Granulated Materials

Easy handling for improved process efficiency

Accelerating Manufacturing Processes

Caking and clumping of chemicals, dust formation and laborious weighing have a negative impact on manufacturing efficiency and may even lead to process interruptions, quality deviations and operator safety risks.

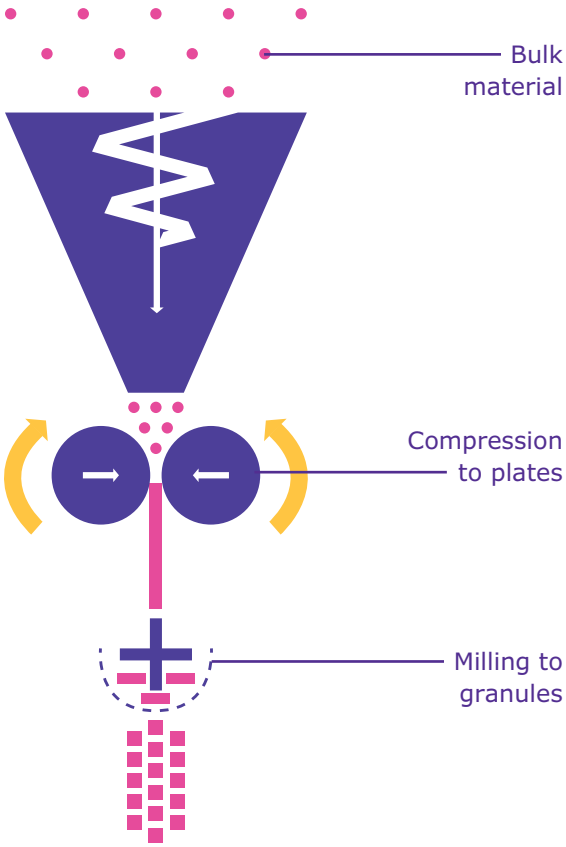
Buffer preparation, to name one example, is a core operation in pharmaceutical manufacturing and is closely linked to plant schedule and capacity. Just-in-time, flexible handling of chemical raw materials is key – delays are not an option.

Granulated raw materials are free-flowing and easy to handle. Their greatly reduced caking behavior facilitates processability, speeds up manufacturing processes and increases operator safety.

Discover our innovative granulated raw materials:

Ammonium Sulfate Granulated
Glycine Granulated
Potassium Chloride Granulated
Sodium Chloride Granulated
Urea Granulated

- Greatly reduced caking
- Better handling and processability
- Increased operator safety
- Multi-compendial
- Emprove® Expert products with low endotoxin levels for high risk applications



Dry Granulation by Roller Compaction

- Compression force only
- No water or other additives used
- Ideal for highly sensitive materials

The raw materials are compacted by dry granulation. This water and additive-free process uses compression force to condense the materials. Compared to other compaction methods, dry granulation is very gentle and particularly appropriate for heat and moisture sensitive materials. By using this process, we ensure that characteristics of the raw materials are preserved and the highest quality standards are met.

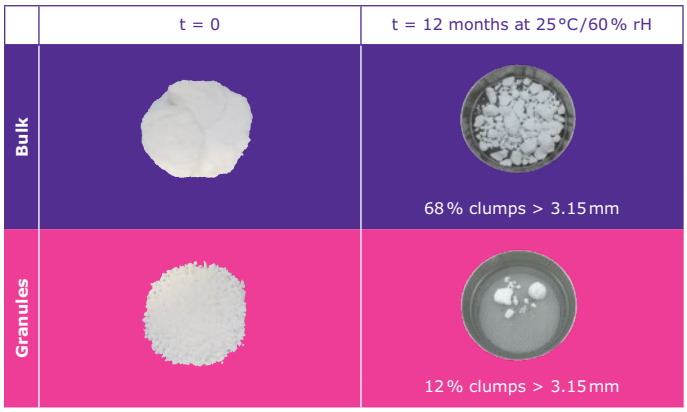
The quality, consistency and compliance of our raw materials is fully documented and supported by a secure and robust supply chain.

Material Properties

Caking is a chemical product property of various compounds, such as glycine and urea, and can lead to complete solidification.

Our granulated materials show significantly reduced caking even under long-term storage conditions. Occasionally emerging small clumps can be easily broken. In contrast, bulk material shows intense caking up to monoblock formation.

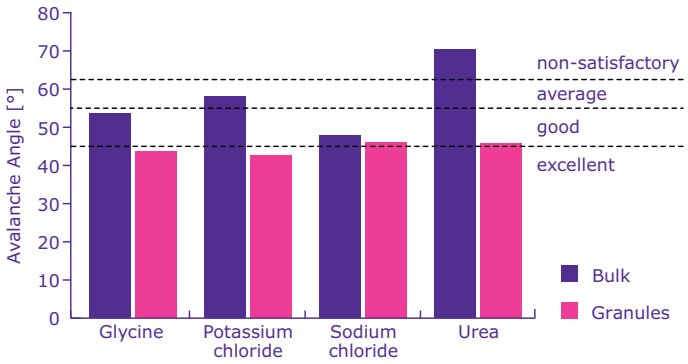
The picture on the right shows granulated urea in comparison to standard bulk material as an example.



Flowability

Our granulated materials provide excellent flowability, whereas respective bulk material often shows average or even non-satisfactory results. Free-flowing characteristics of granular material strongly improve handling and processability.

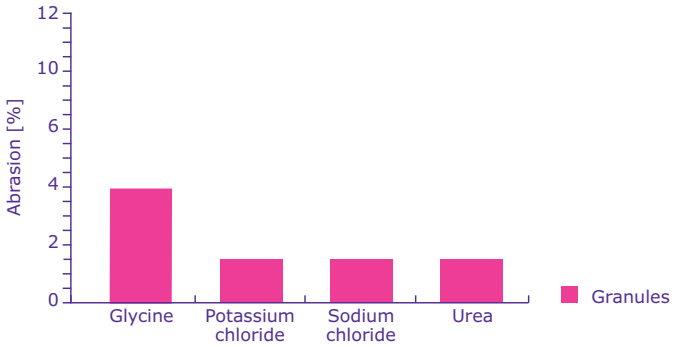
Flowability was determined by powder analyzer, a method measuring the avalanche angle necessary to induce material flow. Lower avalanche angles equal better flowability.



Abrasion

Sustained integrity of granules during transport and storage is key to preserve their positive characteristics. Granulated materials exhibit excellent integrity with very low abrasion rates.

Material integrity was tested using an abrasion drum with ceramic balls. The drum was rotated at 20 rpm for 10 min and the percentage of fine particles mass <500 µm was determined.



Dissolution

Dissolution behavior of granulated material is comparable to bulk material. Studies showed slightly faster dissolution of bulk material due to larger surface area.

Dissolution studies were performed by dissolving 80 g of the respective material in 800 mL of purified water. Samples were stirred at 250 rpm at room temperature and particles were determined by focused beam reflectance measurement (FBRM).

	Dissolution Time [min]	
Raw Material	Bulk	Granulated
Glycine	6.0	8.0
Potassium chloride	6.0	6.5
Sodium chloride	4.0	5.5
Urea	5.0	8.5

The Emprove® Program

Your fast track through regulatory challenges.

Ensuring the compliance of your pharma and biopharma products involves the compilation of a vast amount of data, which can be time- and resourceintensive.

In order to facilitate and accelerate this process, we developed our Emprove® Program. It includes 400 pharma raw and starting materials and a selection of filtration and single-use products.

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Ordering Information

Product Name	Cat. No.	Pack Size	Packaging
Ammonium sulfate granulated EMPROVE® EXPERT ACS, ChP, NF	**1.04161.1000**	1 kg	PE bottle
	1.04161.9026	25 kg	PE bag (in PE pail)
Glycine Granulated EMPROVE® EXPERT Ph Eur, BP, ChP, JP, USP	**1.03669.1000**	1 kg	PE bottle
	1.03669.5000	5 kg	PE bottle
	1.03669.9012	12 kg	PE bag (in PE pail)
	1.03669.9025	25 kg	PE bag (in corrugated cardboard box)
	1.03669.9500	500 kg	Big bag
Potassium Chloride Granulated EMPROVE® EXPERT Ph Eur, BP, JP, USP	**1.04165.1000**	1 kg	PE bottle
	1.04165.9026	25 kg	PE bag (in PE pail)
	1.04165.9500	500 kg	Big bag
Sodium Chloride Granulated EMPROVE® EXPERT Ph Eur, BP, ChP, JP, USP	**1.04163.1000**	1 kg	PE bottle
	1.04163.9026	25 kg	PE bag (in PE pail)
	1.04163.9500	500 kg	Big bag
Urea Granulated EMPROVE® EXPERT Ph Eur, BP, JP, USP, ACS	**1.04166.1000**	1 kg	PE bottle
	1.04166.9026	25 kg	PE bag (in PE pail)
	1.04166.9150	150 kg	PE bag (in PE drum)
	1.04166.9800	800 kg	Big bag

To facilitate qualification processes, the 1 kg package is available for 3 different batches.

For further information, please visit SigmaAldrich.com or contact your local sales representative.

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The typical technical data above serve to generally characterize the product.
These values are not meant as specifications and they do not have binding character.
The product specification is available separately at: **SigmaAldrich.com**

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Lit. No. MK_BR5580EN 08/2022