

Full Paper

乙二醇二甲基丙烯酸酯交联的胸腺嘧啶分子印迹聚合物纤维素支撑膜对核酸碱基分子选择性研究

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摘要 使用光度分析法探讨了功能单体9-乙烯腺嘌呤和模板分子胸腺嘧啶在甲醇中的结合作用。在此基础上, 以乙二醇二甲基丙烯酸酯为交联剂, 纤维素膜为支持体, 制备了分子印迹聚合物膜。通过扫描电镜观察并比较了分子印迹聚合物膜、非分子印迹聚合物膜和纤维素载体膜通道的差异, 以胸腺嘧啶、尿嘧啶、胞嘧啶、鸟嘌呤和腺嘌呤为底物, 评价了印迹聚合物膜的渗透选择性。结果表明分子印迹膜对模板分子胸腺嘧啶及结构类似物尿嘧啶呈现高的选择性, 与用乙二醇二甲基丙烯酸酯为交联剂制备的分子印迹膜比较, 也呈现高的扩散速率和选择性, 因此该膜对生物样品DNA完全水解产物胸腺嘧啶和RNA水解产物尿嘧啶的识别展现了良好的应用前景。

关键词 [分子印迹](#), [运输选择性](#), [胸腺嘧啶](#), [9-乙烯腺嘌呤](#), [缩乙二醇二甲基丙烯酸酯](#)

分类号

Transport Selectivity of a Diethylene Glycol Dimethacrylate- Based Thymine-imprinted Polymeric Membrane over a Cellulose Support for Nucleic Acid Bases

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Abstract The binding mechanism between 9-vinyladenine and pyrimidine base thymine in methanol was studied with UV-visible spectrophotometric method. Based on this study, using thymine as a template molecule, 9-vinyladenine as a novel functional monomer and diethylene glycol dimethacrylate as a new cross-linker, a specific diethylene glycol dimethacrylate-based molecularly imprinted polymeric membrane was prepared over a cellulose support. Then, the resultant polymeric membrane morphologies were visualized with scanning electron microscopy and its permselectivity was examined using thymine, uracil, cytosine, adenine and guanine as substrates. This result showed that the imprinting polymeric membrane prepared with diethylene glycol dimethacrylate exhibited higher transport capacity for the template molecule thymine and its optimal analog uracil than other nucleic acid bases. The membrane also took on higher permselectivity than the imprinted membrane made with ethylene glycol dimethacrylate as a cross-linker. When a mixture including five nucleic acid bases thymine, uracil, cytosine, adenine and guanine passed through the diethylene glycol dimethacrylate-based thymine-imprinted polymeric membrane, recognition of the membrane for the template molecule thymine and its optimal analog uracil was demonstrated. It was predicted that the molecularly imprinted membrane prepared with diethylene glycol dimethacrylate as cross-linker might be applicable to thymine assay of absolute hydrolysates of DNA or uracil assay of absolute hydrolysates of RNA in biological samples because of its high selectivity for the template molecule thymine and its optimal analog uracil.

Key words [molecular imprinting](#) [transport selectivity](#) [thymine](#) [9-vinyladenine](#) [diethylene glycol dimethacrylate](#)

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