

Improve Content Uniformity of Low Dose Drug Formulations

Formulation Simplification

Use of StarTab[®], Directly Compressible Starch enables simpler manufacturing, limiting process steps to reduce manufacturing time and overall cost.

Wet Granulation



Dry Granulation



Direct Compression with StarTab



Film Coating

The Challenge

Low dose drugs bring formulation challenges for good content uniformity when using a direct compression process. Poorly water soluble drugs also have smaller particle size to improve solubility; creating an additional hurdle for direct compression due to poor powder flow and compressibility. This study demonstrates the use of StarTab to simplify formulation and processing, thereby improving content uniformity for a low dose, water insoluble drug, naproxen.

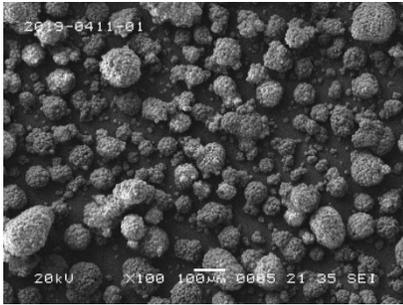
Materials and Methods

As a low dose model drug, water insoluble naproxen was included at 1% w/w dose level in tablets produced using direct compression (Table 1).

Table 1: Immediate Release Tablets of Naproxen

Core Formulation Ingredients	% w/w	mg / tablet
Naproxen	1.0	4.0
StarTab	98.5	394.0
Magnesium stearate	0.5	2.0
<i>Tablet Weight</i>	100.0	400.0

Particle Structure for Enhanced Flow



StarTab is designed for direct compression, with particles having a spherical structure and high surface area; this provides enhanced flow and blend uniformity for low dose micronized drugs.

Results

Good Powder Flow and Blend Uniformity

The resulting low dose naproxen/StarTab formulation showed good powder flow and consistent blend uniformity (Table 2).

Table 2: Comparative Powder Properties

Property	Naproxen	StarTab	Formulation Blend
Bulk density (g/mL)	0.37	0.56	0.54
Compressibility index (%)	33.9	20.0	19.8
Hausner ratio	1.51	1.25	1.25
Particle size d (0,5)	7.6	85.7	87.8
Flow rate (g/min)	No flow	36.0	31.7
Overall powder flow	Very poor	Good	Good

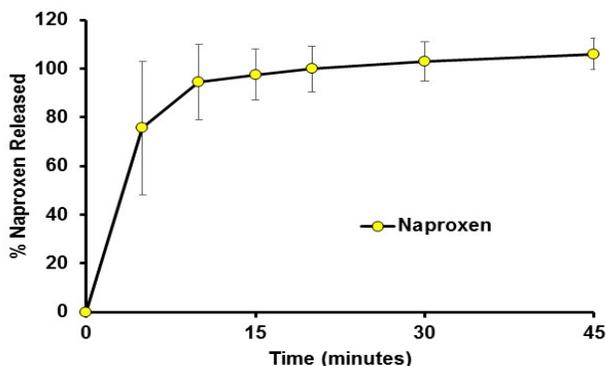
Table 3: Properties of Low Dose Naproxen Tablets

Property	Naproxen Tablets
Weight (mg)	408.0 ± 1.4
Content uniformity (%)	97.2 ± 0.3
Thickness (mm)	5.5 ± 0.0
Hardness (kP)	11.2 ± 0.59
Ejection force (N)	152.0 ± 9.0
Friability, %	<0.01
Disintegration time (sec)	102.0 ± 8.0

The StarTab/naproxen formulation blend was easily compressed on a rotary tablet press and yielded defect free tablets with good physical properties, suitable for film coating (Table 3).

Drug Release

Low Dose Naproxen Tablets Provided Immediate Release > 80% in 15 min.



StarTab Provides Content Uniformity for Low Dose Drug Applications

StarTab supports the development of robust directly compressible tablets of moisture sensitive, high dose and poorly compressible drug:

Think Direct Compression, Think StarTab

- Elimination of glidant and superdisintegrant in tablet formulation
- Excellent powder flow and blend uniformity
- Superior compressibility with rapid disintegration
- Simplified formulation and process

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