# Product Portfolio Mineral Salts

## Aluminium
- **Aluminium Citrate**  
  - Aluminium Lactate  
  - Aluminium Acetotartrate
- **Aluminium Hydroxide Acetate**  
  - Aluminium Potassium Sulfate

## Ammonium
- **Ammonium Acetate**  
  - Ammonium Lactate  
  - Ferric Ammonium Oxalate
- **Ammonium Adipate**  
  - Ammonium Oxalate  
  - Ferric Ammonium Sulfate
- **Ammonium Citrate**  
  - Ferric Ammonium Citrate  
  - Ferrous Ammonium Sulfate

## Calcium
- **Calcium Acetate**  
  - Calcium Gluconate  
  - Calcium Phospholactate
- **Calcium L-Aspartate**  
  - Calcium Glyceroephosphate  
  - Calcium L-Pidolate
- **Calcium Bisglycinate**  
  - Calcium Hydroxide  
  - Calcium Propionate
- **Calcium Carbonate**  
  - Calcium Lactate  
  - Calcium Saccharate
- **Calcium Chloride**  
  - Calcium Lactate PLUS  
  - Calcium Stearate
- **Calcium Citrate**  
  - Calcium Lactate Gluconate  
  - Calcium Succinate
- **Calcium Citrate Malate**  
  - Calcium Malate  
  - Calcium Sulfate
- **Calcium Copper EDTA**  
  - Calcium Nitrate  
  - Calcium Tartrate
- **Calcium Disodium EDTA**  
  - Calcium Oxalate  
  - Sodium Calcium Edetate
- **Calcium Formate**  
  - Calcium Phosphate

## Copper
- **Copper(II) Acetate**  
  - Copper(II) Calcium EDTA  
  - Copper(II) Oxalate
- **Copper(II) Hydroxide Carbonate**  
  - Copper(II) Formate  
  - Copper(II) Pyrophosphate
- **Copper(II) Bisglycinate**  
  - Copper(II) Fumarate  
  - Copper(II) Sulfate
- **Copper(II) Citrate**  
  - Copper(II) Gluconate  
  - Copper(II) Tartrate

## Iron
- **Ferric Albuminate**  
  - Ferric Glycerophosphate  
  - Ferric Pyrophosphate, soluble with Ammonium Citrate
- **Ferrous L-Ascorbate**  
  - Ferrous Lactate  
  - Ferric Pyrophosphate, soluble with Sodium Citrate
- **Ferrous Bisglycinate**  
  - Ferrous Oxalate  
  - Ferric Sodium Pyrophosphate
- **Ferrous Carbonate with sugar**  
  - Ferric Ammonium Oxalate  
  - Ferric Sodium Pyrophosphate
- **Ferric Subcarbonate**  
  - Ferric Peptonate  
  - Ferric Saccharate
- **Ferric Choline Citrate**  
  - Ferric Phosphate  
  - Ferrous Succinate
- **Ferric Citrate**  
  - Ferrous Phosphate  
  - Ferrous Sulfate
- **Ferric Ammonium Citrate**  
  - Ferric Phosphate, soluble with Ammonium Citrate  
  - Ferric Ammonium Sulfate
- **Ferric Sodium Citrate**  
  - Ferric Phosphate, soluble with Sodium Citrate  
  - Ferrous Ammonium Sulfate
- **Ferrous Sodium EDTA**  
  - Ferric Polymaltose Complex  
  - Ferric Subsulfate
- **Ferrous Fumarate**  
  - Ferric Pyrophosphate  
  - Ferric Tartrate
- **Ferrous Gluconate**

## Lithium
- **Lithium Acetate**  
  - Lithium Citrate  
  - Lithium Sulfate

## Magnesium
- **Magnesium Acetate**  
  - Magnesium Carbonate  
  - Magnesium Fumarate
- **Magnesium L-Ascorbate**  
  - Magnesium Chloride  
  - Magnesium Gluconate
- **Magnesium DL-hydrogen Aspartate**  
  - Magnesium Citrate  
  - Magnesium Glutamate
- **Magnesium L-hydrogen Aspartate**  
  - Magnesium Citrate Malate  
  - Magnesium Glycerophosphate
- **Magnesium Aspartate PLUS**  
  - Magnesium Potassium Citrate  
  - Magnesium Hydroxide
- **Magnesium Bisglycinate**  
  - Magnesium Formate  
  - Magnesium Lactate
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<td>Magnesium Phosphate</td>
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<td>Potassium Magnesium Citrate</td>
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<td>Potassium Magnesium L-hydrogen Aspartate</td>
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<th>Zinc</th>
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<td>Zinc L-Ascorbate</td>
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<td>Zinc Oxalate</td>
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<td>Zinc Bisglycinate</td>
<td>Zinc Oxide</td>
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<tr>
<td>Zinc Hydroxide Carbonate</td>
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| Various                   | Glycerophosphoric Acid |                       |

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<thead>
<tr>
<th>Triturations</th>
<th>Iodate Tr 1 % C</th>
<th>Selenate Tr 0.5 % C</th>
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<tr>
<td>Chromium Trit 5 % C</td>
<td>Iodate Tr 5 % TCP</td>
<td>Selenate Tr 0.4 % M</td>
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<td>Chromium Trit 10 % C</td>
<td>Iodide Tr 1 % M</td>
<td>Selenite Tr 0.85 % - 0.99 %</td>
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<tr>
<td>Cupromin 6</td>
<td>Molybdenum Tr 1 % C</td>
<td>Selenite C</td>
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<tr>
<td>Cupromin 20</td>
<td>Molybdenum Tr 1 % M</td>
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www.lohmann4minerals.com
Directly compressible granules provide significant benefits for the production of medicines or dietary supplements in the form of tablets.

The biggest advantage of these products is the significant cost savings in production eliminating the need for wet granulation during the manufacturing process. This allows the fast and economical production of tablets.

Additionally our DC Granules can also be a great option for other dosage forms, such as sachets or stickpacks. “In a nutshell” the advantages of Dr. Paul Lohmann® DC Granules are:

- Reduced production costs and time by sparing the wet-granulation.
- Good tabletting properties, which help to reduce the quantity and cost of binding agents.
- Good flowability and reduced agglomeration during transport and storage, which avoid additional processing costs.
- Easy dosing, making “carriers” unnecessary, thus helping to save costs.
- Reduced dust formation, therefore
  - Lower health risks at the workplace
  - Reduced loss of raw material during processing
  - Low-dust filling of sachets and sticks
  - High compressibility at low compression forces for harder tablets

Micronized mineral salts are recommended for use in various foodstuffs and pharmaceutical products due to their exceptionally fine particle structure. The organoleptic properties and homogeneity of the salts used in the application are significantly improved. In addition, the special particle structure can also improve the absorption of these minerals.

Advantages:
- Improved dispersion behavior in suspensions, and consequently better homogeneity
- Less sedimentation
- Optimal sensory properties (no grittiness)
- Potential enhancement of bioavailability
Microencapsulated Mineral Salts Triturations

Through a uniquely developed coating procedure, mineral salts are covered with a layer of vegetable fat. Thanks to this encapsulation technology, the mineral salts are enclosed in microcapsules, while maintaining their natural function. The microencapsulation of mineral salts offers formulators considerable advantages: Ingredients, which are usually not considered for food fortification or for dietary supplements (e.g., highly bio-available ferrous sulfate that is highly reactive) can now be used without adverse sensory implications, such as, a strong metallic taste or changes in the product color.

Further advantages:
✓ Prevention of interactions with other components, e.g., fat oxidation
✓ Excellent taste masking properties
✓ Improved flowability and dosing control
✓ High level of bioavailability and stomach tolerance due to a controlled release of the mineral within the digestive tract

Additional advantages of Micro2 Microencapsulated & micronized mineral salts
✓ Smaller particle size (d90: approx. 300 μm)
✓ Enlarged specific surface and therefore: Improved functionality (in liquid applications dispersible with reduced sedimentation) and improved bioavailability

The Dr. Paul Lohmann® product portfolio contains several trace elements dissolved in inert carrier substances. These can be used to fortify foodstuffs and also in various dietary supplements.

Advantages:
✓ Cost savings in the process because products can be used and processed directly
✓ Easy dosing
✓ Safe handling
✓ Homogenous distribution of trace elements
✓ Reduced toxicity
✓ Odor-free

<table>
<thead>
<tr>
<th>TRACE ELEMENT</th>
<th>DILUTED IN</th>
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<tbody>
<tr>
<td>Selenium</td>
<td>RDA 55 μg</td>
<td>e.g. Calcium Carbonate</td>
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<tr>
<td>Copper</td>
<td>RDA 1 mg</td>
<td>Maltodextrin</td>
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<tr>
<td>Chromium</td>
<td>RDA 40 μg</td>
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<td>Molybdenum</td>
<td>RDA 50 μg</td>
<td>Calcium Phosphate</td>
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<tr>
<td>Iodine</td>
<td>RDA 150 μg</td>
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Premixes

Besides pure mineral salts, Dr. Paul Lohmann® also offers mixtures of minerals. In these mixtures, mineral salts are optimally combined with regard to their particle size composition and stability. We will be pleased to work with you to develop tailored premixes for your applications.

LomaSalt®
The Tasty Way of Sodium Reduction!

Our LomaSalt® products are ideal sodium-reduced replacements for table salt.
In order to help manufacturers of parenteral products comply with legal and quality requirements, Dr. Paul Lohmann® offers a range of mineral salts very low in endotoxins.

The EU has defined limit values for lead, cadmium and mercury, which cannot be exceeded in dietary supplements in Europe:

- **Lead** (max. 3.0 mg/kg)
- **Cadmium** (max. 1.0 mg/kg)
- **Mercury** (max. 0.1 mg/kg)

To ensure that the final products do not exceed the legally defined maximum for these heavy metals, Dr. Paul Lohmann® offers a wide variety of mineral salts with particularly low levels of these substances.

**Advantages:**
- Simplified compliance with the increasingly stricter standards on limit values for heavy metal content in dietary supplements
- Controlled low lead, cadmium and mercury levels
- Complete traceability through reliably documented processes

The Joint FAO/WHO Expert Committee for Food Additives (JECFA) has determined a new maximum limit for the weekly intake of aluminium, which is now 1 mg aluminium per kilogram of body weight.

Dr. Paul Lohmann® has the production know-how to offer a variety of mineral compounds as e.g. Calcium Citrates or Calcium Phosphates with a tightly controlled, low content of aluminium.

These products are particularly suitable to be used in food or pharmaceutical applications.

**Application areas:**
- Infant and baby food
- Dietary supplements for children
- Dietetic foodstuffs
- Medicine
High Purity Food Grade

Dr. Paul Lohmann® High Purity Food Grade products are particularly suitable for the production of sensitive applications and high value products:

- Infant formula and baby food
- Formula for special medical purposes (e.g. clinical nutrition)
- Dietary products
- Nutritional supplements

Advantages:

- Simplified compliance with increasingly stricter standards, for example, on limit values for microbiological parameters, heavy metals, trace elements and any other potential contaminants, such as, melamine
- Savings in time and cost
- Complete traceability is ensured by documented processes

With over 125 years of producing and providing mineral salts that meet only the highest quality standards, we have established ourselves as a leading global supplier to the pharmaceutical, nutritional supplement, food, and personal care industries.

Based on this experience, we can offer the following:

- GMP and DIN EN ISO 9001:2008 certified production sites
- Products in compliance with the most relevant pharmacopoeias (Ph.Eur., USP, BP), food codices (FCC, E-numbers, etc.) and customer specific requirements
- A wide range of more than 350 various mineral salts
- Regulatory documentation (CEP, ASMF, etc.)
- Tailor-made and innovative solutions for customer questions
- Joint product and application development together with our customers

Product modifications and customer orientated adaptations are possible with respect to:

<table>
<thead>
<tr>
<th>PHYSICAL PROPERTIES</th>
<th>CHEMICAL PROPERTIES</th>
<th>PACKAGING</th>
<th>LABELING</th>
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