

ANTI-CAKING SOLUTIONS FOR AGRICULTURAL FORMULATIONS

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UNIQUE CHEMICAL SOLUTIONS



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ABOUT CAKING

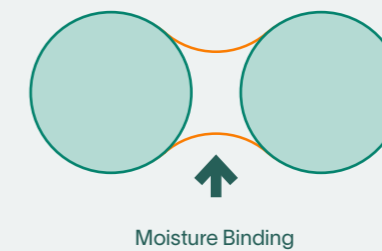
Caking, the formation of agglomerated material from discrete particles or granules, is a widespread problem in powder processing of fertilizers and pesticides.

Caking compromises their value by adversely affecting either in-process or end-use performance. The product might have flowed easily during packaging but discharging after the process could be difficult. As a result, detecting caking problems may take time since agglomeration occurs over time.

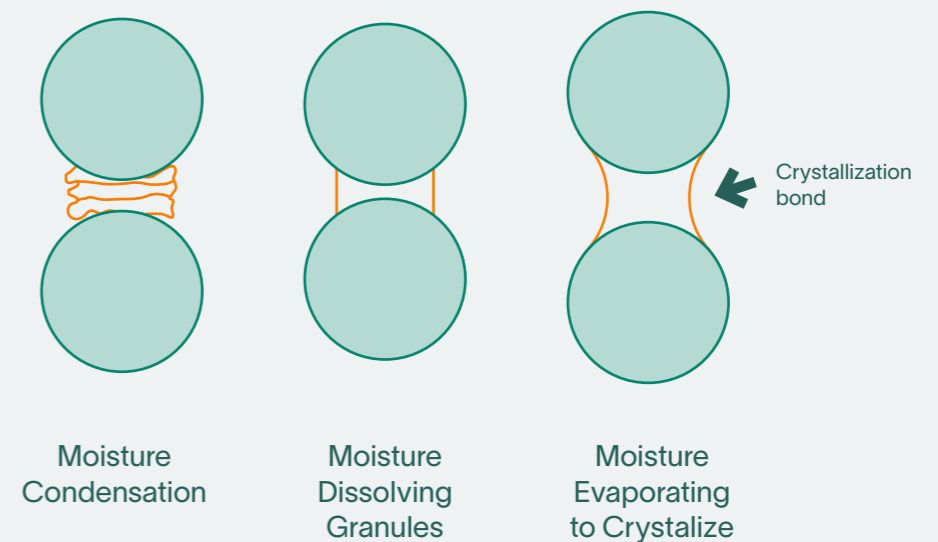
Why does caking occur in the process of pesticides / fertilizers?

Most fertilizers and pesticides have tendency to form lumps or agglomerate during storage. The mechanism of caking of the product is most often attributed to the formation of salt bridges and/or capillary adhesion. The severity of caking can be influenced by a number of factors such as chemical composition, moisture content, particle structure, mechanical strength, hygroscopic properties, product temperature, ambient conditions, storage time and storage pressure.

Liquid binding of granules



Solid binding of granules



Disadvantages of caking

Caking of fertilizers or pesticides is an important problem for both the manufacturers and the users. Manufacturers must recycle the caked product to the process which results with an extra cost and end-users may have difficulties during the application of the fertilizer to the soil.



How to solve caking?

Understanding the mechanisms behind caking, identifying key process variables and product specifications and testing samples to predict the increase in cohesive strength of a powder over time are key to prevent and solve the caking problems.

The various methods that reduce or eliminate caking of a product basically involve process control, storage/packaging conditions and/or addition of anticaking agents.

In manufacturing, the addition of high performance anti-caking agents help prevent caking during the packaging process, which can reduce production rates.

Anti-caking agents function by absorbing excess moisture or by coating particles to make them more water repellent.



Importance of using anti-caking agent for fertilizers & pesticides

An anti-caking agent is an additive used in the fertilizer & pesticide industry to avoid the formation of lumps. It is also used to improve the packaging and transportation of these pesticides and fertilizers. Anticaking agents provide better solutions for moisture absorption, nitrogen loss and caking in granulated fertilizers. Also they comprise surface tension modifiers, powerful surfactants, crystal habit modifiers and parting agents which are soluble in alcohol, water and other organic solvents.

Appropriate anti-caking agents should:

- Provide robust, long-lasting caking control
- Be easy to apply to dry fertilizer & pesticide in a typical process
- Have no negative effect on compliance with applicable regulatory requirements
- Expand the treated fertilizer's market area



NEW GENERATION ANTI-CAKING SOLUTIONS

Latro offers anti-caking agents to provide a comprehensive solution to the problem of caking and moisture absorption in powder & granular fertilizer and pesticides. They provide a complete solution to various problems faced by the fertilizer/pesticide manufacturers and end users.

A WATER SOLUBLE ANTI-CAKING SOLUTION: SUSPERIN® AC/S

SUSPERIN® AC/S helps prevent caking thanks to its moisture absorption capacity. Since it is 100% water soluble, it does not affect solubility of the fertilizer that is applied in.

- Enhance the free flow properties of powder fertilizers
- Enriches the nutrition content and increases the efficiency of the fertilizer in the field.

Table 1: SUSPERIN® AC/S Specifications

Appearance	White Powder
Free Moisture	0,5 % max
Solid Content	97 % min
pH (in 10% Solution)	3-5

We recommend to add Susperin AC/S in fertilizer formulations at the rate of 0,5% - 4,0%. Application dosage of Susperin AC/S depends on the moisture content of fertilizer.



HIGH PERFORMANCE SILICA SOLUTIONS

Synthetic silicas are frequently used in numerous applications within many different industries. When used as a flow agent, the silica acts as an additive which can produce significant improvements even with small amounts. They can also be used as a carrier for liquids, semi-solids or pastes. Precipitated silicas are odorless, inert and highly absorptive materials that function as free-flow and carrying agents in products and processes across many industries.



LATSIL® Series Silicas as High Performance Free-Flow & Anti-Caking Agent

Latro offers a wide range of LATSIL® precipitated silica solutions that enable products to flow better and manufacturing processes to function smoother.

LATSIL® speciality silicas provide three main functionalities for powder and granular fertilizers, WP and WDG pesticide formulations:

- Highly efficient absorption of liquid actives: Solid formulations containing up to 75 % of liquid active ingredient can easily be prepared using suitable LATSIL® grades.
- Free flow additive/anti-caking additive: 1-3% of LATSIL® silica added to powder or granule formulations enhance the fluidity greatly and avoid caking during storage.
- Milling aid: Adding up to 10 % of LATSIL® speciality silica facilitates the milling of ingredients that have a low melting point.

As an important advantage the suspensibility of the WP and WDG can be increased with LATSIL® products. The recommended LATSIL® silicas for WP and WDG are listed in Table 2.

LATSIL® High Capacity Carrier Silicas

LATSIL® carrying silicas are ideal for converting viscous liquids into free-flowing powders, dry liquid concentrates and loading active ingredients into targeted active ingredients

Those grades can be used as a carrier for liquid or low melting actives that provide both free flow as well as non-caking absorbate.

Table 2: LATSIL® Recommendations for Different Agricultural Products

Product	Usage %	Recommended LATSIL®
Fertilizer	0,1 - 2,0	LATSIL® 220(S)
Wettable powders (WP) and water dispersible granulates (WDG)	5,0 - 35,0	LATSIL® 220 LATSIL® 220 (S) LATSIL® 550 LATSIL® 550 (S)
Granulates, powders and dusts in agrochemical applications	0,5 - 3,0	LATSIL® 550 (S) LATSIL® 220 (S)
Blends of trace elements	0,1 - 3,0	LATSIL®550 (S) LATSIL® 220 (S)

SUSPERIN® LIQUID ANTICAKING SOLUTIONS

Effective and high performance liquid coatings can preserve the granular nature of fertilizer.

SUSPERIN® liquid anti-caking agents make the surface of the granule resistant to water so that the rate of moisture absorption by the granules is reduced. They restrict caking in humid conditions while maintaining the granule shape of the product and making it free-flowing.

Application Guides

Laboratory test method

[Simple Funnel Flow method]:

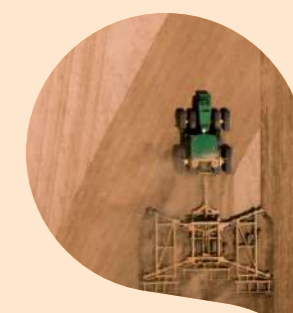
In funnel flow method, samples with different concentration of silica are tested by measuring the time it takes to go through the funnel of a defined aperture. Then, the duration is noted until 100g of sample passes through the funnel.

The optimum filling rate is decided after noting the minimum period required in seconds. The shortest time gives the best flow.

- Prepare 100 g of sample at different Silica concentrations. Mix well and keep it in closed containers.
- Mount a funnel (glass or metal) with defined aperture on a stand.
- Set the time, and pass each sample through the funnel while noting the duration in seconds.
- The sample flowing out of the funnel in shortest duration is the optimum Silica dosage level. The shortest time gives the best flow and anti-caking property.

Production test method:

- In the production test method, an anti-caking agent is added to the product during the mixing. After putting the product in sacks, 5-10 sacks are placed on top of each other and stored. The sacks are opened and flow rate of the product is checked after 1 week, 1 month, 3 months and 6 months.



Technical Approach of Latro

Latro has expertise in solid fertilizer and pesticide formulations. We have all the equipment to make our own trials in the **Wonderlab**. We test the flow properties of fine powders and perform caking tests.



Better Solutions for a Better World!

In order to make agriculture more sustainable, resources in the nature should be used more efficiently.

As Latro, we develop eco-friendly chemicals that aim to increase efficiency and decrease the consumption of natural resources. In this way, we contribute to a sustainable agriculture that can meet the needs of the rapidly increasing world population.



LET'S CREATE NEW POSSIBILITIES TOGETHER!

Latro is an ecosystem with a holistic perspective along the whole value chain, guided by our expertise and customer-first mentality.



introduction video



The experimentation at the heart of chemistry inspires us to create new possibilities with extraordinary solutions. Our purpose and values are the key driving force behind the continuous improvement of our products, processes and solutions. With this mindset, we are not only supplying raw materials, but also solving current and future's problems.

Adopting different approaches in the face of challenges distinguished us. Our Ministry of Industry and Technology-accredited R&D Center, is the confluence of our innate creativity with our technical know-how. We offer a wide range tailor-made solutions such as new product development, technical support and process consultancy.

Latro offers a wide range of innovative solutions for Agriculture industry. We are supporting our customers by creating tailor-made formulations and making various performance tests in our application laboratory. Our main goal is to create value-added and cost-effective products by following the market and customer needs.



Disclaimer

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