Fuji Chemical Industries

PHARMACEUTICAL TECHNICAL NEWSLETTER

ISSUE: 03

NEUSILIN® THE EXTRAORDINARY EXCIPIENT FOR SOLID DOSAGE FORMS

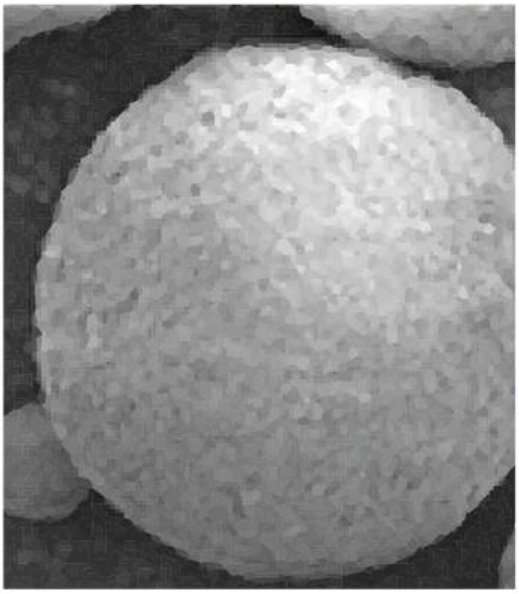
Neusilin®| The Extraordinary Excipient for Solid Dosage Forms

Fuji Chemical Industries

What is Neusilin® US2?

Neusilin® US2 is a fine ultra-light granule of magnesium aluminometasilicate, widely accepted as a multi-functional excipient that improves the quality of pharmaceuticals. Due to its large surface area and porous nature, US2 adsorbs high loads of oils or water, and can be mechanically compacted into high quality tablets.

Furthermore, Fuji's unique manufacturing expertise makes US2 neutral unlike traditional Magnesium aluminum silicates whose pH is alkaline. In this newsletter we introduce you to the best disintegrant combination with Neusilin® US2 for tabletting.



Typical Properties	Grade US2 (Granule)
Loss on Drying (%)	1.4
Bulk Density – Loose (g/ml)	0.15
Bulk Density – Tapped (g/ml)	0.19
True Specific Gravity (g/ml)	2.2
BET Specific Surface Area (m2/g)	300
Mean Particle Size (μm) (Agglomerate)	60 - 120
Angle of Repose (Degrees)	30
Oil Adsorbing Capacity (ml/g)	3.2
pH of 5% Slurry	7.4
Packaging (Kg)	10

Neusilin® US2 (X700)

Chemical Formula: $Al_2O_3 \cdot MgO \cdot 1.7SiO_2 \cdot xH_2O$
Chemical Abstract Service (CAS) Number: 12511-31-8
U.S. Drug Master File (DMF) filed.

Disintegrants & Tabletting

Among excipients, disintegrants play an important role in disintegration and dissolution of tablets. This factor is critical for drug absorption in vivo. In order to give formulators the best choice of disintegrating agent in combination with Neusilin® US2, eight of the most common disntegrants were selected and their ability to quickly disintegrate compressed tablets was evaluated.

Disintegrants Used in Tabletting

Sodium Starch Glycolate (Explotab)	Croscarmellose sodium (Ac-Di-Sol)
Corn starch	Cross-link polyvinylpyrrolidone (Kollidon-CL)
Carmellose calcium (ECG-505)	Rice starch (Microperl)
Hydroxypropylcellulose (LH-21)	Carboxymethyl cellulose (NS-300)

Formulation & Testing Methods

Neusilin® US2 was compounded with 5% disintegrant and 1% magnesium stearate.

- The mixture was then compressed into tablets of 11 mm. dia and 200 mg. weight in a rotary tableting machine.
- Disintegration test was carried out as per JP. To measure the disintegration time, one tablet is placed in each tube in a basket rack assembly containing a total of six glass tubes.
- Each tube was 7.75 cm. long, open at the top with a 1.8-2.2 mm. mesh attached at the bottom.
- The assembly was positioned in a 1-liter beaker of water maintained at 37 C.
- The basket rack was then moved up and down at a constant speed.

Distintegration times were calculated from the time taken for tablets to distintegrate to the point where all particles had passed through the mesh screen. The results are summarized in the below table.

The Results

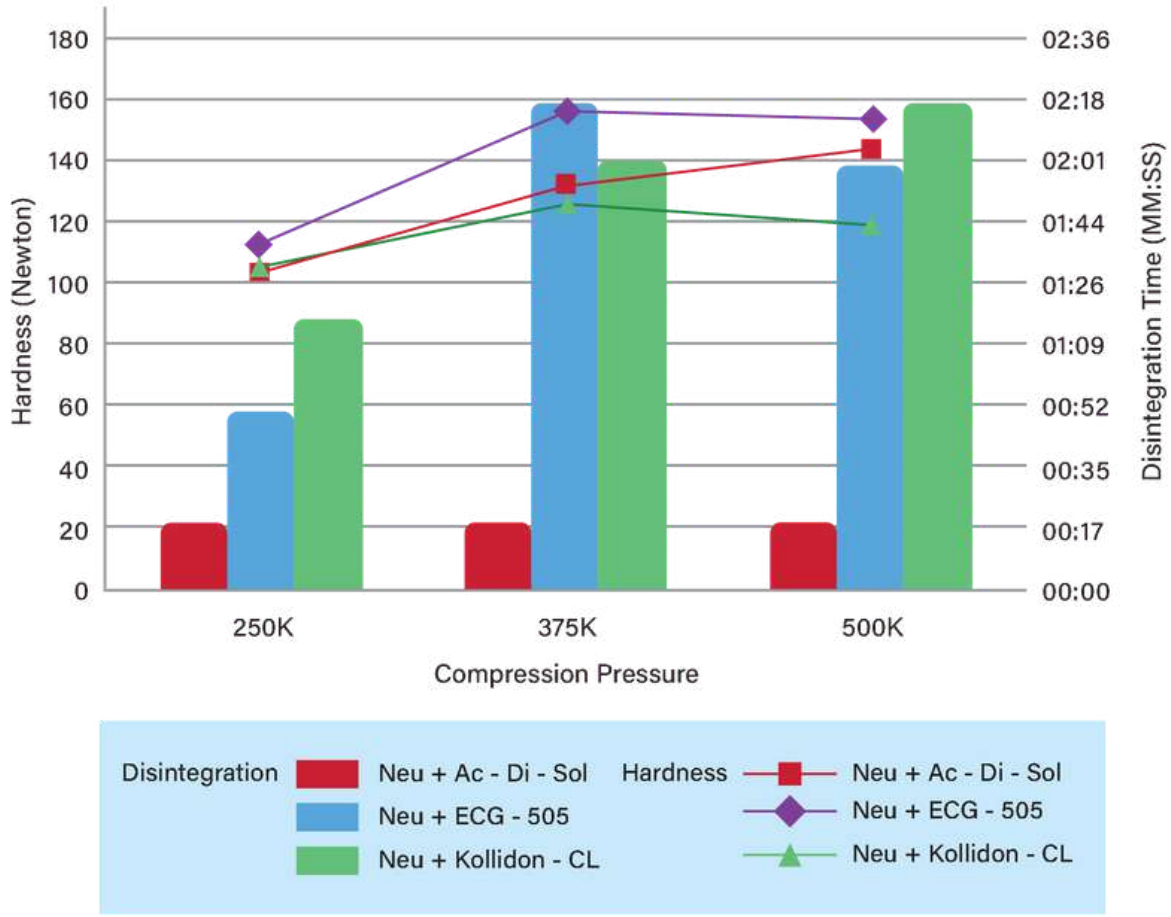
Compression pressure	Hardness (Newton) at			Tablet thickness (mm) at			Disintegration Time (min:sec)		
	250K	375K	500K	250K	375K	500K	250K	375K	500K
Neusilin alone	108.7	142.1	161.3	5.191	4.559	4.187	> 30:00	> 30:00	> 30:00
Neu* + Explotab	95.9	130.1	144.8	5.064	4.478	4.12	> 30:00	> 30:00	> 30:00
Neu + Corn Starch	107.5	105.8	94.7	5.033	4.483	4.126	> 30:00	> 30:00	> 30:00
Neu + ECG-505	111.4	156.9	154	5.022	4.493	4.124	00:50	02:17	02:00
Neu + LH-21	105.8	119.1	135.5	5.027	4.47	4.108	15:47	25:11	19:47
Neu + Ac-Di-Sol	102.7	131.4	143.2	5.022	4.478	4.105	00:18	00:18	00:18
Neu + Kollidon-CL	105.1	125.3	118.7	5.078	4.514	4.151	01:16	02:01	02:17
Neu + Microperl	94.8	115.4	134.3	5.084	4.501	4.131	30:00	> 30:00	> 30:00
Neu + CMC	97.8	128.9	144	5.103	4.496	4.133	26:52	18:30	18:45

*Neu=Neusilin

Using the Right Disintegrant with US2

Among the common disintegrants used, the most compatibile disintegrant with Neusilin® US2 was found to be Croscarmellose sodium (Ac-Di-Sol) followed by Cross-link polyvinylpyrrolidone (Kollidon-CL) and Carmellose calcium (ECG-505).

Fig. 1. Disintegration Time & Hardness of Three Best Combinations of Disintegrants with Neusilin® US 2.



- The characteristics (large surface area and porous nature) of US2 and the cross-linking of Croscarmellose sodium act synergistically allowing the tablet to swell and absorb many times its weight in water leading to quick disintegration.
- **Neusilin® US2** improves flowability and makes sufficiently hard tablets at low compression forces. Increases in hardness and compression pressure did not affect disintegration time or tablet conformity when Croscarmellose sodium was used as a disintegrant.
- As most starch type disintegrants do not go well with **Neusilin® US2**, Croscarmellose sodium is the best choice when choosing **Neusilin® US2** for your formulations.

Neusilin® US2 is extremely safe with no reports of adverse reactions, and is listed in the US Pharmacopeia / National Formulary and Japanese Pharmaceutical Codex. Please consult Fuji technical sales teams to inquire about your specific requirements.

Neusilin® is available in various grades to meet the diverse requirements of complex actives that can be converted to oral solid-dosage forms.

To obtain a sample or to find your local distributor, please contact us at pharma@fujichemical.co.jp. For more technical information, please visit

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