

Taste-masking of crystals by coating with the innovative methacrylate copolymer Kollicoat® Smartseal 30D

S. Kupferschmied, F. Guth, K. Kolter

¹ BASF SE, R&D Pharma Ingredients, 67056 Ludwigshafen, Germany

BASF
The Chemical Company

Purpose

The protection from unpleasant tastes has gained importance with the increasing popularity of orally dispersible tablets. Taste masking of granules or smaller particles is particularly important and challenging in the development of such dosage forms.

Kollicoat® Smartseal 30 D (methyl methacrylate – diethylaminoethyl methacrylate) is an aqueous dispersion of a new copolymer designed for taste masking and moisture barrier applications. To date literature reveals only coated pellets and granules [1, 2].

Crystals usually have sharp edges and are difficult to coat. The performance of the aqueous polymer dispersion in the taste masking of particles was investigated and suitable settings of the coating process were defined.

Materials

Acetaminophen crystals, (Fagron, particle size 300 µm), Kollicoat® Smartseal 30 D (BASF SE), triethyl citrate (Jungbunzlauer) and talc (Sigma Aldrich) were used as received.

Dissolution tests were conducted with an USP apparatus 2 (paddle) operating at 50 rpm and using 900 mL dissolution medium, hydrochloric acid (0.08 molar); pH 1.1 (gastric fluid); phosphate buffer; pH 6.8 (saliva) and acetate buffer (pH 4.5) respectively.

Samples were taken automatically through a 45 µm filter and the amount of dissolved drug was immediately measured by UV spectroscopy.

Table 1: Spraying suspension

Ingredient	Content [%]
Kollicoat® Smartseal 30 D	33.33
Triethyl citrate	1.51 (15 % rel. to polymer)
Talc	8.00
Colorant	0.40
Water	56.67
Total	100.00
Solids content of the spray suspension	20.0 %
Polymer content of the dried film	50.4 %

Table 2: Process parameters

Machine	Aeromatic Strea 1, top spray
Inlet air temperature	55°C
Batch size	0.5 kg
Product temperature	25 – 30°C
Spraying rate	6 g/min
Nozzle diameter	0.8 mm
Spray pressure	1.5 bar
Blending	0.2% colloidal silica for 10 min in a Turbula blender (prevents any stickiness of crystals)

Results

The coating formulation could be applied onto crystals without significant sticking and agglomeration. Microscopic pictures demonstrate

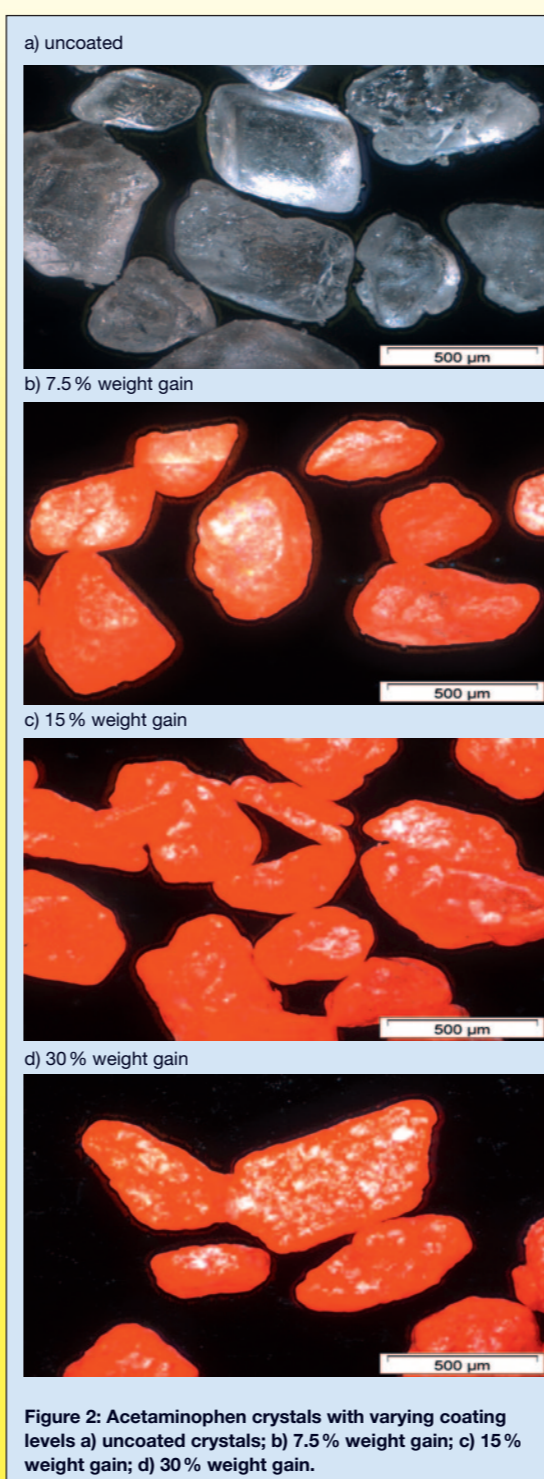


Figure 2: Acetaminophen crystals with varying coating levels a) uncoated crystals; b) 7.5% weight gain; c) 15% weight gain; d) 30% weight gain.

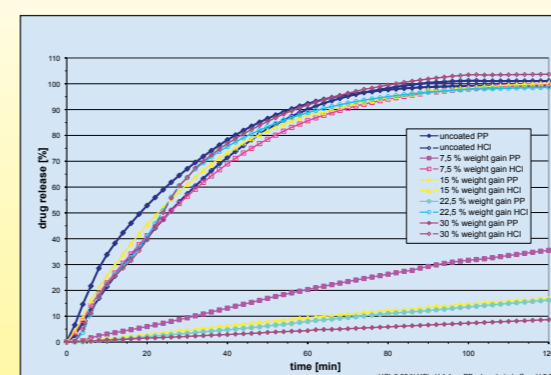


Figure 3: Dissolution of uncoated and coated acetaminophen crystals in acidic and neutral medium

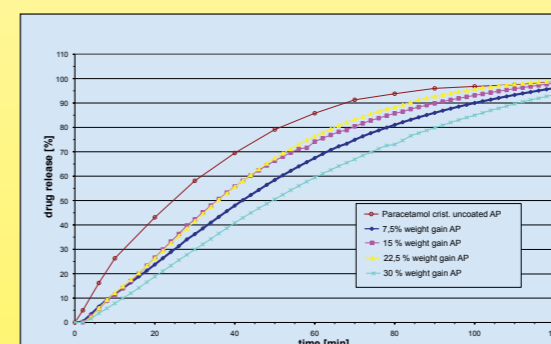


Figure 4: Dissolution coated acetaminophen crystals in acetate buffer at pH 4.5

indicates a strong taste masking effect. Dissolution at pH 1.2 (gastric fluid of coated and uncoated particles remains unchanged even at higher coating levels (Figure 3).

Dissolution of coated crystals at an intermediate pH value of 4.5 was quick and for all coating levels only slightly reduced compared to the release rates in the acidic medium (Figure 4).

Conclusion

- Drug crystals with a mean particle size of approximately 300 µm could easily be coated in a fluid bed coater.
- Drug dissolution at pH 6.8 (saliva) was reduced as a function of coating level, whereas the coating level had no significant impact on the release at pH 1.1 (gastric fluid) and pH 4.5 (intermediate pH).
- The new polymer can serve as an effective taste masking agent probably without affecting the dissolution and absorption from the formulation in humans.

References

- [1] Kolter, K. et al.: Physicochemical Characteristics of a New Aqueous Polymer Designed for Taste Masking & Moisture Protection. AAPS Annual Meeting and Exposition, November 2010, New Orleans, USA
- [2] Kolter, K. et al., CRS 2011 38th Annual Meeting & Exposition of the Controlled Release Society, August, 2011, National Harbor, Maryland, U.S.A.

2011 AAPS Annual Meeting & Exposition, October 23–27, 2011, Walter E. Washington Convention Center, Washington, DC, U.S.A.

Methods

The composition of the coating formulation and process parameters are provided in tables 1 and 2.

that at a coating level of 7.5% weight gain, some defects still occur, but the homogeneity of the coating improves at higher coating thicknesses (Figure 2).

Results from dissolution tests in phosphate buffer at pH 6.8 can be correlated with the taste masking efficiency of the coating formulation. A coating level of 7.5% resulted already in a significant decrease of the dissolution from 92.3% after 60 min from the uncoated crystals to 20.3% after 60 min.

Dissolution was further reduced at higher coating levels. At a coating level of 30% only 2.3% acetaminophen are released after 60 min which