化学学报 2005 63 (24): 2225-2228 ISSN: 0567-7351 CN: 31-1320/06

研究论文

亲水单体对聚氨酯-含氟丙烯酸酯复合乳液颗粒和表面性能的影响

李刚辉，李小瑞，沈一丁*，任庆海

(陕西科技大学化学与化工学院 咸阳 712081)

收稿日期 2005-3-22 修回日期 2005-9-5 网络版发布日期 接受日期

摘要 为了提高聚氨酯-丙烯酸酯聚合物的耐水性和耐溶剂性, 将*N*-甲基二乙醇胺(MDEA)扩链的交联聚氨酯丙酮溶液作为反应介质, 以苯乙烯、丙烯酸丁酯、含氟丙烯酸酯(FA)为单体, 过氧化苯甲酰为引发剂, 通过溶液聚合相转化法制得新型阳离子聚氨酯-含氟丙烯酸酯复合乳液. 研究了MDEA对聚合物水分散液的乳胶粒径、Zeta电位以及乳胶膜表面性能的影响, 并用FTIR, TEM对聚合物的结构和乳胶粒形态进行了表征. 结果表明, MDEA的添加利于降低乳胶粒径, 但对乳胶膜的疏水性能有不利影响, 当MDEA的质量分数为13.15%时, FPUA乳胶粒的形态呈球形, 粒径约为253 nm, 乳胶膜的表面自由能低于25.1 mJ/m^2, 接触角衰减速率约为0.38 (°)/min. 另外, 乳胶膜的高温处理能够使表面自由能降低11.5%以上.

关键词 阳离子聚氨酯-含氟丙烯酸酯聚合物 亲水单体 表面自由能 浸水行为

分类号

Effect of Hydrophilic Monomer on the Particle Sizes and Surface Properties of Polyurethane-fluorinated Acrylate Hybrid Latex

LI Gang-Hui, LI Xiao-Rui, SHEN Yi-Ding*, REN Qing-Hai

(*College of Chemistry and Chemical Engineering, Shaanxi University of Science and Technology, Xianyang 712081*)

Abstract Novel cationic polyurethane-fluorinated acrylate hybrid dispersion was prepared with the copolymerization of styrene, butyl acrylate and fluorinated acrylate in the medium of crosslinked polyurethane by the initiation of benzoyl peroxide via phase inversion polymerization in order to increase the liquid resistance of general polyurethane-acrylate hybrid dispersions. The said polyurethane was synthesized in acetone from toluene-2,4-diisocyanate, *N*-methyldiethanolamine (MDEA) as a hydrophilic chain-extender, trimethylolpropane as a crosslinker, and soft polyester diol (PE1000) block. The influences of MDEA on particle diameter and Zeta potential of dispersions and surface properties of dispersion films were investigated. FTIR and TEM were used respectively to characterize the structure and the particle morphology of the resultant dispersions. The results show that the addition of MDEA will decrease the particle diameters of dispersions and hydrophobic properties of the dispersion films. With the MDEA content of about 13.15%, the morphology of the dispersion particle is sphericity and the diameter is about 253 nm. The surface free energy of the film is less than 25.1 mJ/m^2, and the attenuation rate of contact angle is about 0.38 (°)/min. At the same time, the treatment of the films with high temperature can decrease the surface free energy by more than 11.5%.

Key words cationic polyurethane-fluorinated acrylate hydrophilic monomer surface free energy immersion behavior

DOI:

通讯作者 沈一丁 ydshen@sust.edu.cn