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MONOLITHIC CHROMATOGRAPHIC MATERIALS

Abstract

In the last two decades, chromatography experienced particularly extensive progress in the pharmaceutical industry, where they are facing a challenge to purify large quantities of very complex biological samples. However, it is necessary to emphasize that structure of large biological molecules like proteins, DNA and viruses is very sensitive and therefore their separation process should not last long. Furthermore, conditions like temperature, pressure, pH, shear forces and binding strength during chromatographic process should be most mild in order to avoid their denaturation. Since conventional particulate chromatographic material failed to fulfill all above mentioned demands, it is self evident that novel chromatographic material, dedicated for separation of large biomolecules was introduced.
One of the most successful attempts was development of highly porous polymeric materials, so called monoliths. The monolith, with its unique structure, where mass transfere is governed by convection, enables fast and efficient separations of large biomolecules. High porosity (60%) together with bimodal pore structure and relatively short path length substantially reduces back pressure of monolithic chromatographic column. Furthermore, because of convective mass transfer, separations and capacity on monolithic chromatographic column are not affected by change of mobile phase flow velocity anymore.