

Preparation of D-Phenylalanine Imprinted Polymer by Emulsion Polymerization

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Abstract

Molecularly imprinted polymers (MIPs) are attractive as versatile and inexpensive materials capable of molecular recognition. MIPs consist of highly crosslinked polymer matrices that are synthesized in the presence of template molecule. Upon extraction, the resulting cavities retain affinity and selectivity for the template. Nowadays polymers imprinted with different templates like drugs, herbicides, sugars, nucleotides, amino acids and proteins are more and more applied in analytics, as well as in catalysis or for synthetic processes. To this point in time the general approach of MIP has been limited to the template molecules soluble in organic solvents. The capacity to utilize molecular imprinting for the preparation of synthetic receptors for the water soluble substrates would be of great potential for the use of imprinted polymers in a range of biomedical and environmental diagnostic applications.

MIPs, which are prepared based on relatively weak intermolecular attractions between the template molecule and pre-polymer components, have decreased binding abilities in polar solvents. However, to be used in many practical applications, MIPs will need to be able to function in polar solvents such as water. The aim of this work is to develop an effective D-phenylalanine (D-Phe) imprinted polymer in aqueous medium and find its application for the chiral separation of Phe from its racemic mixture.

In the present study, we prepared D-Phe imprinted polymer by emulsion polymerization using functional monomer (methacrylic acid) and cross-linker (ethylene glycol dimethacrylate). Various amounts of stabilizer (polyvinyl alcohol) and surfactant (sodium dodecylsulfate) were used during polymerization. The polymer was characterized by different analytical techniques. In the aqueous medium, the chiral separation ability of the prepared polymer was evaluated at various operating parameters.

Acknowledgement

This research was supported by the Center for Advanced Bioseparation Technology.