

AVOIDING KETOPROFEN PLASTICIZATION DURING MICROPARTICLE MANUFACTURING: THE CASE OF HYDROTALCITE

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Purpose

Anti-inflammatory drugs with aryl-propionic structure showed plasticizing effect on different polymers, causing problems during manufacturing of polymeric devices. For example, during the preparation of polymer microparticles, the presence of a plasticizing drug can hinder the recovery of microparticles, especially when polymers with low molecular weight are employed. To reduce plasticization of polyesters, the anti-inflammatory drug ketoprofen (K) was included in hydrotalcite (HTlc) and encapsulated in polylactide (PLA) and poly(lactide-co-glycolide) (PLGA), obtaining composite microparticles.

Methods

K-HTlc intercalation was performed by simple ion exchange at room temperature under stirring. Inclusion compound was characterized by X-ray powder diffraction and scanning electron microscopy (SEM). PLA, PLGA Resomer® RG 504H, RG 504, RG 502H and RG 502 were used to produce composite microparticles by solvent diffusion-evaporation technique. Microparticle morphology was determined by SEM and thermal behavior was characterized by differential scanning calorimetry (DSC).

Result

K inclusion in HTlc was confirmed by the X-ray diffraction pattern, which showed a widening of the interlamellar spaces compatible with the presence of K. K intercalation yield was ~40%. SEM images showed that K inclusion did not lead to substantial changes of HTlc morphology. K loaded microparticles showed a glass transition temperature (T_g) of ~15°C lower than that of the raw polymer and blank microparticles. K-HTlc was successfully encapsulated in PLA and PLGA microparticles and DSC data showed the absence of plasticization. Composite microparticles had different morphology depending on the polymer used.

Conclusion

It was possible to intercalate K in a lamellar solid and the intercalation product was used to prepare composite polymeric microparticles. This strategy, which implies a physical segregation of K, was successfully used to hinder the plasticizing effect of K avoiding manufacturing problems.