Encapsulating low viscosity products using liquid filling and banding technology

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PURPOSE

Conisnap® capsule shells have been used routinely for banding liquid filled capsules. Due to the venting system, very low viscosity materials (eg Miglyol 812N, Crodamol etc) are likely to leak from the capsules following filling and preceding banding. This can cause poor band adherence and affect processing time and product yield. In order to overcome this, thixotropic agents are added to formulations to reduce leaking, which may lead to dissolution and potential bioavailability changes. Licaps® capsule shells have been designed for liquid encapsulation micro spray sealing (LEMS) sealing applications. The new design Licaps capsules dual ring system is designed to provide a double barrier between the capsule contents and seal zone. Based on the locking ring system, it was therefore anticipated that the new design capsule may also be beneficial in capsule banding.

OBJECTIVE(S)

The objective of this study was to assess the ability to fill and band low viscosity products into liquid filled hard capsules, without the need for viscosity modification.

METHOD(S)

Miglyol 812N was selected as a low viscosity excipient, to represent liquid fill formulations with a viscosity less than 100 cP.

Gelucire 48/16 was selected to represent a thermosoftening excipient, demonstrating low viscosity during filling at elevated temperature and a semi-solid nature at room temperature.

Size 1 Conisnap® and Licaps® new design HPMC and size 0 Licap new design gelatin capsules were filled with each excipient, using a commercial scale Bosch 1500 capsule filling machine and banded using a commercial Qualiseal S100 capsule bander, at a target batch size of 10000.

Following band drying and curing, capsule band integrity was assessed by applying a vacuum challenge of <-20 inHg for 20 minutes. The extent of capsule leaking was determined and appearance of the band recorded.

RESULT(S)

Two capsule types were investigated Conisnap® and Licaps® capsules (Figure 1 and Figure 2).

Filling and banding of Miglyol 812N with Conisnap® capsules was not possible at commercial scale, due to the extent of leaking between filling and banding (Figure 3 details the extent of capsule content leaking onto witness paper).

Filling and banding of Miglyol 812N with Licaps® capsules was performed effectively at commercial scale for both HPMC and gelatin capsules (Figure 4). For HPMC capsule shells, a batch of 11520 capsules was prepared and following vacuum assessment, a very low leak rate of 0.09%.

For gelatin capsule shells (25% gelatin solution), 11394 capsules was prepared and following vacuum assessment, a very low leak rate of 0.04%. Higher rates of rejected capsules were seen when the gelatin concentration was reduced to 23% and 21%, with reject rates of 3.58% and 5.58%) due to capsule deformation (Figure 5).

Filling and banding of Gelucire 48/16 with Licaps® capsules was performed effectively at commercial scale for both HPMC and gelatin capsules. Again low reject rates were shown for both gelatin (0.33%) and HPMC (0%).

Figure 1 Conisnap® capsule schematic

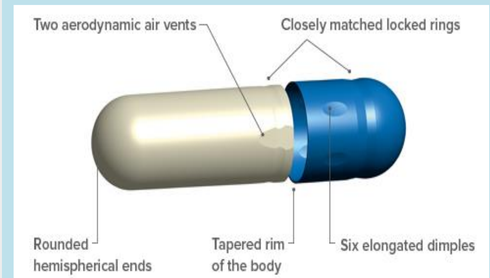


Figure 1 Licaps® capsule schematic

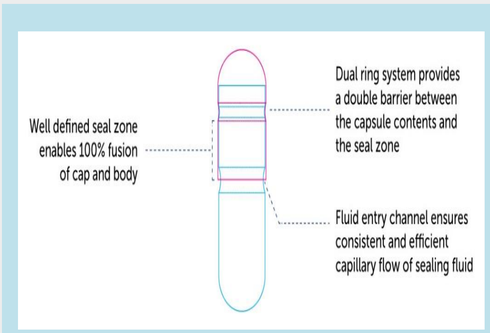


Figure 3 Extensive leaking for low viscosity product with a Conisnap® capsule

Figure 4 Licaps® capsule filled and banded effectively containing a low viscosity fill

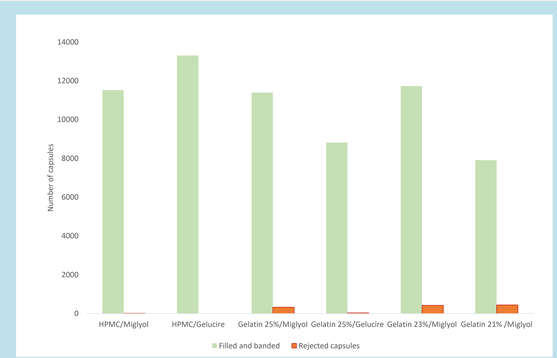
CONCLUSION(S)

The use of Licap® shells has the potential to significantly reduce the instance of leaking capsules

This has the potential to improve the efficiency of manufacturing and remove requirement for additional thixotropic agents in formulations and the need for vacuum sorting low viscosity products.

Licap® capsule shells may be used for banding capsules filled with room temperature liquids, liquids filled at elevated temperatures and thermo-softening materials.

Figure 5 Capsule batches [re[ared using commercial scale filling and banding equipment and incidence of capsule rejection per batch



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