



Dietary Supplements

Enlighten your formulation



THINKING OF TOMORROW



Active Nutraceutical Ingredient

Natural Calcium Carbonate

Omya offers certified high purity, Natural Calcium Carbonate – a source of highly bioavailable calcium, specially designed for nutraceutical applications.

Omya Natural Calcium Carbonate is suitable for solid and liquid dietary supplements in nutra applications. Three product ranges are available: Calcipur[®], Calcipur[®] DC and Omya-Cal[®].

APPLICATIONS:

*Calcium
supplementation*

PRODUCTS:

*Calcipur[®]
Omya-Cal[®]
Calcipur[®] DC*

Benefits

- *High purity*
- *Compliant with E170 and FCC*
- *GMP*

Calcium Supplementation

Calcium is the fifth most abundant element in the human body. In average, adults carry between 0.9 and 1.4 kg of calcium in their bodies. While calcium is needed for the proper functioning of muscles and nerves, 99% of the total body calcium is contained in the bones.

Strong bones are the result of a good balance between the formation and resorption of bone mass. Bone calcium balance is neutral in healthy young adults. The resorption of old bone is equal to the formation of new bone. At certain stages of our lives, the balance might be negative, for example during pregnancy, lactation or old age, and calcium intake from the regular diet could be insufficient. It is then that supplementation could become necessary.

"It is estimated that a fracture due to low bone density occurs every 3 seconds" ¹

Availability of Ca²⁺ in blood plasma is of high importance to facilitate the incorporation of the calcium mineral into the bones.

Calcium Carbonate is insoluble at neutral pH but soluble in the acidic environment of the stomach. Upon reaction with hydrochloric acid, calcium ions are released and absorbed in the small intestine.

Calcium Carbonate provides similar oral calcium absorption to that of other calcium salts.²

It is known that vitamin D3 and K2, help the absorption and correct distribution of calcium ions in the body. Thus, most current calcium supplements are formulated together with these two vitamins.³

Ref.1. International Osteoporosis Foundation

Ref.2. Weaver, Connie M., International Dairy Journal:

Solubility and Absorbability of Calcium Salts 8 (1998), 443-449.

Ref.3. Van Ballegooijen, Adriana, International Journal of Endocrinology: The Synergistic Interplay between Vitamins D and K for Bone and Cardiovascular Health: A Narrative Review (2017), 7454376

Calcipur® 2 - OG Omyanutra® 300 - OG

Omya distribution products: Vitamin D₃, Vitamin K₂

Swallowable tablet formulation

Ingredients	Content %	Content per tablet (mg)	Active content per tablet (mg)
Calcipur® 2 - OG (Natural Calcium Carbonate)	50	400	400
Vitamin K2 4500 ppm	1.9	15.2	0.0675
Vitamin D3 100000 IU/g	0.4	3.2	0.0077
Omyanutra® 300 - OG	46.9	397	
Croscarmellose sodium	0.5	4	
Magnesium stearate	0.2	2	
Total	100	821.4	

Procedure

Mix all active ingredients together with Omyanutra® 300 - OG in the turbula mixer for 10 minutes. Granulate the blend by roller compaction. Then, add croscarmellose sodium and mix again in the turbula mixer for 5 minutes. Finally, add magnesium stearate to the blend and mix for additional 5 minutes. Tablet the final blend.

Equipment

Mixer	Turbula® - T 10 F
Roller compactor	Fitzpatrick CCS220
Tablet press	Fette1200i
Hardness tester	Pharmatron MultiTest 50
Friability tester	Erweka TAR 120
Disintegration tester	Pharmatron Disitest 50

Tablet characteristics

Compaction force (kN)	6.8
Ejection force (N)	350
Tablet dimensions (diameter x height) (mm)	13 x 3.5
Tablet weight (mg)	800
Hardness (N)	90
Friability (%)	0.24
Disintegration time (s)	25



Direct Compressible Calcium Carbonate

Calcipur® DC products are direct compressible Natural Calcium Carbonates that can be used as ingredients in nutraceutical formulations as well as pharma excipients. The Calcipur® DC product range consists of high-purity Calcium Carbonate granulated with 5 - 10% wt of binder. The binders used are gluten-free maltodextrin, non-GMO corn starch or a mixture of acacia gum and gluten-free maltodextrin. By turning the powdered Calcium Carbonate into a granulate, flow properties are dramatically enhanced. This again, enables processes where good flow is decisive such as capsules and sachet / stick pack filling or direct compression tableting.

Benefits

- *Direct compressible*
- *Calcium fortification*
- *Free flowing*
- *Good compactability*
- *Allergen & GMO-free*

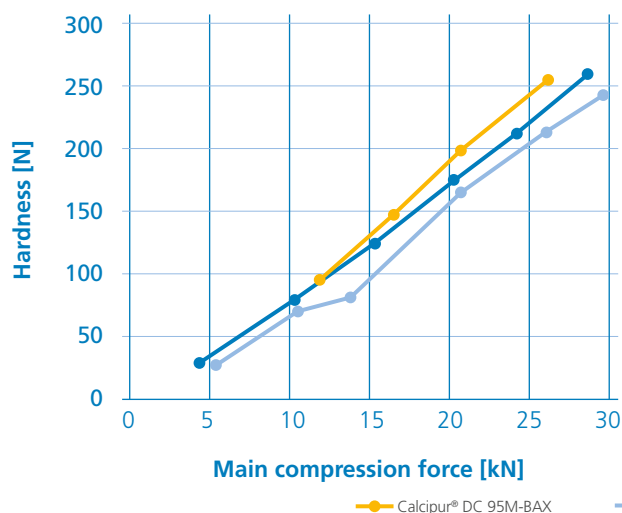
Compactability and Friability

Calcipur® DC products were formulated into chewable tablets according to the below formulation and compacted into 1 g ground tablets of 13 mm.

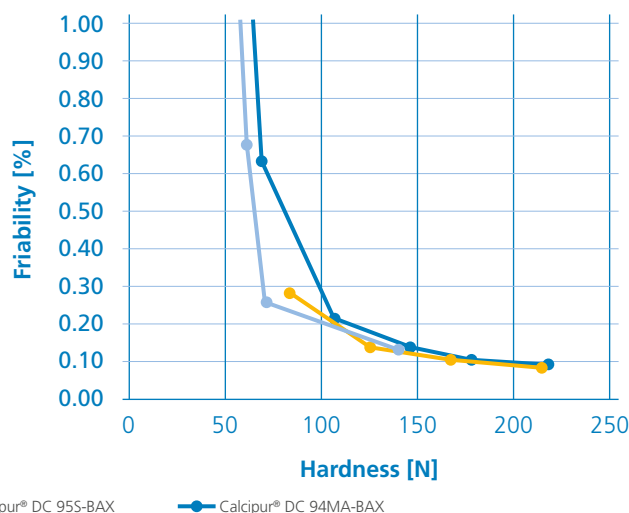
Ingredient	mg / Tablet	Content %
Calcipur® DC product	663*	66.3
Mannitol DC	200	20.0
Sorbitol DC	100	10.0
Sucralose	1	0.1
Cola flavor	5	0.5
Brown HT lake	1	0.1
Magnesium stearate	15	1.5

*Equivalent to 239 - 252 mg of elemental calcium depending on selected Calcipur® DC product

Compaction profile of formulated tablets containing Calcipur® DC products



Friability of formulated tablets containing Calcipur® DC products



Hardness vs compression force profiles showed that, independently of the type of binder, all the formulations containing Calcipur® DC exhibited good compactability behavior.

The obtained tablets were also mechanically stable as shown by the above friability vs hardness profiles of 60 N tablets.

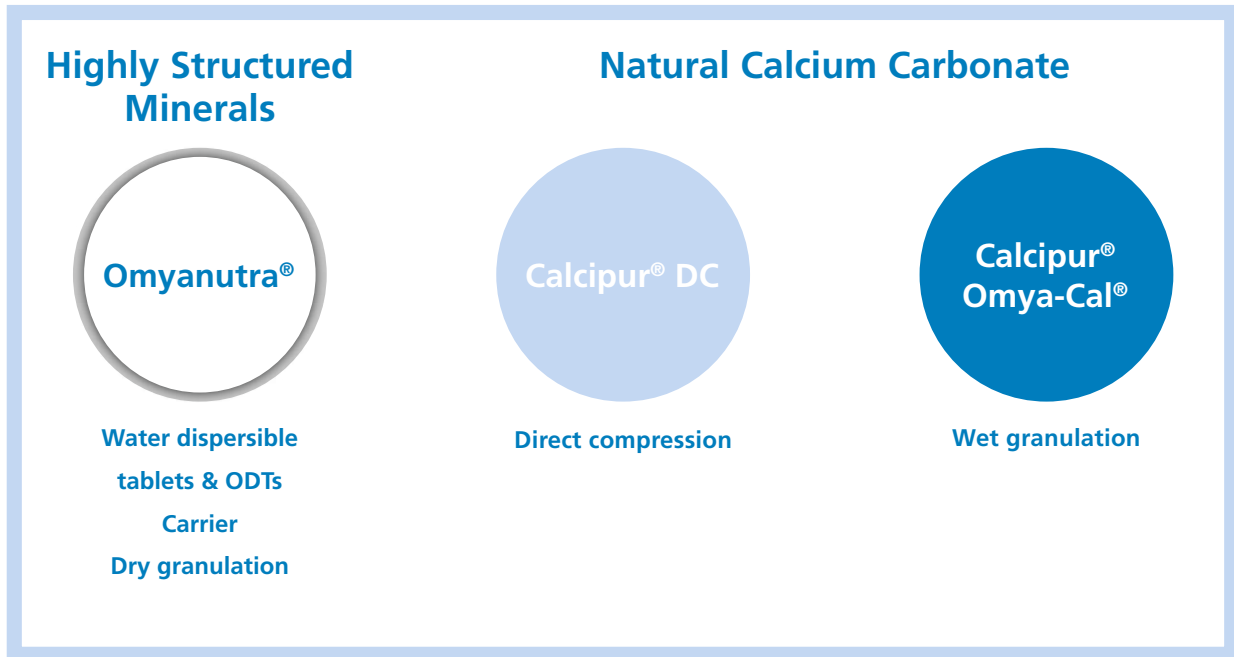
Calcipur® DC can also be used as a diluent excipient, increasing both weight and drug content dosage form uniformity. Resulting from its good flowability properties, Calcipur® DC product range can easily be used as a diluent in direct compression processes.

DOSAGE FORMS:

- Tablets (swallowable, effervescent, chewable)
- Hard capsules
- Stick packs

Inactive Ingredients for Dietary Supplements

Omya offers three different product ranges



Omyanutra® is a multifunctional ingredient based on Omya proprietary technology and suitable for a wide range of applications. It is a co-processed ingredient consisting of Calcium Carbonate and tribasic calcium phosphate.

All Omyanutra® ingredients are monographed and Generally Recognised as Safe (GRAS).

NUTRACEUTICAL FORMS:

- *Chewable tablets*
- *Water dispersible tablets*
- *ODTs*
- *Granules*
- *Capsules*

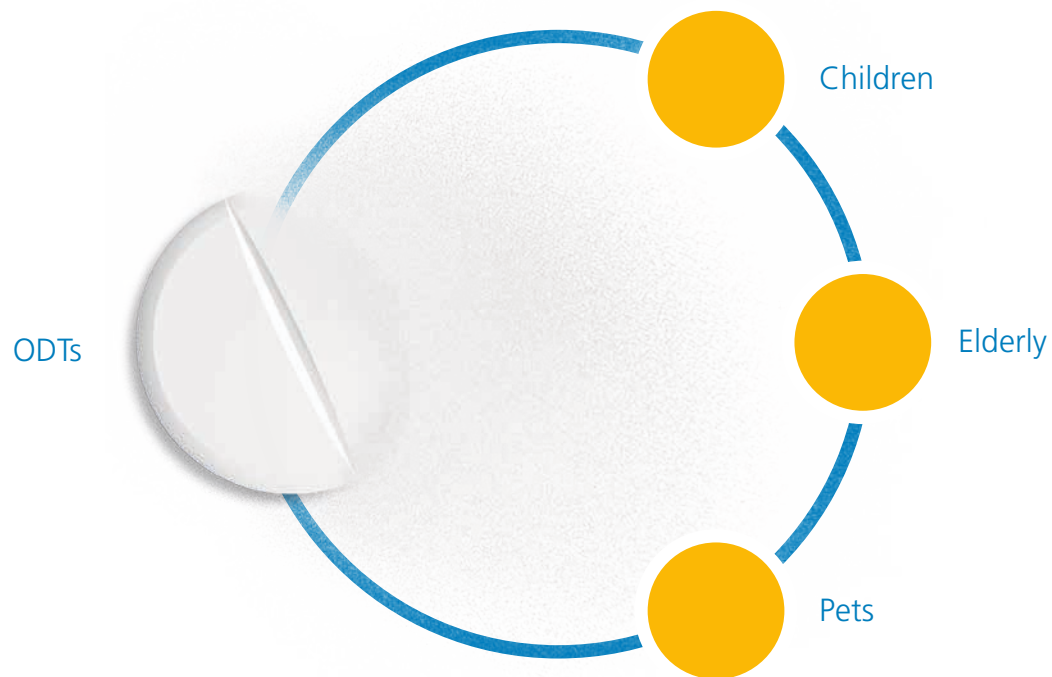


Omyanutra® is an innovative ingredient for ODTs.

Water Dispersible Tablets and ODTs

ODTs (Orally Dispersible Tablets) are innovative nutraceutical forms that have been quickly adopted by the population due to their ease of use.

ODTs are designed to disintegrate rapidly on contact with saliva, thus eliminating the need to chew the tablet, swallow an intact tablet, or take the tablet with liquids.



ODTs are preferred dosage forms when swallowing or chewing tablets may be an issue, e.g. for children, elderly or pets. Moreover, they are a convenient form to be taken on-the-go, no need for water.

Omya has developed Omyanutra®, an innovative ingredient for ODTs.

Orally dispersible tablets have received ever-increasing demand during the last decade

Benefits

- *Excellent compactability*
- *Fast disintegration time*
- *Fast active release*
- *ODT disintegration time independent of hardness*

Excellent compactability

Thanks to the external lamellae and highly porous structure, Omyanutra® allows high compactability.

As shown in the comparative compaction profile in figure 1, the granules obtained by dry granulation of Omyanutra® with croscarmellose sodium ranked among the best in terms of compaction.

Granules containing Omyanutra® and a super disintegrant showed superior compactability properties than ready-to-use ODT platforms available in the market

Technical facts*

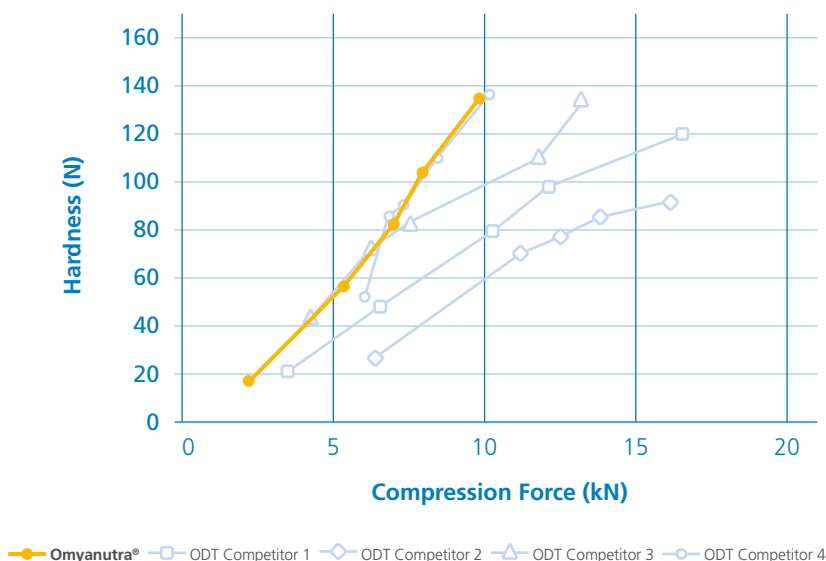
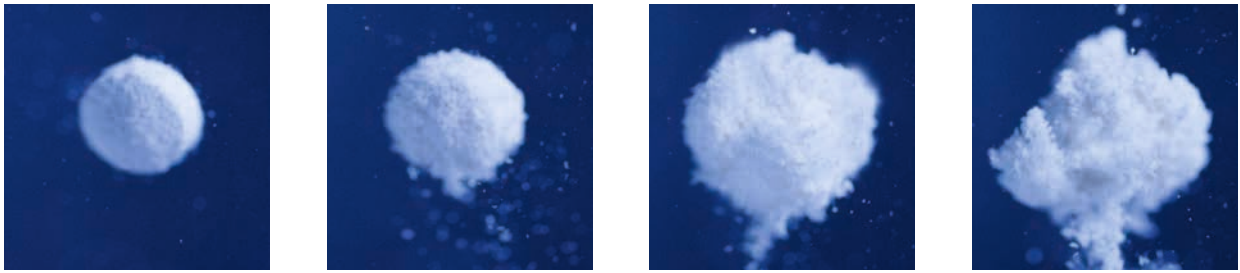


Figure 1: Compaction profile (compression force vs hardness) of 10% caffeine ODTs

The formulation with Omyanutra® required less compression forces to achieve equal hardness. Thus, the use of Omyanutra® may translate into less equipment wearability, higher tableting speeds and improved active stability due to lower temperature build up during production.

Technical facts*
Comparative studies performed at Omya pharma-nutra application laboratory.

Fast disintegration time



Fast disintegration is a key performance attribute of ODTs. Omyanutra® enables very fast disintegration times due to the preserved high porosity.

ODTs manufactured from Omyanutra® completely disintegrate within 5 seconds

Technical facts*

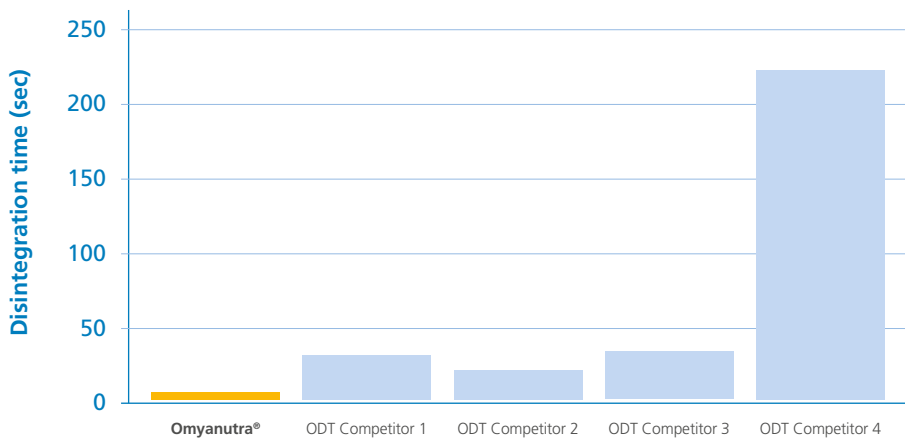


Figure 2: Disintegration time of 10% caffeine ODTs

Unlike other ingredients, Omyanutra® does not compromise on either compaction or disintegration time. It can provide both in the same formulation.

Technical facts*
Comparative studies performed at Omya pharma-nutra application laboratory.
Current marketed ODT platforms were compared to granules composed of 98% Omyanutra® and 2% croscarmellose sodium, manufactured by dry granulation.

ODT disintegration time is independent of tablet hardness

The robustness of an ODT platform allows a constant disintegration time across a wide range of tablet hardnesses. The disintegration time for Omyanutra®-based formulations remains short, despite a large hardness range, as shown in figure 3.

Omyanutra® in ODTs means high hardness and fast disintegration

Technical facts*

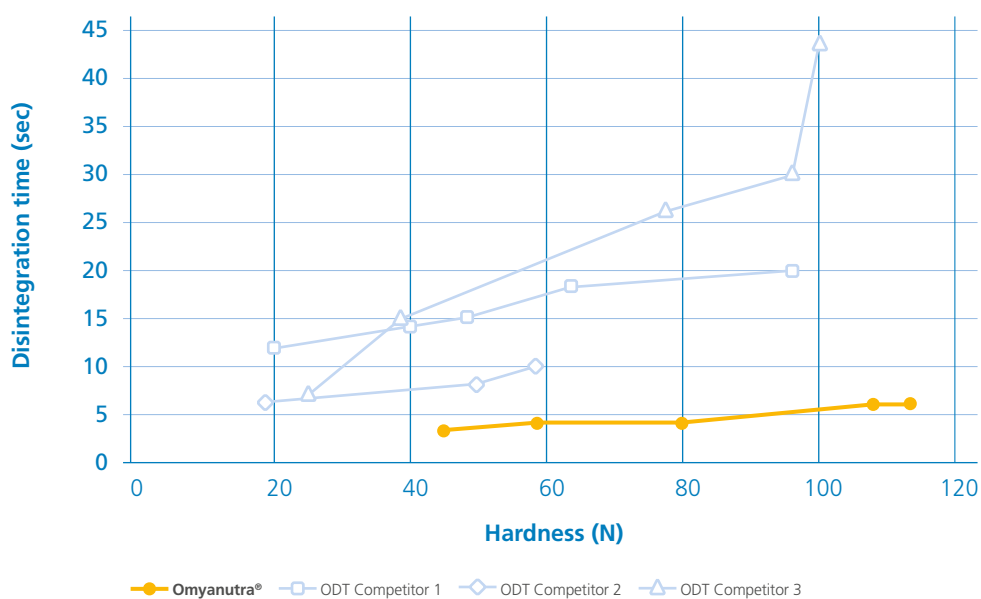


Figure 3: ODT disintegration time as a function of the tablet hardness

*Technical facts**
Comparative studies performed at Omya pharma-nutra application laboratory.



Fast drug release

In ODTs short disintegration times must be correlated to fast drug release. This is important to ensure the timely onset of the expected therapeutic effect.

Technical facts*

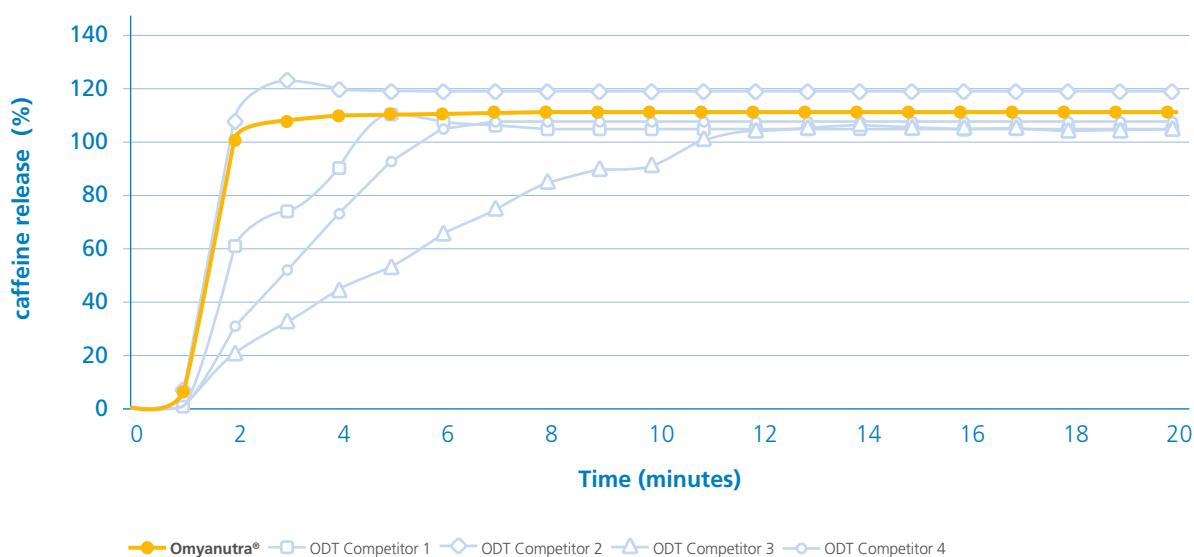


Figure 4: Caffeine release from ODTs

*Technical facts**
Comparative studies performed at Omya pharma-nutra application laboratory. Current marketed ODT platforms were compared to granules composed of 98% Omyanutra® and 2% croscarmellose sodium, manufactured by dry granulation.



Omyanutra® releases 100% of the caffeine contained in the ODTs within only 2 minutes, indicating a good correlation between the disintegration time and the release of the drug.

Carrier

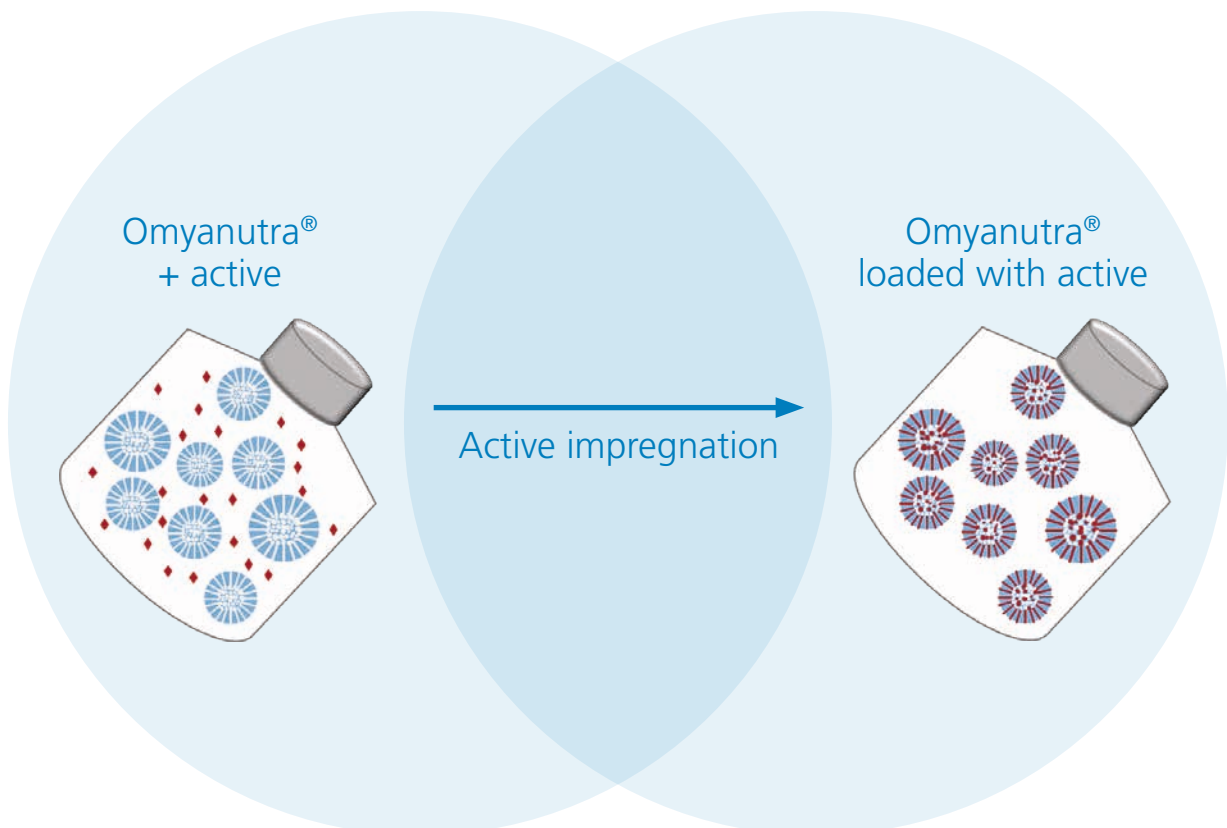
Solid forms are preferred over liquid formulations due to ease of use, improved stability and robustness. However, many active ingredients make use of oils as carriers to improve their bioavailability. Thus, the possibility of turning oils into powders is an increasingly attractive feature of inactive ingredients.

Omyanutra[®] can be used to convert oils into compressible powders

Omyanutra[®] can be used as an efficient carrier to convert liquids and oils into compressible powders. For instance, oily actives or actives dissolved in lipids can be converted into compressible powders with Omyanutra[®].

Benefits

- *Highly efficient & compactable carrier*
- *High oil absorption capacity*
- *Excellent compactability and low friability*



Highly efficient & compactable carrier

Thanks to its external lamellar structure and high internal porosity Omyanutra® can be loaded with up to 50% w/w* with hydrophilic or hydrophobic substances.

* 50% w/w: 50 g of oil/drug plus 50 g of Omyanutra®

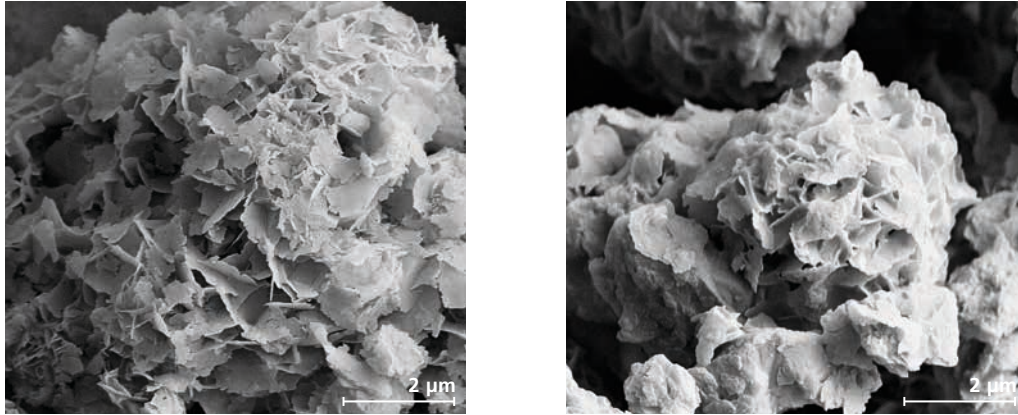


Figure 5: left: unloaded Omyanutra® carrier, right: loaded Omyanutra® carrier showing effective pore filling by the active

High oil absorption capacity

As it can be seen in table 1, Omyanutra® shows a higher absorption capacity than other commonly used compressible carriers, such as lactose or DCP.

Ingredients	Milled lactose monohydrate	Spray dried milled lactose monohydrate	Direct compression dicalcium phosphate anhydrous	Tricalcium phosphate	Omyanutra®
Oil absorbed (gr/100gr total weight)	93	111	115	117	150

These values are given for guidance only. Paraffin oil absorption measured by Brabender absorptometer.

Table 1: Oil absorption capacity of several ingredients

High compactability and low friability

Dextrose formulations containing 10 % of Omyanutra® loaded with oil can be directly compressed into tablets. These tablets show increased hardness and reduced friability when compared to tablets formulated with dextrose excipient alone.

Compactability

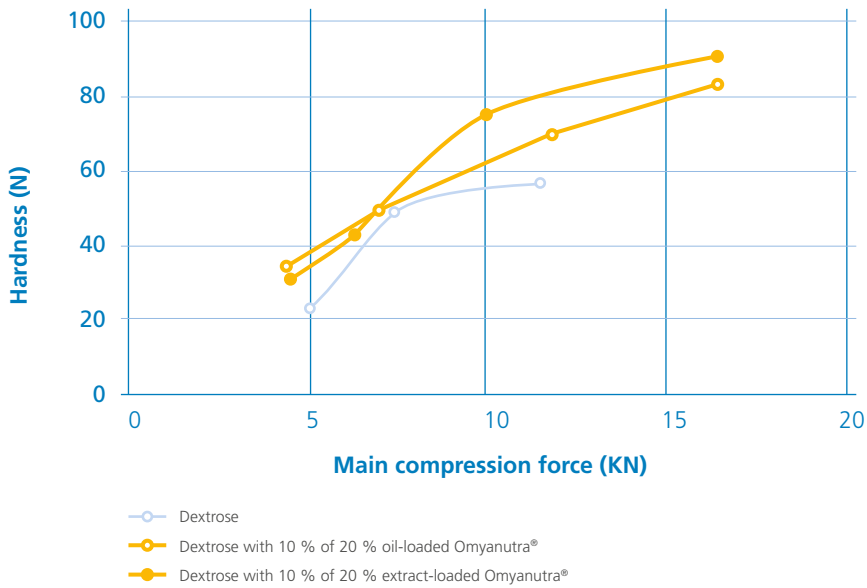


Figure 6: Compaction profile of oil-containing tablets

Friability

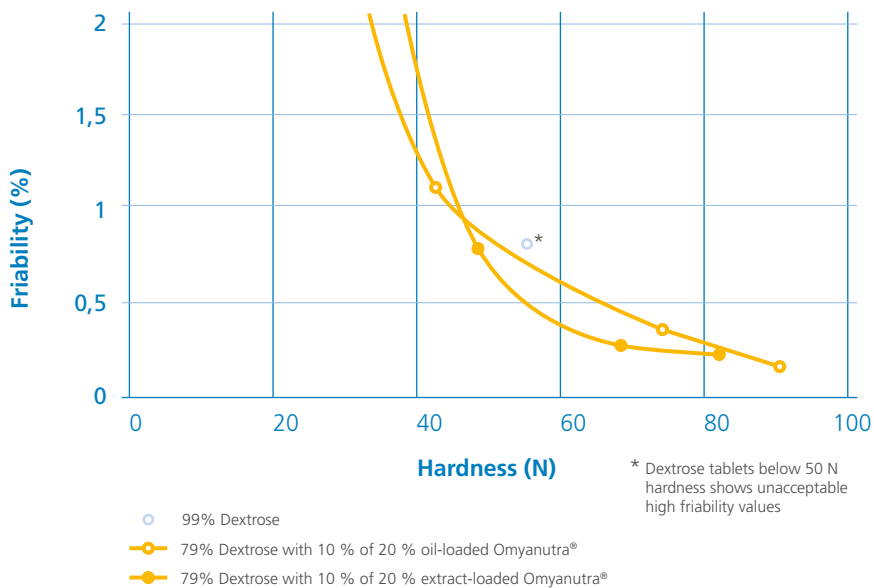
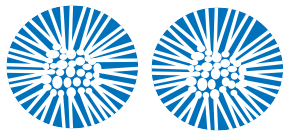


Figure 7: Friability of oil-containing tablets

Dry Granulation

Dry granulation is the granulation method of choice for moisture or temperature sensitive actives. Dry granulation, in comparison to wet granulation, is a faster and a more cost-effective process, which offers improved physical and chemical compatibility as well as easier scalability and technology transfer. Omyanutra® can be used as a highly efficient dry binder with excellent compaction properties.



Omyanutra® particles



Omyanutra® particles interlocking



Figure 8: Illustration of the compaction mechanism of Omyanutra® ingredient

Highly efficient binder

Omyanutra® has a unique morphology and physical structure. Its external lamellar structure provides many potential binding points for mechanical interlocking.

Under low compression forces, Omyanutra® can be compacted into stable granules with preserved internal porosity.

Omyanutra® shows a plastic-brittle behaviour as in figure 8.

At low compression forces interlocking of lamellae (I) results in interparticle bonding.

At high compression forces, the particle fragments, creating new surfaces for interparticle bonding (II).

Benefits

- *Highly efficient mechanical binder*
- *Excellent recompactability properties*
- *Retained high porosity*



Excellent recompactability properties

Omyanutra® shows excellent recompactability properties, much higher than microcrystalline cellulose (MCC). As in figure 9, placebo tablets manufactured by dry granulation of Omyanutra® show excellent mechanical properties, with increased hardness compared to those of MCC.

Recompactability

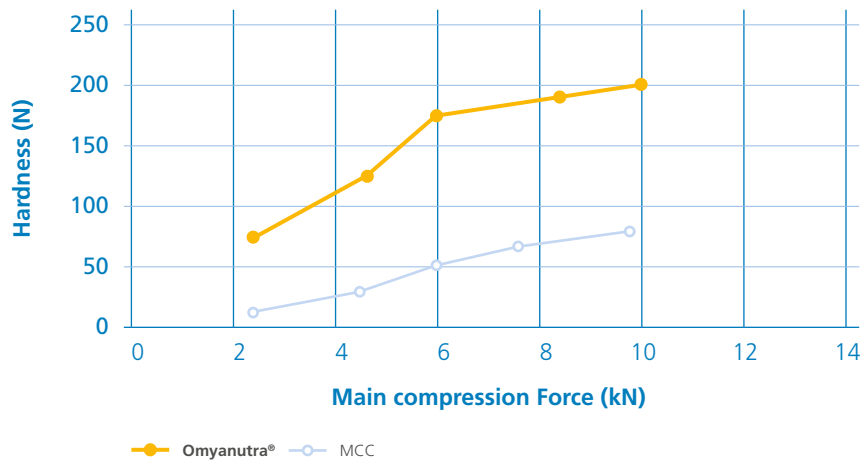


Figure 9: Recompactability (dry-granulation plus tableting) properties of Omyanutra® & microcrystalline cellulose excipient



Dry Binder for DC Ingredients

Omyanutra® is a highly efficient dry binder. As little as 5% can significantly improve the compactability of wet granulated actives and the mechanical stability of the tablets yielded.

Calcium Carbonate tablets

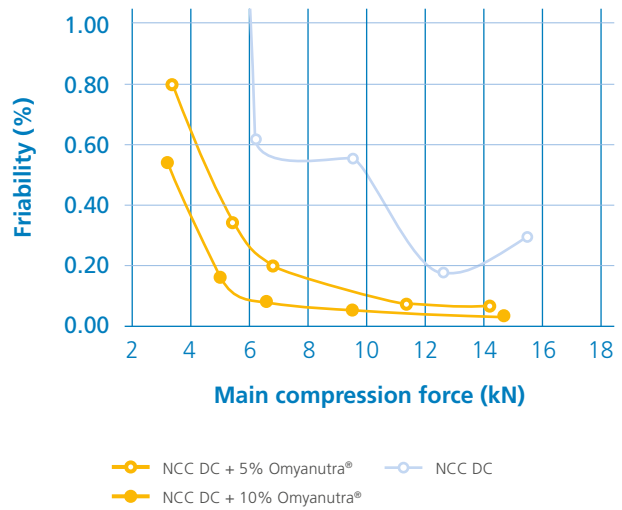
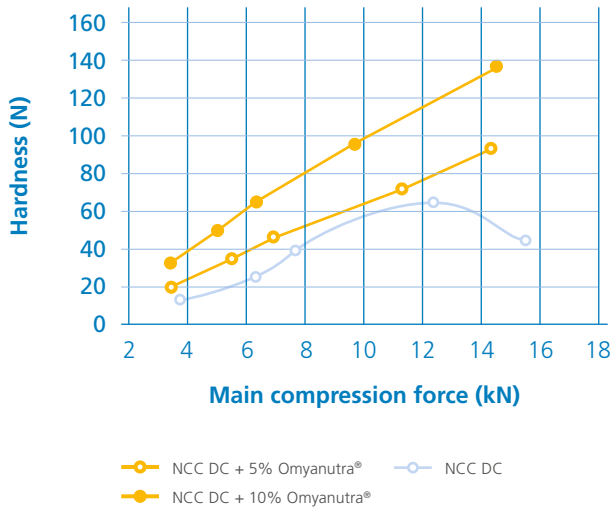


Figure 10: 5% and 10% of Omyanutra® significantly improved the compactability of wet granulated Natural Calcium Carbonate (NCC)

Figure 11: 5% of Omyanutra® increased the mechanical stability of formulations with wet granulated Natural Calcium Carbonate (NCC)

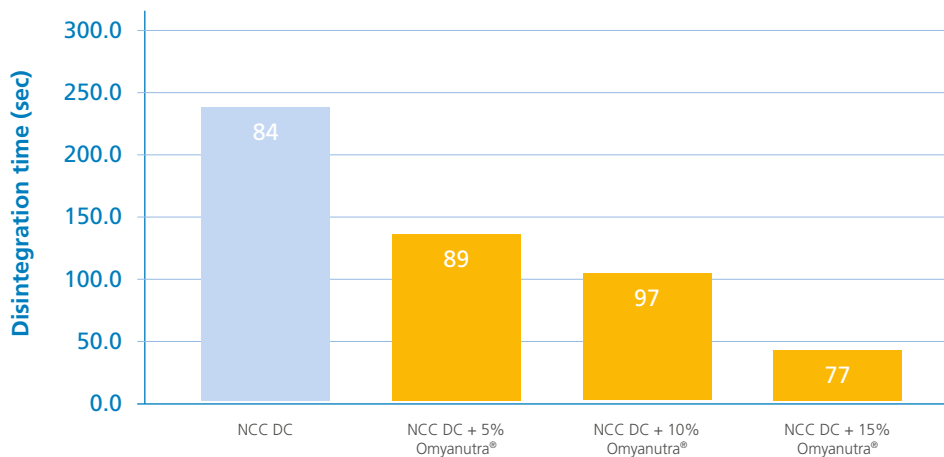


Figure 12: Increasing small amounts of Omyanutra® decreased the disintegration time of wet granulated Natural Calcium Carbonate (NCC) tablets. Moreover, the increasing amounts of Omyanutra® showed a decrease in the variability of disintegration time. The numbers in the data labels indicate the average hardness of the tested tablets in N.



Expertise and state-of-the-art facilities for dedicated customer support

Our team of experts advises on customer product formulations and continuously develop new mineral solutions for pharma and nutra applications. In our state-of-the-art pharma-nutra laboratory in Switzerland (Oftringen) we are ready to support you with your projects.

Developing innovative solutions for our customers

Product Recommendation

High-purity Natural Calcium Carbonate

	Calcipur® 2 - OG	Calcipur® 5 - OG	Omya-Cal® FG-4 - AZ	Omya-Cal® FG-10 - AZ	Omya-Cal® FG-15 - AZ	Omya-Cal® FG-20 - AZ	Omya Calcipur® 110 - KP	Omya Calcipur® 90 - KP	Omya Calcipur® 70 - KP	Omya Calcipur® 60 - KP
Applications										
Calcium supplementation	√	√	√	√	√	√	√	√	√	√
Regulatory & Quality Status										
E170	√	√					√	√	√	√
FCC	√	√	√	√	√	√	√	√	√	√
Manufacturing standards	HACCP									
Product Characteristics										
Typical Calcium Carbonate content	> 98%	> 98%	> 98%	> 98%	> 98%	> 98%	> 98%	> 98%	> 98%	> 98%
Median particle size (d50%)	3.0 μm	6.8 μm	3.3 μm	12.0 μm	14.5 μm	18.0 μm	2.0 μm	3.0 μm	6.3 μm	13.7 μm
Production site	1	1	2	2	2	2	3	3	3	3
Production site										

¹ Orgon (France)

² Arizona (US)

³ Kemalpasa (Turkey)

Multifunctional Ingredient - Omyanutra®

	Omyanutra® 300 - OG
Applications	
Dry binder for DC ingredients	√
Dry granulation in direct compression	√
Hot-melt extrusion	√
Carrier	√
Microencapsulation	√
Fast disintegration	√
Product Characteristics	
Product	Powder
Compressibility	Compressible
Production site	Orgon (France)

Direct compressible Calcium Carbonate - Calcipur® DC

	Calcipur® DC 90S-BAX	Calcipur® DC 92S-BAX	Calcipur® DC 95S-BAX	Calcipur® DC 90MD-BAX	Calcipur® DC 92MD-BAX	Calcipur® DC 95MD-BAX	Calcipur® DC 94MA-BAX
Applications							
Calcium supplementation	√	√	√	√	√	√	√
DC diluent	√	√	√	√	√	√	√
Regulatory & Quality Status							
E170, FCC, USP & EP	Starting materials compliant						
Manufacturing standards	HACCP & EXCiPACT						
Product Characteristics							
Calcium Carbonate content (% wt/wt)	90	92.5	95	90	92.5	95	94
Binder	Corn starch*			Maltodextrin**			Malto-dextrin** Acacia gum
Binder content (% wt/wt)	10	7.5	5	10	7.5	5	6

*Non-GMO origin **Gluten-free

Calcipur is a registered trademark of Omya AG in the European Union and multiple other countries.

Omya-Cal is a registered trademark of Omya AG in the USA and multiple other countries.

Omyanutra is a registered trademark of Omya AG in the European Union.

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OMYA PIGMENTS**

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