



## Colorant removal process for polypropylene waste

Supaporn Pookok<sup>1</sup>, Cherdchai Laongthipparos<sup>1</sup>, Parinya Khongprom<sup>1</sup> and Sirisart Ouajai<sup>1,2\*</sup>

<sup>1</sup>*Department of Industrial Chemistry, Faculty of Applied Science,  
King Mongkut's University of Technology North Bangkok, Thailand*

<sup>2</sup>*Polymer research center, King Mongkut's University of Technology North Bangkok, Thailand*

\*e-mail: sirisart.o@sci.kmutnb.ac.th

Colorant is one of major barriers to recycling of plastics since various types of additives are incorporated in plastics during the fabrication. Removal colorant from plastic waste is a big challenge and the success will expand the use of recycle plastics into a further desired application. This research aimed to remove colorant from a selected plastic waste (polypropylene, PP) by the chemical process. PP waste of various colors was dissolved in xylene before the chemical reaction was taken. Times and temperatures of dissolution were varied from 20-60 min and 110-130 °C respectively. The degree of solubility was found to increase with increasing time and temperature. Long duration of dissolution, however, caused the structural degradation of polymer as the decrease in melting temperature ( $T_m$ ) of PP was observed by the Differential Scanning Calorimetry (DSC). Various ratios (0.1, 0.2, 0.3, 0.4, 0.5, 1 and 2 mg : 5.0 ml) of zinc catalyst and 50 % v/v hydrochloric acid (HCl) solution were employed in the 10 % wt/v PP-xylene solution of various colors. The reaction was conducted at 130 °C for 60 min. Fourier Transform Infrared spectroscopy (FTIR) was performed to confirm the successful colorant removal found in blue and yellow PP wastes. In addition, the low metal catalyst to HCl ratio (0.5 mg : 5.0 ml) showed a slight reduction of  $T_m$  of PP indicating low structure disruption caused by the reaction.

**Keywords:** Polypropylene; Recycling; Colorant removal