



enhanced
by Omya

Oral Dosage Forms

Enlighten your formulation



THINKING OF TOMORROW



Active Pharmaceutical Ingredient

Natural Calcium Carbonate

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

Omya Natural Calcium Carbonate is suitable for solid and liquid oral dosage forms in pharma applications. Two product ranges are available: Omyapure® and Omya-Cal®.

APPLICATIONS:

Antacids

*Osteoporosis
treatment*

PRODUCTS:

Omyapure®

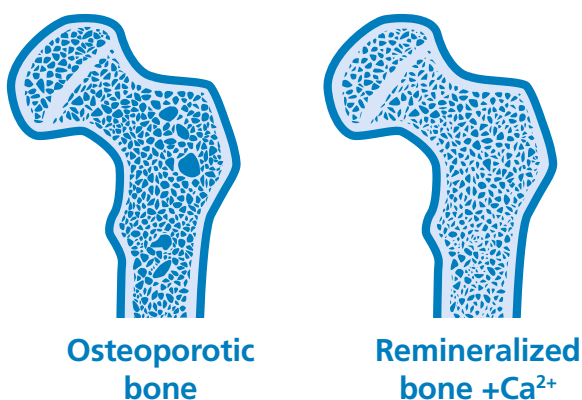
Omya-Cal®

Benefits

- *High purity*
- *Compliant with
Pharmacopeia*
- *GMP*

Osteoporosis treatment

Human bone contains 99% of the total body calcium. 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. Osteoporosis occurs when the process is out of balance and often appears during normal aging or pregnancy.



“It is estimated that an osteoporotic fracture occurs every 3 seconds.”¹

In order to prevent and treat osteoporosis, availability of Ca^{2+} 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

Ref. 1. International Osteoporosis Foundation
Ref. 2. Weaver, Connie M., International Dairy Journal: Solubility and Absorbability of Calcium Salts 8 (1998), 443-449.

Omyapure® 35-OG Omyapharm® 500-OG

Omya distribution products: Vitamin D₃, Vitamin K₂

Swallowable tablet formulation

Ingredients	Content %	Content per tablet (mg)	Active content per tablet (mg)
Omyapure® 35 -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
Omyapharm® 500-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 Omyapharm® 500-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

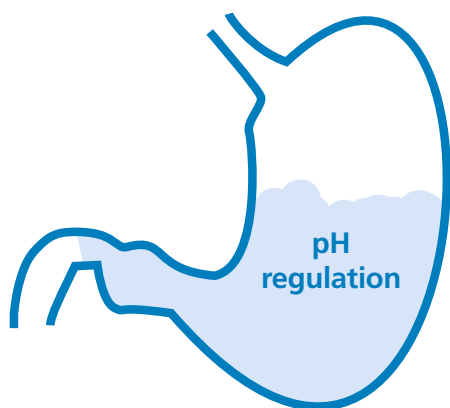
Tablet characteristics

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

Antacids

Antacids are frequently used to neutralize gastric acid excess, providing relief against heartburn.

They do not prevent gastric acid overproduction but help to neutralize acid secretions.



Omyapure® and Omya-Cal® comply with most stringent quality requirements.

One of the most used alkaline APIs in antacid formulations is Calcium Carbonate. It acts as a buffer by reacting with the hydrochloric acid in the stomach as follows:



Omyapure® and Omya-Cal® are suitable for liquid and solid dosage forms. In suspensions, the low particle size of Omyapure® and Omya-Cal® ensures physical stability. In tablets, a wet granulation step is required prior to tableting.

Omyapure® 35-OG Chewable tablet formulation

No	Ingredients	% (w/w)	Content per tablet (mg)
1	Natural Calcium Carbonate (Omyapure® 35-OG)	48.5	511.19
2	PVP K-90	3.50	36.89
3	Mannitol DC	29.3	308.82
4	Sorbitol DC	15	158.10
5	Orange flavour	2	21.08
6	FD&C Yellow #6	0.1	1.05
7	Sucralose	0.1	1.05
8	Magnesium stearate	1.50	15.81
	Total	100	1054

Procedure

Granulate Omyapure® 35-OG with PVP K-90 in a fluid bed equipment (top-spraying). Blend the granulated Calcium Carbonate with mannitol DC, sorbitol DC, orange flavour and sucralose in the turbula mixer for 10 minutes. Then, add magnesium stearate and FD&C yellow #6 to the mixture and blend for additional 5 minutes. Tablet the final blend in a rotary tablet press.

Equipment

Mixer	Turbula® - T 10 F
Roller compactor	Fitzpatrick CCS220
Tablet press	Fette1200i
Hardness tester	Pharmatron MultiTest 50
Friability tester	Erweka TAR 120
Fluid bed	Glatt GPCG2 Top spray 6L

Tablet characteristics

Compaction force (kN)	8.8
Ejection force (N)	251
Tablet dimensions (diameter x height) (mm)	13 x 5.78
Tablet weight (mg)	1054
Hardness (N)	82
Friability (%)	0.03



Excipients for solid oral dosage forms

Omya offers two different product ranges

Highly Structured Minerals



Water dispersible tablets & ODTs

Carrier

Dry granulation

Wet granulation

Natural Calcium Carbonate



Wet granulation

Omyapharm® is a multifunctional excipient platform based on Omya proprietary technology and suitable for a wide range of applications. It is a co-processed excipient consisting of Calcium Carbonate and tribasic calcium phosphate. Omyapharm® ODT platform contains additionally croscarmellose sodium as a superdisintegrant.

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

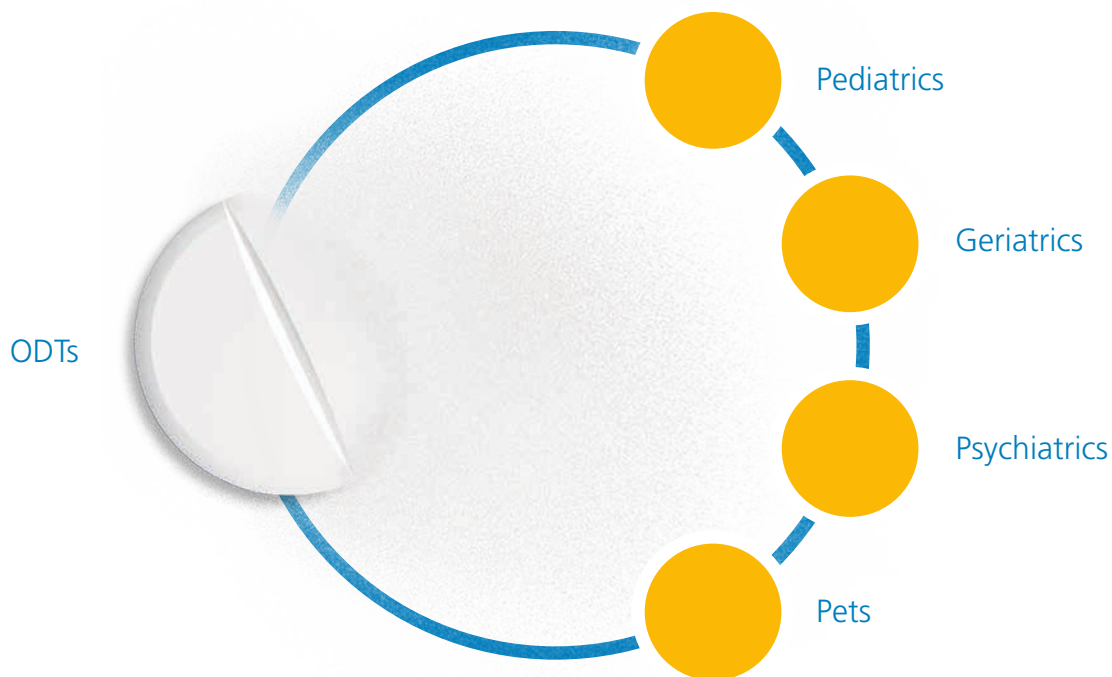
PHARMACEUTICAL FORMS:

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

Water dispersible tablets and ODTs

ODTs (Orally Dispersible Tablets) are innovative drug delivery systems used to improve patient compliance.

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 a preferred dosage form when patient compliance is a challenge such as geriatric, psychiatric and paediatric patients.

In addition, they have become increasingly attractive for product life cycle management and marketing purposes.

Omya has developed Omyapharm®, an innovative direct compressible excipient for ODTs.

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

Benefits

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

A close-up portrait of a young woman with blonde hair pulled back, smiling broadly. She has a white, round, flat tablet resting on the tip of her tongue. The background is a plain, light blue-grey color.

Omyapharm® is
an innovative direct
compressible platform
for ODTs.

Excellent compactability

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

As shown in the comparative compaction profile in Figure 1, Omyapharm® is the most compactable ODT platform.

Omyapharm® ODT platform shows superior compactability properties Vs. other excipients in the market.

Technical facts*

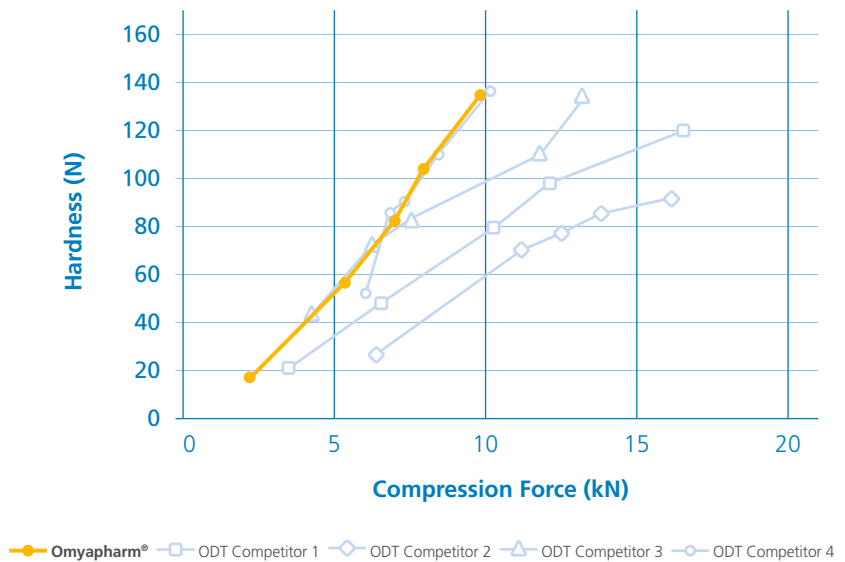
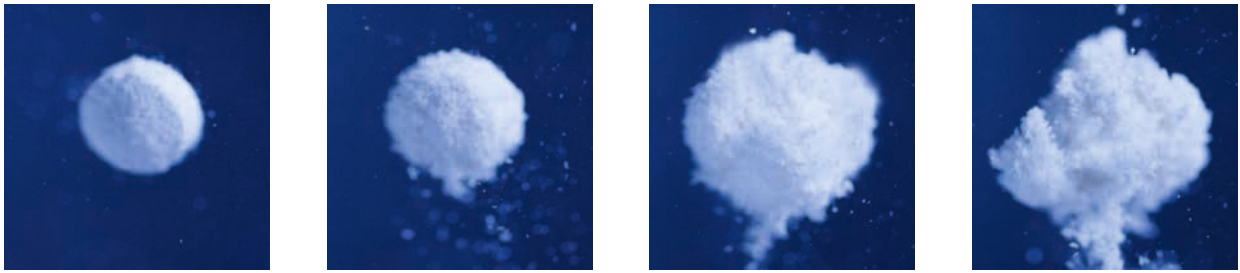


Figure 1. Compaction profile (Compression force vs hardness) of caffeine-containing ODTs

Omyapharm® ODT platform shows a linear increase in tablet hardness with increasing compression forces. When using Omyapharm® ODT platform, lower compression forces are needed to reach the desired tablet hardness.

Fast disintegration time



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

ODTs manufactured from Omyapharm® completely disintegrate within 5 seconds.

Technical facts*

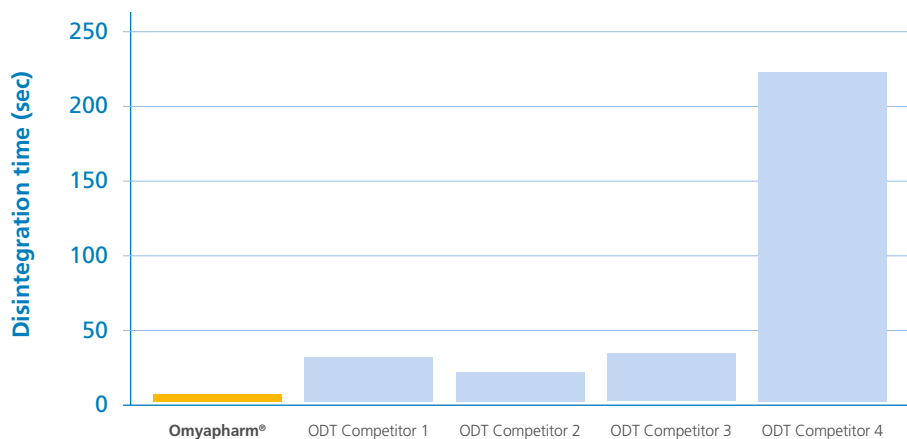


Figure 2. Disintegration time of caffeine-containing ODTs

ODTs formulated with Omyapharm® disintegrate twice as fast as a market reference.

Technical facts*
Comparative studies performed at Omya
pharma application laboratory.
Current marketed ODT platforms were
compared to Omyapharm® ODT platform.

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 Omyapharm®-based formulations remains short, despite a large hardness range, as shown in figure 3.

*Omyapharm®
in ODTs means
hardness and fast
disintegration.*

Technical facts*

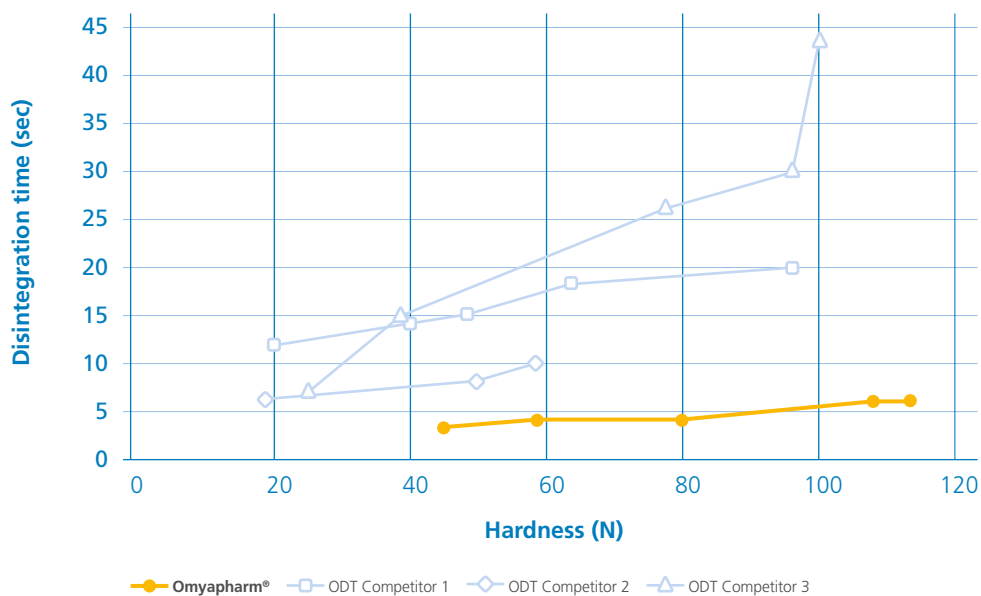


Figure 3. ODT disintegration time as a function of the tablet hardness

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*

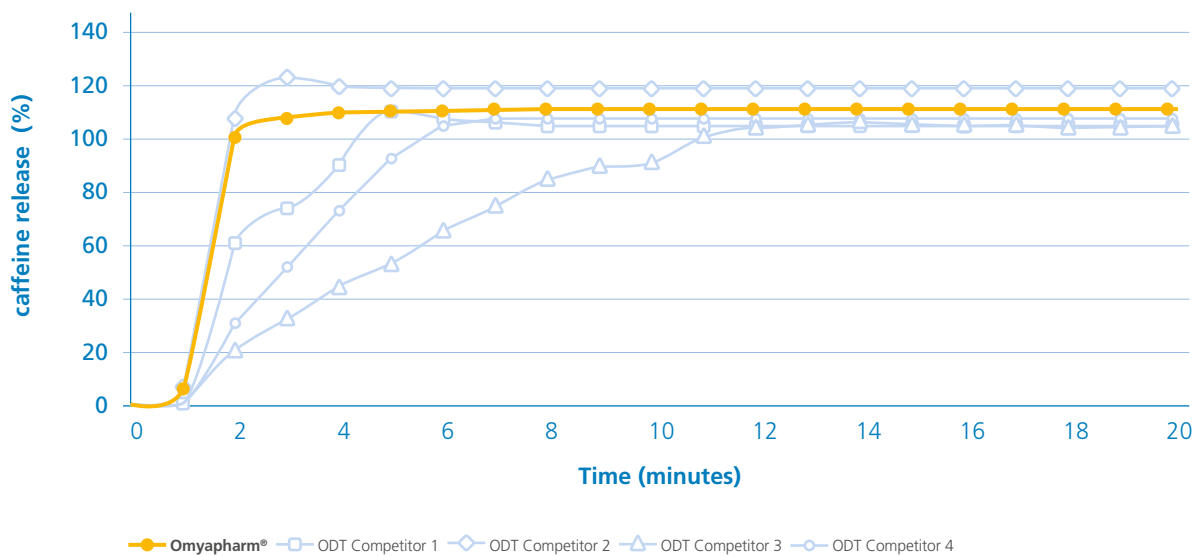


Figure 4. Caffeine release from ODTs

Technical facts*
Comparative studies performed at Omya
pharma application laboratory.
Current marketed ODT platforms were
compared to Omyapharm® ODT platform.



Omyapharm® 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

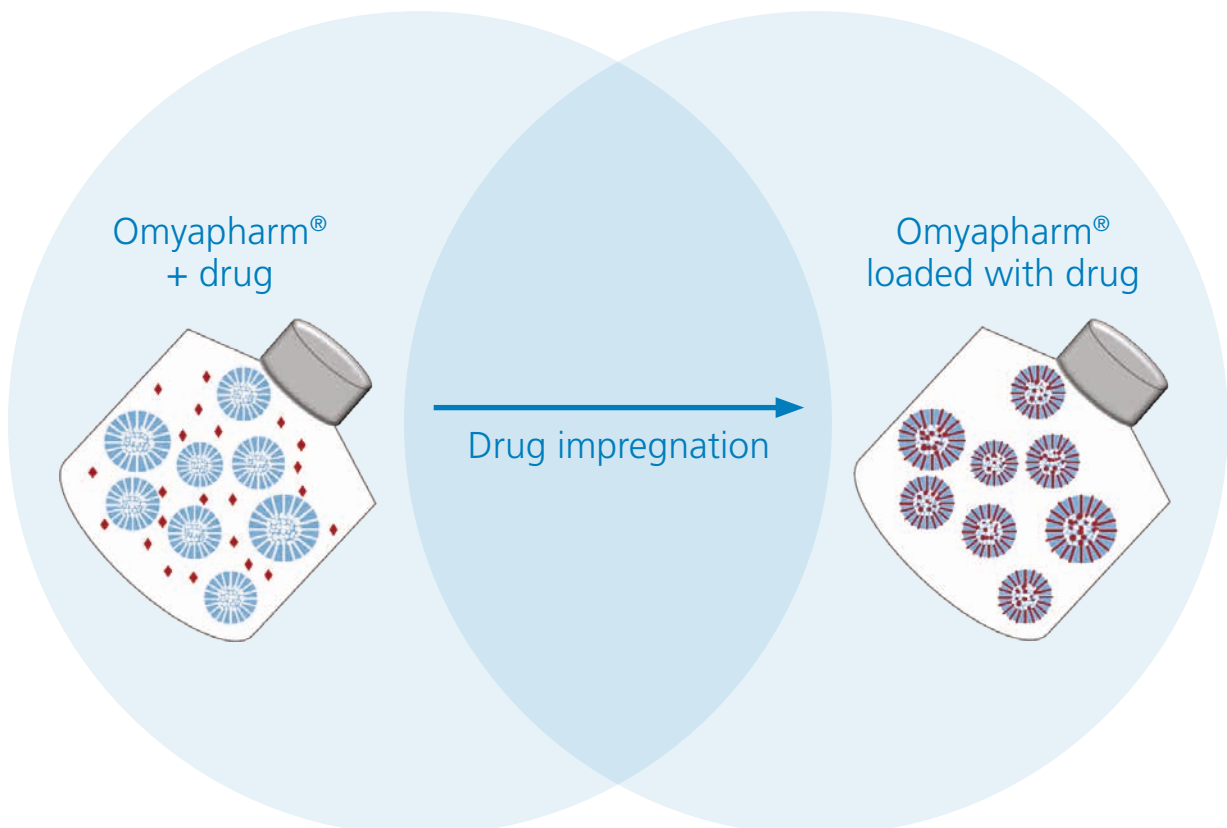
Solid dosage forms are the form of choice and preferred over liquid formulations due to ease of use, improved stability and robustness. Oil-based formulations are becoming increasingly important in pharma applications. For example, Lipid-based formulations have drawn considerable attention as a way to increase bioavailability of poorly soluble actives.

The Omyapharm® excipient range can be used to convert oils into compressible powders.

Omyapharm® can be used as an efficient carrier to convert liquids and oils into compressible powders. For instance, oily drugs or drugs dissolved in lipids in SEEDS (self-emulsifying drug delivery systems) and SMEEDS (self-microemulsifying drug delivery systems) formulations can be converted into compressible powders with Omyapharm®.

Benefits

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



Highly efficient & compactable carrier

Due to the high specific surface area and high internal porosity Omyapharm®, excipients 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 Omyapharm®

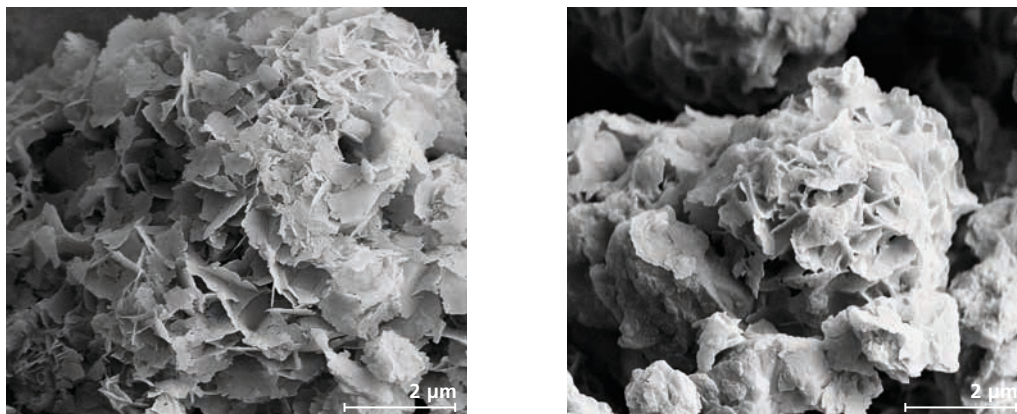


Figure 5. left: unloaded Omyapharm® carrier, right: loaded Omyapharm® carrier showing effective pore filling by the active

High oil absorption capacity

As it can be seen in figure 6, Omyapharm® shows a higher absorption capacity than other common ingredients, such as sugars, cellulose or other inorganic excipients.

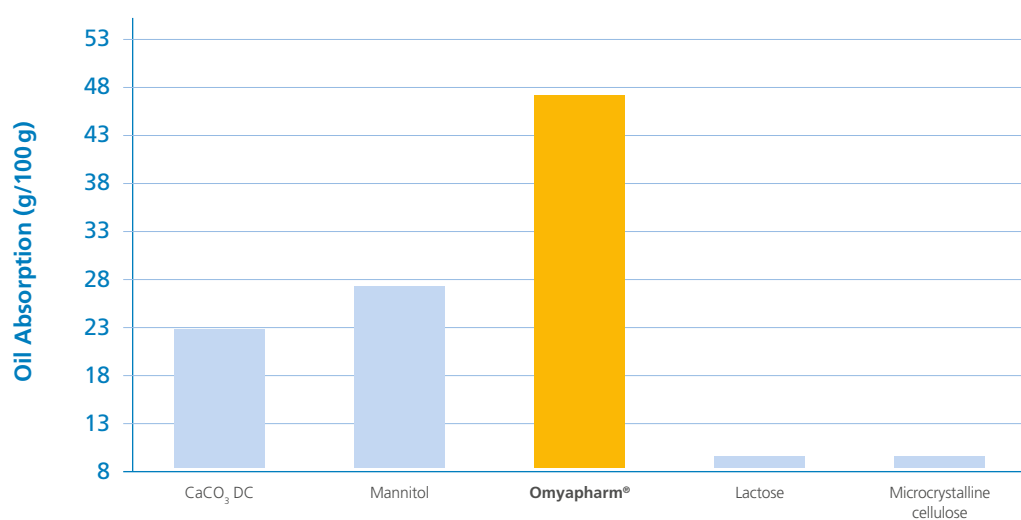


Figure 6. Oil absorption capacity of several excipients

High Compactability and Low Friability

Dextrose formulations containing 10 % of Omyapharm® 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

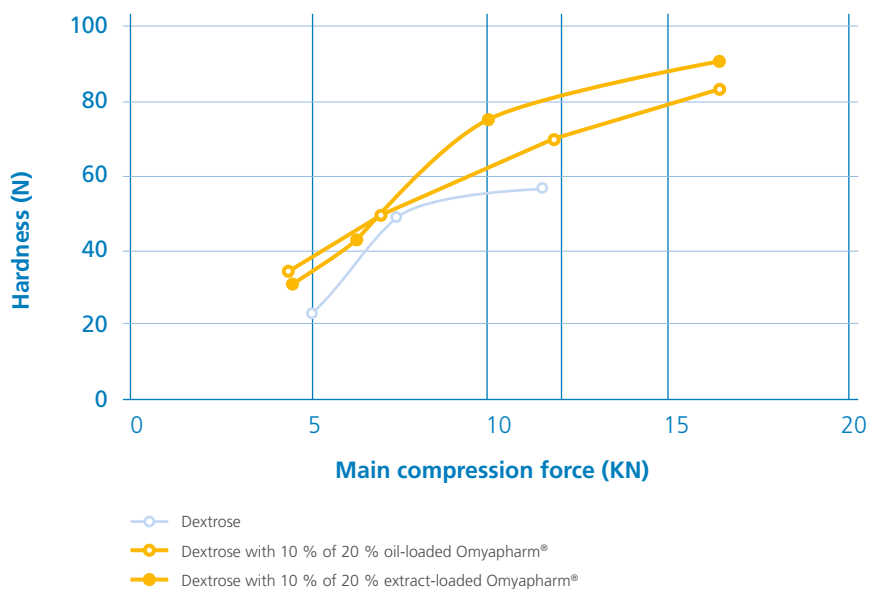


Figure 7. Compaction profile of oil-containing tablets

Friability

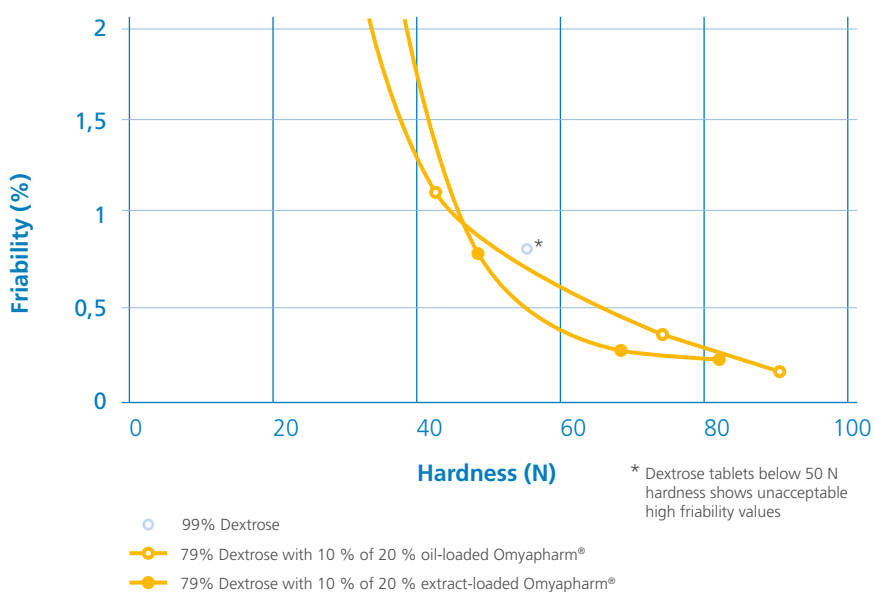


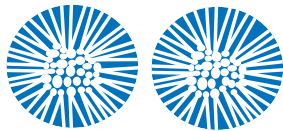
Figure 8. Friability of oil-containing tablets

Dry granulation

Dry granulation is the granulation method of choice for moisture or temperature sensitive APIs.

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.

Omyapharm® can be used as a highly efficient dry binder with excellent compaction properties.



Omyapharm® particles



Omyapharm® particles interlocking



Figure 9. Illustration of the compaction mechanism of Omyapharm® excipient

Highly efficient binder

Omyapharm® has a unique morphology and physical structure.

Its high external surface area provides many potential binding points for mechanical interlocking.

Under low compression forces, Omyapharm® can be compacted into stable granules with preserved internal porosity and high specific surface area.

Omyapharm® shows a plastic-brittle behaviour as in figure 9.

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 binder*
- *Excellent compactability properties*
- *Retained high porosity*



Excellent recompactability properties

Omyapharm® shows excellent re-compactability properties, much higher than microcrystalline cellulose (MCC). As in figure 10, placebo tablets manufactured by dry granulation of Omyapharm® show excellent mechanical properties, with increased hardness compared to those of MCC.

Re-Compactability

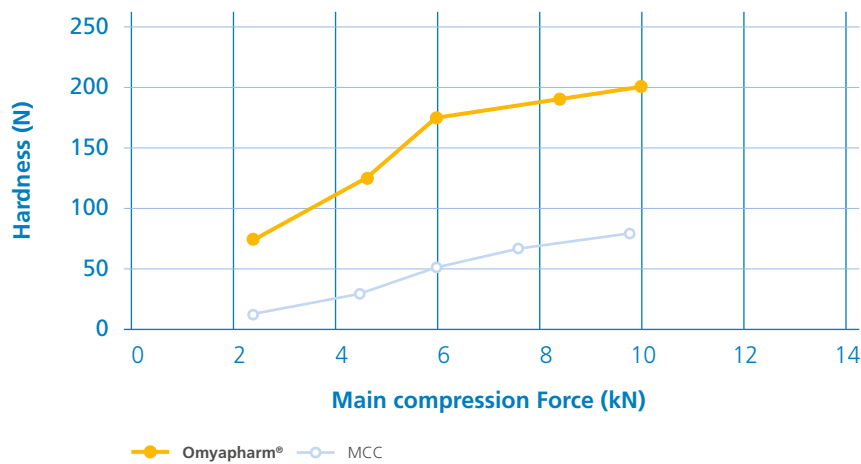


Figure 10. Recompactability (dry-granulation plus tableting) properties of Omyapharm® & microcrystalline cellulose excipient





Wet granulation

Wet granulation is been used extensively in tablet manufacturing. It is the preferred process in the following cases:

- High-dose drug formulations with actives exhibiting poor flow and compactability
- Very potent low-dose drug formulations

Natural Calcium Carbonate is an efficient functional filler in wet granulation processes. As shown in figure 11, CaCO_3 can be used in tablet formulations in combination with other excipients such as MCC.

Compactability

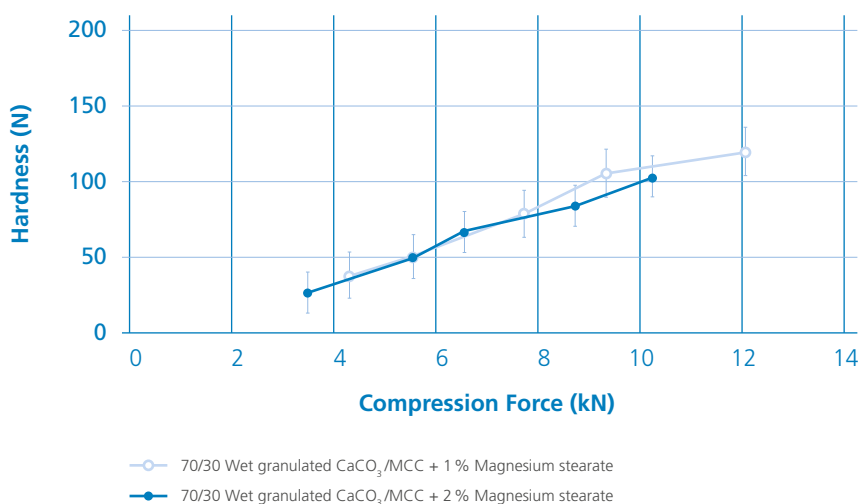


Figure 11. Compaction profile of wet-granulated calcium carbonate & microcrystalline cellulose tablets

Benefits

- Lactose-free
- Gluten-free
- Suitable for diabetics
- Low reactive impurities level
- Compatibility with a wide range of excipients and actives



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 applications.

In our state-of the-art pharma laboratory in Switzerland (Oftringen) we are ready to support you with your projects.

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*Developing pharma
innovative solutions
for our customers*

Product Recommendation

High-purity Natural Calcium Carbonate

	Omyapure® 35 - OG	Omya-Cal® USP-4 - AZ	Omya-Cal® USP-10 - AZ	Omya-Cal® USP/EP-15 - AZ
Applications				
Osteoporosis treatment	√	√	√	√
Antacid	√	√	√	√
Certifications				
Pharmacopeia	EP/USP/JP	USP	USP	EP/USP
GMP	ICH Q7A	√	√	√
Product Characteristics				
Purity	99.50%	>99%	>99%	>99%
Median particle size d(50)	3.0 µm	3.3 µm	12.0 µm	14.5 µm
Production site	Orgon (France)	Arizona (US)	Arizona (US)	Arizona (US)

Multifunctional Excipient Platform – Omyapharm®

	Omyapharm® 500-OG
Applications	
Wet granulation	√
Dry granulation	√
Hot-melt extrusion	√
Direct compression	
Carrier	√
Microencapsulation	√
Fast disintegration	
Product Characteristics	
Product	Powder
Compressibility	Compressible
Production site	Orgon (France)

Omya Consumer Goods

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OMYA PIGMENTS**