

论文

甲基丙烯酸正丁酯/甲基丙烯酸 β 羟乙酯共聚吸附功能纤维的制备及表征

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摘要:

以过氧化苯甲酰(BPO)为引发剂, 合成了甲基丙烯酸正丁酯/甲基丙烯酸羟乙酯(BMA/HEMA)二元共聚树脂, 采用冻胶纺丝技术制备了低分子量有机液体吸附功能纤维, 利用傅里叶变换红外光谱(FTIR)和¹³C核磁共振波谱(NMR)、广角X射线衍射仪(WAXD)和综合热分析仪以及环境扫描电子显微镜(SEM)研究了共聚物的交联结构、纤维的结晶性能以及纤维的表面形貌, 同时研究了共聚合阶段HEMA与BMA投料比对纤维饱和吸附量的影响. 研究表明, 树脂大分子间不存在化学交联结构, 大分子内和大分子间存在氢键作用, 有利于物理交联结构的形成; 纤维结晶性能随着HEMA质量分数增加而减弱, 且HEMA质量分数对纤维表面形貌有较大影响; 纤维对甲苯和三氯乙烯的饱和吸附量随着HEMA质量分数增加而增大, HEMA质量分数相同时所得纤维对三氯乙烯的吸附量明显高于对甲苯的吸附量.

关键词: 甲基丙烯酸酯 冻胶纺丝 吸附功能纤维 核磁共振(NMR) 氢键作用

Preparation and Characterization of Absorptive Functional Fiber Copolymerized by *n*-Butyl Methacrylate with Hydroxyethyl Methacrylate

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Abstract:

The attempt was made to prepare fiber which could absorb organic matter and to investigate its peculiarity. Firstly, resin was synthesized by the copolymerization of *n*-butyl methacrylate(BMA) and hydroxyethyl methacrylate(HEMA) when benzoyl peroxide(BPO) was used as an initiator, then crosslinking structure of copolymer was investigated by Fourier-transform infrared(FTIR) and nuclear magnetic resonance(NMR) spectrometer and the results show that chemical crosslinking structure was not formed between macromolecules, but intermolecular and intramolecular hydrogen bonding action existed so that physical crosslinking structure which located between molecules of copolymer was formed. Functional fiber to absorb low molecular weight organic matter was prepared by gelation-spinning and the effect of mass fraction of HEMA in monomer feed ratio on saturated absorbency was studied, it could be found from the result that not only toluene and trichloroethylene saturated absorbency increased with the increase of mass fraction of HEMA but also trichloroethylene saturated absorbency was higher than toluene saturated absorbency for fiber obtained by the same mass fraction of HEMA in monomer feed ratio. Crystallization behavior of fibers was analyzed by wide angle X-ray diffractometer(WAXD) and universal thermal gravimetric analyzer and the result indicates that as mass fraction of HEMA being enhanced, the crystallization ability was weakened. Finally, the result which was analyzed by scanning electron microscope(SEM) shows that mass fraction of HEMA had a great impact on the surface morphology of fibers.

Keywords: Methacrylate Gelation-spinning Absorptive functional fiber Nuclear magnetic resonance (NMR) Hydrogen bonding action

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