VYSOKÁ ŠKOLA
CHEMICKO-TECHNOLOGICKÁ
V PRAZE

Fakulta chemicko-inženýrská

Ústav chemického inženýrství

Studium mechanismů rozpouštění a kinetiky uvolňování obtížně rozpustných účinných látek z amorfních tuhých disperzí

DISERTAČNÍ PRÁCE - ABSTRAKT ANGLICKY

AUTOR/KA	**Ing. Kateřina Punčochová**
ŠKOLITEL/KA	**prof. Ing. František Štěpánek, Ph.D.**
ŠKOLITEL/KA SPECIALISTA	**Ing. Josef Beránek, Ph.D.**
STUDIJNÍ OBOR	**Léčiva a biomateriály**
ROK	**2016**

The present dissertation thesis deals with studying the dissolution mechanisms of poorly soluble drug from amorphous solid dispersions. Due to the specific formulation, where the drug is molecularly dispersed in polymer carrier, the amorphous solid dispersion is a suitable approach to enhance the dissolution rate of drug as well as the bioavailability. The mechanisms of drug release from the polymer matrix and the inhibition of precipitation was studied using imaging techniques.

Amorphous solid dispersions were prepared by spray drying. The single matrices were used in the first part of research to identify the crucial properties of two different types of polymers and their effect on drug release. Polyvinylpyrrolidone (PVP) showed the improvement of dissolution rate of aprepitant. However, the drug recrystallized from the supersaturation concentration. On the other hand, Soluplus formed the gel layer around the tablets and aprepitant gradually diffused to the dissolution medium. Soluplus in matrix helped to keep aprepitant in amorphous form and inhibited the precipitation.

The multicomponent matrices with different ratio of polymers were prepared with the aim to combine the favourable characteristics from each of the components in the final formulation. The Soluplus:PVP ratio 1:1 in the amorphous solid dispersion was identified as the best matrix, where the drug dissolution rate was significantly enhanced, and at the same time the drug has not precipitated during dissolution.

This thesis highlighted the benefits of combining imaging methods in order to understand the release process. Recrystallization was succesfully detected using the spectroscopic imaging techniques, which significantly identified the recrystallization of drug during dissolution. MRI determined different water penetration rate into the tablets. The combination of imaging techniques were successfully employed to understand the mechanism of drug release from amorphous solid dispersions.