Drug-polymer miscibility of ibuprofen with eudragit® RL and ethylcellulose by differential scanning calorimeter / Chutima Wiranidchapong, Boonta Chutvirasakul

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Abstrak

Drug-polymer miscibility is a prerequisite for a stable solid dispersion. In this study, the miscibility of ibuprofen and the polymers, i.e., Eudragit® RL (ERL) and ethylcellulose (EC), were investigated by DSC. Ibuprofen in ERL solid dispersion at 0 - 100 %w/w was examined by the heating program: 25 - 140 °C, 10 K/min; 140 - (-60) °C, -10 K/min; and (-60) - 140 °C, 5 K/min. Solid dispersion of ibuprofen in EC at the same concentration range was examined by the heating program: 25 - 180 °C, 10 K/min; 180 - (-60) °C, -10 K/min; and (-60) - 180 °C, 5 K/min. The melting point depression and the variation of a single glass transition temperature (Tg) as a function of composition were presented in solid dispersion of ibuprofen in either ERL or EC, indicating the miscibility between blend components. Fitting the melting point of ibuprofen in either ERL or EC (Tmb) to Nishi-Wang equation by nonlinear regression analysis gave R2 equal to 0.8768 and 0.9667, respectively. Fitting experimental Tg to Gordon-Taylor and Kwei equations gave R2 equal to 0.9796 and 0.9851 for ibuprofen in ERL and 0.9753 and 0.9793 for ibuprofen in EC. The Kwei equation seemed to be better for describing the Tg of the blends, indicating the interaction between ibuprofen and the polymers, i.e., ERL and EC, which was confirmed by FTIR analysis. However, the non-randomness of residuals suggested that Nishi- Wang, Gordon-Taylor, and Kwei could not completely explain the Tmb and Tg of the blends.