Thitima Songjitsomboon 2010: Production of Mefenamic acid-Polyethylene glycol Composites Using Gas Anti-Solvent Process. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Manop Charoenchaitrakool, Ph.D. 128 pages.

Micronization and production of composites between mefenamic acid (MEF) and Polyethylene glycol (PEG 4000) by Gas Anti-Solvent (GAS) technique, using carbon dioxide as the antisolvent, can be used to enhance the dissolution of mefenamic. In this research, the effects of temperature, drug-solution concentration and solvent ratio between dichloromethane and ethanol on the particle size of precipitated MEF were studied. It was found that the particle size of mefenamic acid produced by the GAS technique (average particle size = 130-170 micron) was larger than the unprocessed mefenamic acid (average particle size = 7.5 micron). In addition, with the use of various solvent ratios between dichloromethane and ethanol from 80:20 to 50:50 and 20:80 by volume, it was found that an increase in temperature or a decrease in drug-solution concentration resulted in smaller size of the precipitates and higher threshold pressures. In the dissolution kinetic studies, the dissolution rate of precipitated mefenamic acid by the GAS process and the unprocessed mefenamic acid were nearly identical at the beginning. However, the processed mefenamic could dissolve completely in 4 hours while the unprocessed mefenamic acid could only dissolve 82%. In the study of MEF-PEG 4000 composite production, it was found that when using dichloromethane and ethanol of 80:20 %v/v, mass ratio of drug and polymer at 1.5:3.5 at 45^{o}C resulted in the highest % drug loading of 22.83%. A reduction in temperature or an increase in polymer concentration yielded slightly smaller size of composite particles. In addition, it was found that the composites exhibited a higher dissolution rate than the MEF precipitated by the GAS process, and could dissolve completely within 3 hours. However, the dissolution rate of the composites was lower than that of the physical mixture between MEF and PEG 4000. This could be attributed to the larger particle size of the composites compared to the physical mixture.

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