Synthesis and Performance of Waterborne Polyurethane Finishing Agent Based on Polycarbonate Diol

Quanjie Wang^{1,2*}, Xianyi Zhu¹, Lijie Hou³, Yanyun Jiang³, Baorong Duan³

¹College of Resource and Environment, Shaanxi University of Science and Technology, Xi'an 710021, Shaanxi, P. R. China

² State Research and Promotion Center of Leather-making Technology, Yantai 264003,

Shandong, P. R. China

³ Department of Chemical Engineering, Yantai University; Yantai 264005, Shandong, P.R.

China

*Corresponding author, Phone:+86-(0)535-6901721, E-mail:wangquanjie@126.com, Fax:+86-(0)535-6901722

Abstract: Polyurethane based on aromatic isocyanate become frequently yellow after exposure to daylight. To solve this problem, waterborne polycarbonate polyurethane(WPCU) was synthesized by polycarbonate diols(PCDL), Dimethylolbutanoic acid(DMBA), 1,4-butanediol(BD) and 4,4'-diphenylmethane diidocyanate (MDI). Fourier transform infrared spectroscopy(FTIR), differential scanning calorimetry(DSC), thermogravimetric analysis(TG), X-ray diffraction(XRD) and mechanical tests were employed to characterize the polyurethanes. The influence of soft segment molecular weight, soft segment content on the mechanical performance and microscopic phase separation structure of WPCU were investigated. On one hand, an increase in the soft segment content was accompanied by a decrease in breaking strength of the WPCU film and the elongation at break also decreases in some degree. On the other hand, with the increasing of soft segment molecular weight, the breaking strength increases but the elongation at break decreases a little.Yellowing index results show that WPCU was better than polyester polyol-based on the resistance to yellowing.

Key words: polycarbonate diol; polyurethane; MDI; yellowing resistance