

# **Effects of the Extrusion Process Parameters on the Dissolution Behavior of Indomethacin in Eudragit<sup>®</sup> E PO Solid Dispersions**

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There is a strong interest from both academia and the pharmaceutical industry to utilize hot melt extrusion (HME) to prepare drug-polymer solid dispersions or solid solutions, which have the potential to dramatically increase the dissolution rate and the bioavailability of the drugs. However, many active pharmaceutical ingredients are heat sensitive. A strategy to circumvent the thermal degradation issue is to decrease the processing set temperature. More research is needed to understand the underlying dissolution mechanism.

This work studied the dissolution of indomethacin (INM) into polymer excipient Eudragit<sup>®</sup> E PO (E PO) melt at temperatures lower than the melting point of INM using a laboratory-size, twin screw counter-rotating batch internal mixer. The effects of three process parameters – set mixer temperature, screw rotating speed and residence time – were systematically studied. Scanning electron microscopy (SEM), optical microscopy (OM), X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FT-IR) were employed to investigate the evolution of INM's dissolution into the molten excipient. Differential scanning calorimetry (DSC) was used to quantitatively study the melting enthalpy evolution of the drug. The results showed that the dissolution rate increased with increasing the mixer set temperature, or the screw rotating speed. It was concluded that the dissolution of the drug in the polymer melt is a convective diffusion process, and that laminar distributive mixing can significantly enhance the dissolution rate.