Evaluation of Increased Surface Area Fractional Precipitation with Silica-Alumina for the Purification of Paclitaxel

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Fractional precipitation is a simple, efficient method for purifying paclitaxel extracted from plant cell cultures. However, fractional precipitation process has been inherently problematic due to the lengthy precipitation time that is required. An improved fractional precipitation process could significantly reduce the precipitation time by increasing the surface area available for precipitation. Silica-alumina was used to increase the surface area, and the optimal surface area per working volume (i.e. volume of reaction solution) (S/V) for achieving the highest purity and yield of paclitaxel possible was found to be 1007.6 mm-1. In this study, we evaluated the effects of the zeta potential of silica-alumina on the behavior (purity, yield, fractional precipitation time, precipitate shape and size) of fractional precipitation for improving the purification efficiency of paclitaxel. As the zeta potential of surface area-increasing materials were increased, the yield of paclitaxel was increased and the precipitation time and precipitate size were decreased. Furthermore, we also found that the purity of paclitaxel was constant regardless of the zeta potential of silica-alumina.