A new matrix for membrane affinity chromatography and its application to the purification of concanavalin A

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Abstract

Macroporous cellulose membranes with large pore sizes (1–2 μm) and high porosity (about 60%) were prepared from filter paper by chemical crosslinking. These membranes were activated by introducing epoxy groups with various spacer lengths, after which maltose was immobilized as an affinity ligand. Packed into a cartridge, the prepared membranes were used for the affinity purification of concanavalin A. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Affinity membranes; Chromatography; Crosslinked filter paper membrane; Concanavalin A purification

1. Introduction

As a new technology in affinity separation, the membrane affinity chromatography has proven its efficiency and time stability. This technology had already significant applications in the separation and purification of biomolecules [1–12]. One of the most important factors in membrane affinity chromatography is the identification of suitable membranes. The selection of the membrane material and its preparation constitute dominant factors affecting the chromatographic performance. The materials used for affinity membranes can be roughly divided into two groups, namely, natural and artificial polymers. Generally, the artificial polymers, such as nylon, polysulfone and glycidyl methacrylate are suitable from a mechanical point of view, but are less suitable for the immobilization of the ligand due to their low compatibility. The natural macromolecular materials, such as agarose, dextrin, chitosan and cellulose, are good affinity matrixes because they are compatible with the usual ligands, but are often difficult to process as membranes. How to solve this problem constitutes one of the main issues in the research regarding membrane affinity chromatography.

Cellulose is a good affinity matrix because of its high compatibility with the usual ligands. However, it is difficult to prepare macroporous membranes from cellulose because of its insolubility in almost all solvents. Regenerated acetate cellulose or nitrate cellulose membranes could be obtained through the phase-inversion method, and ion exchange groups or affinity ligands could be coupled to the crosslinked regenerated membranes [13–15]. These membranes have, however, a low porosity (less than 20%) and small pore sizes (~0.45 μm),1 which are inherited from the initial acetate or nitrate moieties of the cellulose materials, and are not suitable for affinity chro-

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1 Catalogue of Millipore.