Fuji Chemical Industries

PHARMACEUTICAL TECHNICAL NEWSLETTER

ISSUE: 01

February 2022

THIS ISSUE OF FUJI'S NEWSLETTER HIGHLIGHTS THE PREPARATION OF ACETAMINOPHEN WITH FUJICALIN® AND A COMPARISON OF FUJICALIN® WITH OTHER COMMERCIALLY AVAILABLE DCPA'S.

NEWSLETTER HIGHLIGHT

Blending and Content Uniformity of Micronized Low-Density Acetaminophen

Comparison of Fujicalin® with Other DCPA's

Fujicalin® is an innovative Dibasic Calcium Phosphate Anhydrous (DCPA) that provides significantly improved compressibility and flowability when compared to other DCPA's.

The blending of micronized and low dose drugs can pose challenges due to problems related to **segregation, content uniformity and physical stability**. The micronized drug substances may exhibit increased cohesiveness and a tendency to segregate in the blend.

Choice of excipients with narrow particle size variation, appropriate bulk density, selection of suitable equipment, and technique are among the factors that contribute to an easy, stable blending of powders with different particle sizes.

Table 1. Comparison of powder properties- Fujicalin® with other DCPA's

	Acetaminophen	Fujicalin®	DCPA 1	DCPA 2	DCPA 3
Mean particle size (μm)	14	120	45	154	81
Bulk density (g/ml) loose	0.28	0.46	0.84	0.69	0.59
Bulk density (g/ml) Tapped	0.36	0.54	1.08	0.83	0.67
Oil adsorption capacity (ml/100g)	-	110	63	70	84
BETSSA (m^2/g)	-	36.9	0.74	16.2	19.6
Angle of respose (°)	-	29.5	39.6	38.2	30.5

Fujicalin® has distinct advantages with respect to the specific surface area, angle of repose, and oil adsorption capacity when compared to other DCPA's.

EXPERIMENTAL METHODS

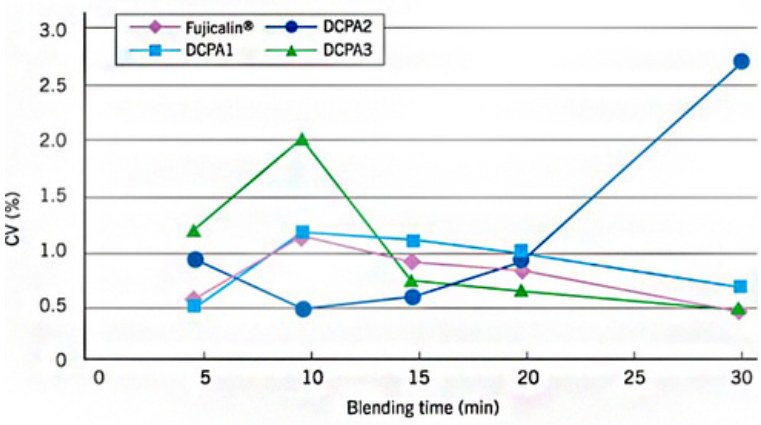
Acetaminophen tablets were prepared with the direct compression technique on Fujicalin® and three other DCPA's. Then micronized acetaminophen (14 µm) was blended with DCPA's and the resulting powder, as well as its tablet properties, were compared with Fujicalin®.

Table. 2 Formulation Summary

Formulation	i	ii
Micronized acetaminophen (14 µm)	10.0	10.0
Fujicalin®	84.0	-
DCPA's (1, 2 and 3)	-	84.0
Croscarmellose sodium	5	5
Mg-St	1	1

*Croscarmellose sodium was used as a disintegrant and Magnesium stearate (Mg-St) as lubricant.

RESULTS

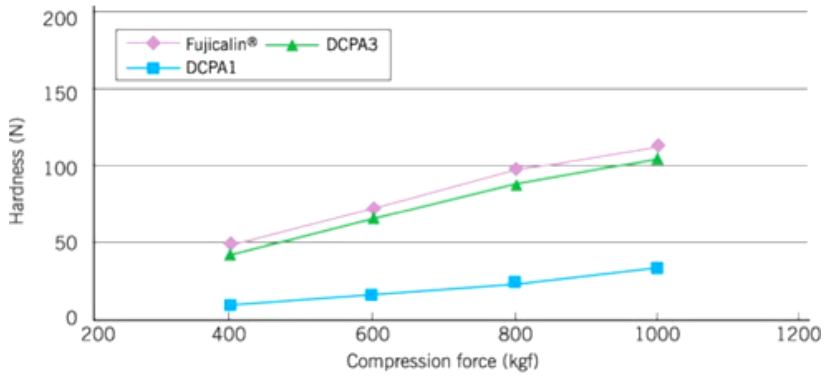


The blending of micronized acetaminophen powder and DCPA's were carried out for 30 minutes in a 2 Litre V-shaped low shear blender at 40 rpm. Samples were then chosen from three predefined locations in the blender at 5-minute intervals, then checked for content uniformity using spectroscopic assay.

Fig. 1. Content uniformity of powder blend of micronized acetaminophen with Fujicalin® and other DCPA's

Fujicalin® exhibited an easy blending character compared to other DCPA's. DCPA 2 tended to segregate only after 20 minutes of blending. The blending process was extended to further investigate the stability of tabletting operations, such as the transfer to hopper prior to tabletting.

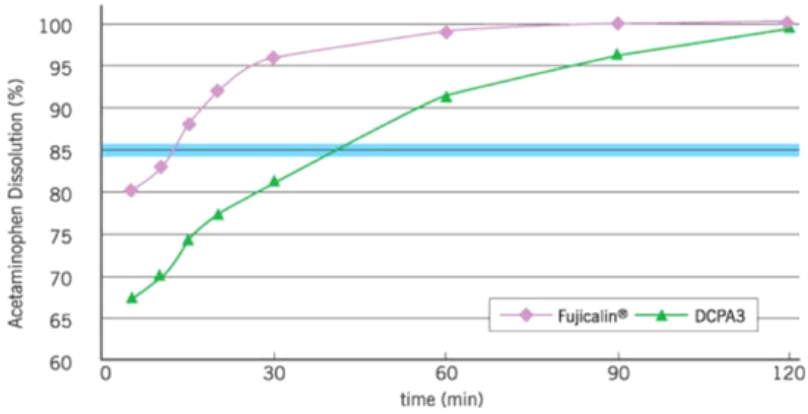
RESULTS



Tabletting was carried out in a rotary tabletting machine (2 HT AP18SS) manufactured by Hata Iron Works, at 400 to 1000 Kgf. Tablet dimensions (Ø8mm x 9mmR); Tablet weight (275 mg)

Fig 2. Tablet hardness of acetaminophen tablets directly compressed with Fujicalin® and other DCPA's

Fujicalin® and DCPA3 showed similar tabletting properties with respect to hardness. DCPA1 exhibited poor moldability and DCPA2 was not considered for tabletting due to segregation of blends.



Dissolution was carried out as per JPC in purified water at 37°C at a paddle speed of 50 rpm. The acetaminophen content was determined spectrophotometrically. **More than 85% of the drug was released within 15 minutes of dissolution.** DCPA 1 was not tested due to poor hardness of tablets.

Fig 3. Dissolution profile of directly compressed acetaminophen tablets and DCPA 3

SUMMARY

Among the DCPA's tested, Fujicalin® has shown superior powder and tabletting properties after blending with low density micronized acetaminophen.

Tablet Characteristics	Fujicalin®	DCPA 1	DCPA 2	DCPA 3	Quality parameters
Content uniformity	Good	Good	Poor	Good	Uniform Blend
Hardness	Good	Poor	Below spec	Good	High Quality
Drug Release in 15 min	>85%	Below spec	-	>75%	Release

Fujicalin® is spherically granulated, and has high specific surface area compared to other available DCPA's.

Fujicalin® was shown to be the best performer, rendering higher tablet hardness at low compression forces with an improved dissolution profile compared to other DCPA's.

DOSAGE AND SAFETY

Fujicalin® is manufactured under strict quality control at our FDA-GMP certified facilities. Dibasic calcium phosphate anhydrous is widely used in oral pharmaceutical products and food products. It is generally regarded as relatively nontoxic and nonirritant material.

Fujicalin®

Chemical formula : CaHPO4
Chemical Abstract Service (CAS) Number: 7757-93-9
U.S. Patent No. 5,486,365, Jan 1996
U.S. Drug Master File (DMF) filed, Conforms to USP/NF, EP and JP; and listed as GRAS

Fuji Chemical Industries

CONTACT US:

Japan

Fuji Chemical Industries Co., Ltd.
Shibakoen Ridge Building 2nd Floor,
1-8-21 Shiba Koen, Minato-ku,
Tokyo 105-0011 JAPAN
Tel. +81-3-3437-2350 | Fax: +81-3-3437-2347
Email: **pharma@fujichemical.co.jp**
www.fujichemical.co.jp/english

Europe

AstaReal AB
(A Fuji Chemical Group Company)
Forumvägen 14, Level 16,
131 53, Nacka, SWEDEN
Tel. +46-8-570-139-50
Email: **pharma@fujichemical.co.jp**

India

AstaReal (India) Private Limited
(A Fuji Chemical Group Company)
120, Ackruti Star, Central Road,
Opp. Ackruti Centre Point, MIDC, Andheri (E),
Mumbai 400093, INDIA
Tel. +91-22-62369998
Email: **pharma@fujichemical.co.jp**

USA

Fuji Chemical Industries USA, Inc.
3 Terri Lane, Unit 12
Burlington, NJ 08016 USA
Tel. +1-609-386-3030 | Fax: +1-609-386-3033
Email: **contact@fujichemicalusa.com**
www.fujichemicalusa.com