

ABSTRACT

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Title of Thesis: Spray drying of a drug suspension in lactose solution

Spray drying can be used to increase the solubility and thus bioavailability of drugs that are poorly soluble in water. In the present work, particles from a suspension of meloxicam in lactose solution were prepared by spray drying. The effect of the nozzle size of 0.7 mm and 1.4 mm, the effect of drug concentration of 0.5 g/100 ml and 1 g/100 ml, and the effect of lactose concentration on the properties of the resulting particles were investigated. The lactose solutions used had concentrations of 15, 20 and 25 %.

The appearance and size of the formed particles were evaluated using optical and scanning electron microscopy (SEM). The amount of drug released was investigated using dissolution and the thermal characteristics of the particles were evaluated using differential scanning calorimetry (DSC). The evaluation by SEM and DSC was then performed again 6 months after the first measurement.

The resulting particles were spherical in shape with no surface irregularities. Some of them contained clusters of meloxicam particles. At the second observation after 6 months, crystallization of spherical amorphous lactose particles was evident. The size range of most particles was between 7.5–15 μm , with samples dried using the larger 1.4 mm nozzle containing larger resulting particles.

The dissolution profile showed better drug release from the dried powders, but also from the physical mixtures of meloxicam and lactose compared to meloxicam alone. Higher concentration of meloxicam 1 g/100 ml and also smaller nozzle of 0.7 mm showed smoother dissolution process.

Peaks of dehydration, melting and crystallization temperatures as well as glass transition temperatures are visible in the DSC thermograms. However, the glass transition temperature in some samples was obscured by the dehydration peak and its presence, and therefore the presence of the amorphous form, can only be assumed. In the thermograms of some samples, especially those dried with the 0.7 mm nozzle, the glass transition temperature was also recorded when measured after 6 months, which may indicate a greater stability of these particles.