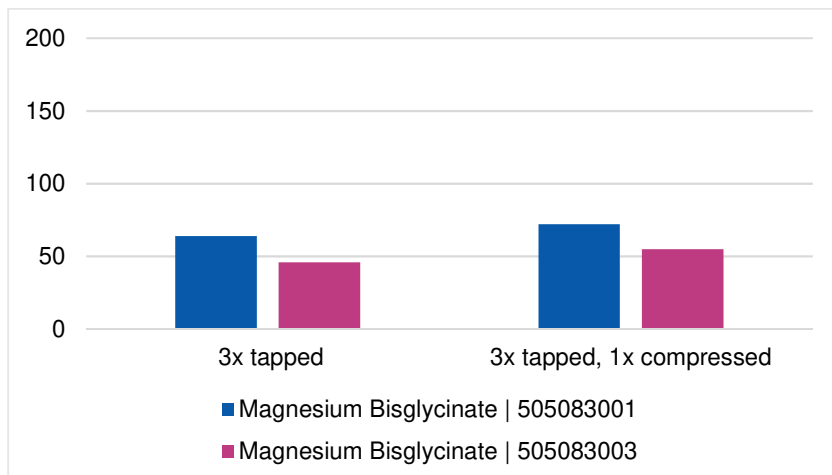
Flowability	Cohesion index
Excellent	< 5
Good	5 - 10
Fair	10 - 20
Passable	20 - 30
Poor	30 - 40
Very poor	40 - 50
Very, very poor	> 50

### 2) Powder properties: Dust number



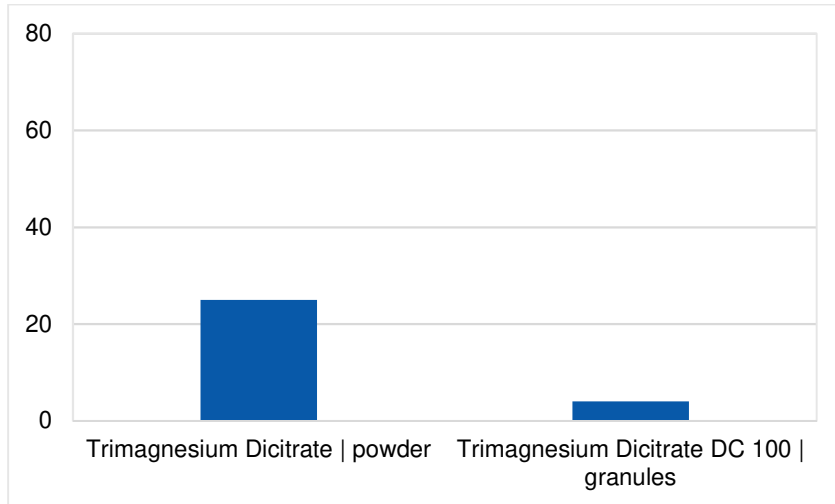
Dustiness	Dust number
Practically not dusty	< 15
Dusty	approx. 100
Very dusty	> 150

### 3) Maximum Magnesium content per capsule (mg)



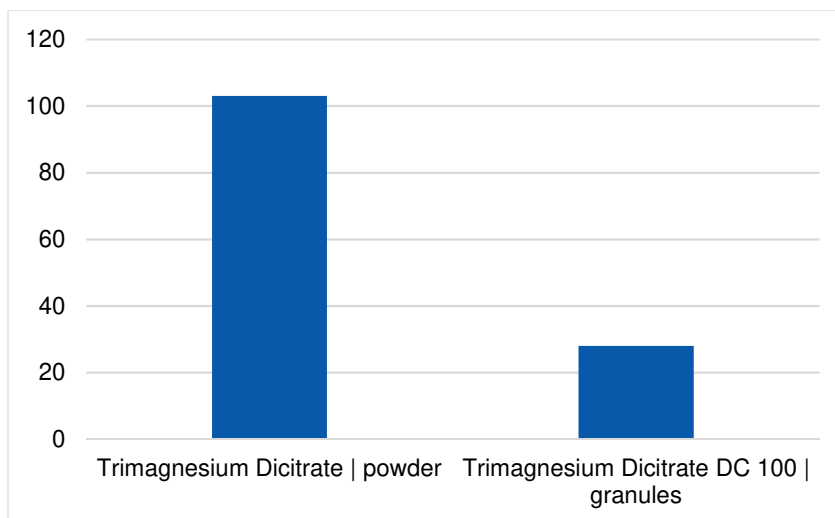
## Trimagnesium Dicitrate, anhydrous – Test Results

### 1) Powder properties: Cohesion index



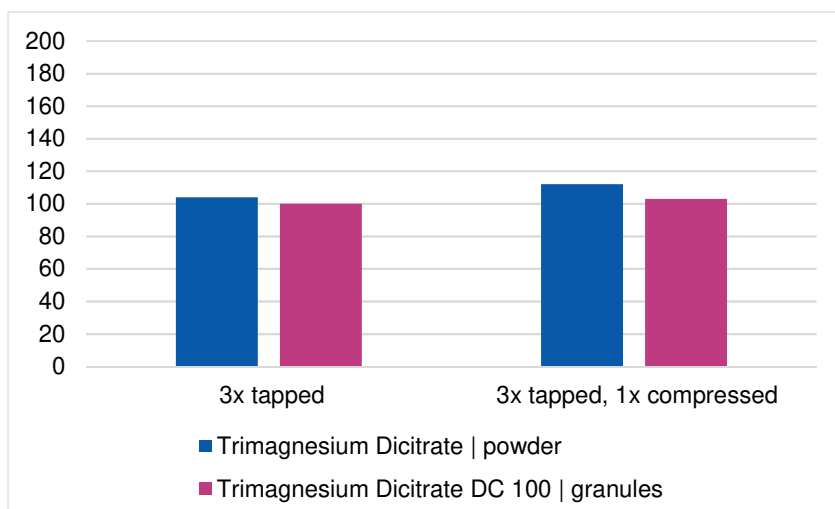
Flowability	Cohesion index
Excellent	< 5
Good	5 - 10
Fair	10 - 20
Passable	20 - 30
Poor	30 - 40
Very poor	40 - 50
Very, very poor	> 50

### 2) Powder properties: Dust number



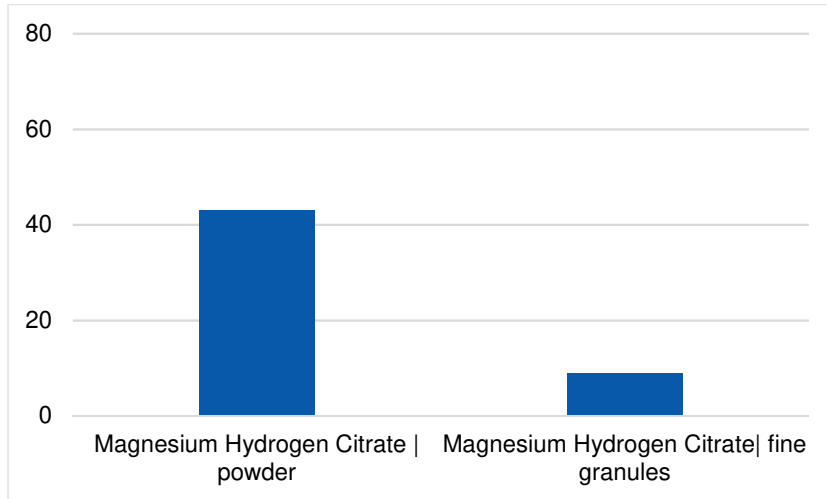
Dustiness	Dust number
Practically not dusty	< 15
Dusty	approx. 100
Very dusty	> 150

### 3) Maximum Magnesium content per capsule (mg)



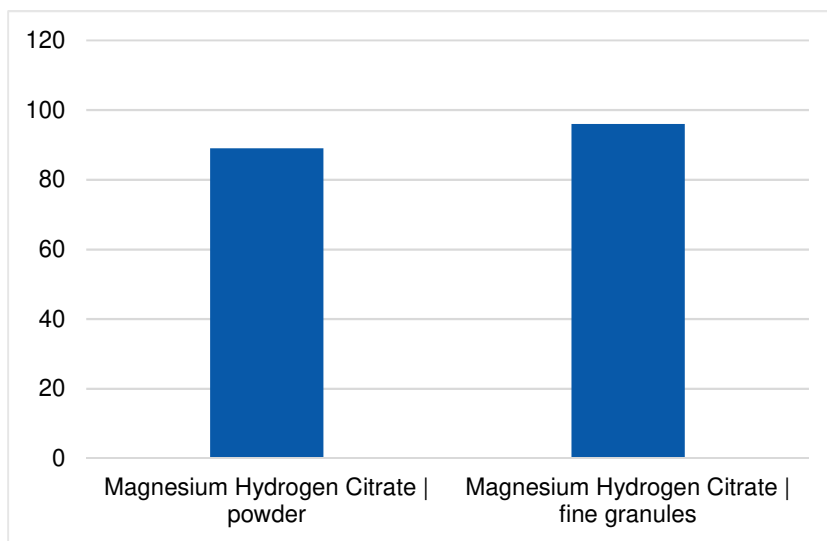
## Magnesium Hydrogen Citrate – Test Results

### 1) Powder properties: Cohesion index



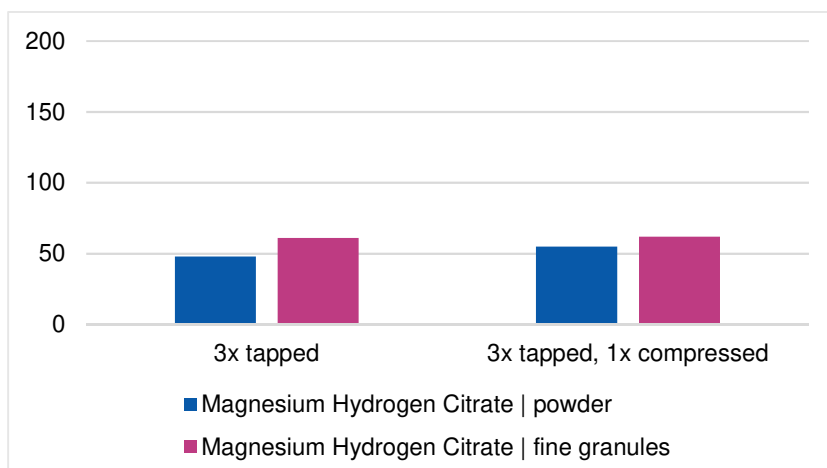
Flowability	Cohesion index
Excellent	< 5
Good	5 - 10
Fair	10 - 20
Passable	20 - 30
Poor	30 - 40
Very poor	40 - 50
Very, very poor	> 50

### 2) Powder properties: Dust number



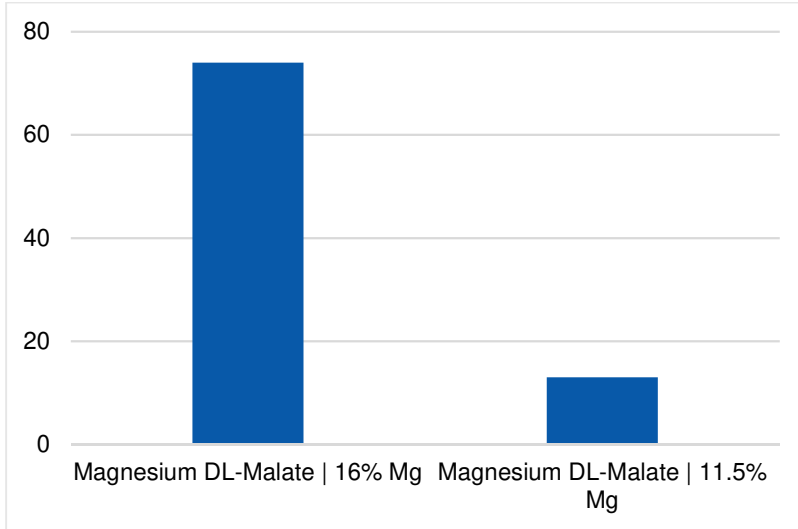
Dustiness	Dust number
Practically not dusty	< 15
Dusty	approx. 100
Very dusty	> 150

### 3) Maximum Magnesium content per capsule (mg)



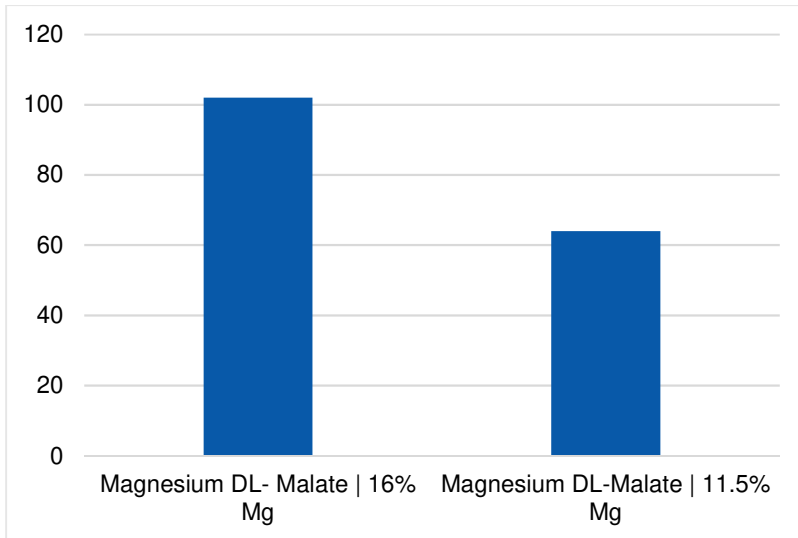
# Magnesium DL-Malate – Test Results

## 1) Powder properties: Cohesion index



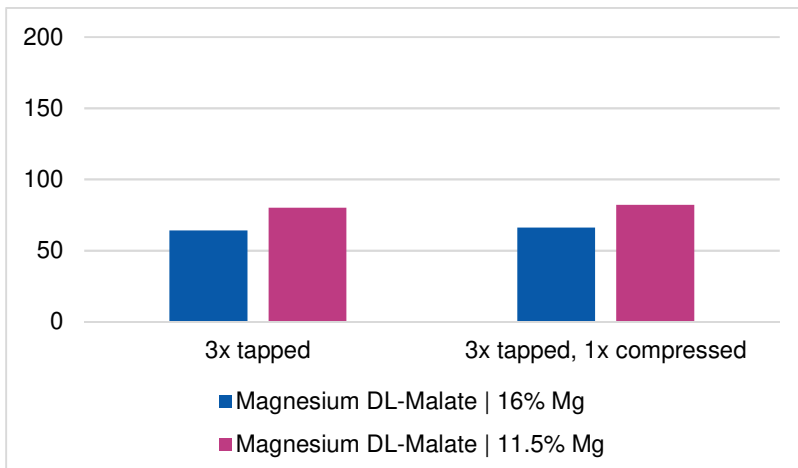
Flowability	Cohesion index
Excellent	< 5
Good	5 - 10
Fair	10 -20
Passable	20 - 30
Poor	30 - 40
Very poor	40 -50
Very, very poor	> 50

## 2) Powder properties: Dust number



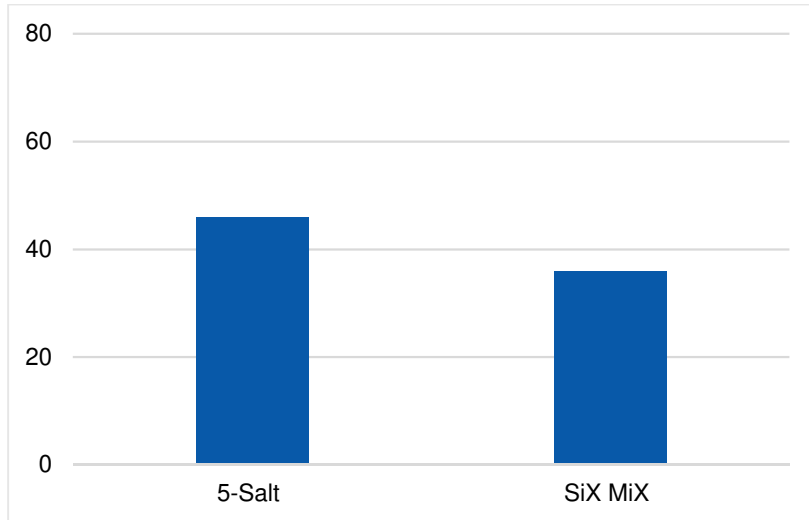
Dustiness	Dust number
Practically not dusty	< 15
Dusty	approx. 100
Very dusty	> 150

## 3) Maximum Magnesium content per capsule (mg)



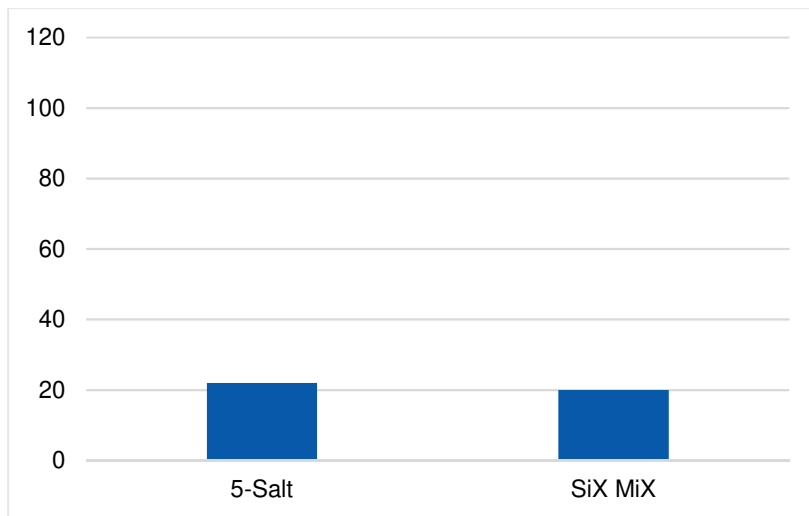
## Magnesium Premixes – Test Results

### 1) Powder properties: Cohesion index



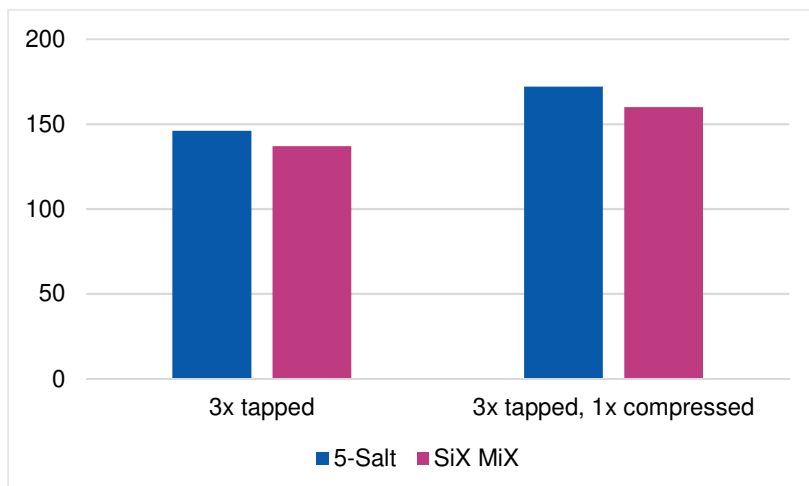
Flowability	Cohesion index
Excellent	< 5
Good	5 - 10
Fair	10 -20
Passable	20 - 30
Poor	30 - 40
Very poor	40 -50
Very, very poor	> 50

### 2) Powder properties: Dust number



Dustiness	Dust number
Practically not dusty	< 15
Dusty	approx. 100
Very dusty	> 150

### 3) Maximum Magnesium content per capsule (mg)



## Summary

Product	Product no.	Physical appearance	Remark
<b>Bisglycinate</b> <b>Magnesium Bisglycinate</b>	505083001	powder	<ul style="list-style-type: none"> <li>◆ &gt; 70 mg Mg content per capsule</li> <li>◆ passable flowability</li> <li>◆ dusty</li> </ul>
<b>Magnesium Bisglycinate</b>	505083003	powder	<ul style="list-style-type: none"> <li>◆ &gt; 50 mg Mg content per capsule</li> <li>◆ very poor flowability</li> <li>◆ dusty</li> </ul>
<b>Citrate</b> <b>Trimagnesium Dicitrate, anhydrous</b>	503043009	powder	<ul style="list-style-type: none"> <li>◆ &gt; 110 mg Mg content per capsule</li> <li>◆ passable flowability</li> <li>◆ dusty</li> </ul>
<b>Trimagnesium Dicitrate, anhydrous DC 100</b>	503043007	granules, directly compressible	<ul style="list-style-type: none"> <li>◆ &gt; 100 mg Mg content per capsule</li> <li>◆ excellent flowability</li> <li>◆ less dusty</li> </ul>
<b>Magnesium Hydrogen Citrate</b>	503033004	fine granules	<ul style="list-style-type: none"> <li>◆ &gt; 60 mg Mg content per capsule</li> <li>◆ good flowability</li> <li>◆ dusty</li> </ul>
<b>Magnesium Hydrogen Citrate</b>	503033001	powder	<ul style="list-style-type: none"> <li>◆ &gt; 50 mg Mg content per capsule</li> <li>◆ very poor flowability dusty</li> </ul>
<b>Malate</b> <b>Magnesium DL-Malate</b>	503090001	powder	<ul style="list-style-type: none"> <li>◆ &gt; 60 mg Mg content per capsule</li> <li>◆ very poor flowability</li> <li>◆ dusty</li> </ul>
<b>Magnesium DL-Malate</b>	503090003	powder	<ul style="list-style-type: none"> <li>◆ 70 mg Mg content per capsule</li> <li>◆ good flowability dusty</li> </ul>
<b>Premixes</b> <b>Premix SiX MiX – Magnesium</b>	524011190	powder	<ul style="list-style-type: none"> <li>◆ 160 mg Mg content per capsule</li> <li>◆ poor flowability</li> <li>◆ less dusty</li> </ul>
<b>Premix 5-Salt – Magnesium</b>	524011160	powder	<ul style="list-style-type: none"> <li>◆ &gt; 160 mg Mg content per capsule</li> <li>◆ very poor flowability</li> <li>◆ less dusty</li> </ul>

High Magnesium content of more than 100 mg Magnesium per capsule was achieved with [Trimagnesium Dicitrate, anhydrous](#). The flow properties of the DC granules (503043007) are excellent while that of the powder (503043009) are passable. In general, powder of coarser particles show better flowability than finer particles. Other Magnesium Salts with good flowability are granular [Magnesium Hydrogen Citrate](#) (503033004), [Magnesium DL-Malate](#) (503090003) and with passable flow properties [Magnesium Bisglycinate](#) (505083001). The highest Magnesium content of 160 mg Magnesium and more per capsule was achieved with the premixes [Six Mix](#) and [5-Salt](#).

The tested Magnesium Salts differ in their Magnesium content and their powder properties. Not all the Magnesium products tested show a good flowability according to the classification. However, the flow properties may change in combination with other products and finally have to be acceptable for the application.

We are happy to help you find the best solution for your product. The production of tailor-made grades for your needs is possible.

**Interested in finding out more? Get in touch and [request a sample](#). We will be pleased to help you developing your next product.**



## Dr. Paul Lohmann®

# Your Competent Partner for High Value Mineral Salts

With over 135 years of producing Mineral Salts that meet the highest quality standards, we have established ourselves as the leading global supplier to the pharmaceutical, biopharmaceutical, nutritional supplement, food and personal care industries.

### Our Expertise

- ◆ GMP and DIN EN ISO 9001 certified production sites
- ◆ FSSC 22000/ISO 22000 certified
- ◆ Processes according to HACCP
- ◆ Compliance and commitment with the FSMA (food safety modernization act)
- ◆ Tailor-made and innovative solutions according to customer requirements
- ◆ Highly qualified experts in R&D lab and application technology with long-term experience and a wide variety of possibilities to develop new products and applications
- ◆ Joint product and application development together with our customers
- ◆ Our manufactured products are exclusively Made in Germany
- ◆ A wide range of more than 400 different Mineral Salts
- ◆ Products in compliance with the most relevant pharmacopoeias (Ph.Eur., USP, BP), food codices (FCC, E-numbers, etc.) and customer specific requirements
- ◆ Regulatory documentation (CEP, ASMF, etc.)
- ◆ REACH compliance on request
- ◆ Wide range of production equipment
- ◆ Social and environmental standards (Sustainability report, EcoVadis, DIN EN ISO 50001, Sedex)
- ◆ High purities can be realized according to specific requirements

### Modification

- ◆ Physical properties
- ◆ Chemical properties
- ◆ Packaging
- ◆ Labeling

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