4 CONCLUSION

An attempt was made to find correlation between the morfology of the solid support of chelating sorbents based on poly(methacrylic) esters as well as type and concentration of chelating groupings and the affinity of their nickel complexes for binding of specific immunoglobulins.

It was proved, that the spatial factors play an important role in modification of supports with the studied chelating ligands as well as in their coordination with Ni^{2+} ions and subsequently in interaction with target immunoglobulin.

The support carriers with highly porous matrices exhibited high capacities for immunoglobulin binding and could be recommended if purification of a preparative quantity of specific IgG_1 is intended. However, the poor information about values of total porosity or specific surface area is insufficient for the prediciton of the sorbent efficiency in ligand exchange; in the case of immunoglobulins, the proportion of macropores with diameters ≥ 100 nm of the solid support was the crucial factor affecting the immobilized metal complexes accessibility for the protein binding. In comparison, the sorbents with small-pore matrix contributed to the increase of the amount of the bonded target protein in considerably less extent even they had higher specific surface area values and diameters of all their pores fairly exceeded the dimensions of the immunoglobulin molecule (ca.12 nm). Moreover, an increase in concentration of the immobilized nickel complexes of the small- pores containing carriers did not changed the capacity for immunoglobulin.

When homogeneous, but highly hydrophilic and regularly shaped spherical polymeric sorbents support with immobilized surface chelating groups were utilized, the considerably lower capacities for target protein binding were observed. On the other hand, they showed small spatial and kinetic limitations both in coordination with Ni^{2+} ions and in protein binding.

The effect of the type of chelating groupings of ethylenediaminetriacetic acid (EDATA), quinolin-8-ol (HQ) and *N*-(2-pyridylmethyl)glycine (PMAA) in immunoglobilin binding after the formation their nickel complexes was evaluated. The observed difference in binding as well elution of the specific IgG_1 and eventually accompanying proteins was caused by the strength of protein binding with the studied Ni^{2+} complexes, which increased in the order Ni^{2+}-EDATA < Ni^{2+}-PMAA< Ni^{2+}-HQ. Sorbent with the HQ chelating groups exhibiting low hindrance to mass transfer, relatively high protein sorption capacity and very high separation efficiency, could be recommended for analytical separations.

Finally, it should be mentioned that controlling the spatial arrangement of chelating groupings, their distribution in the support as well as the nature and morfology of the latter might be a way for improving the selectivity of a target protein binding and IMAC efficiency.

In addition, sheets of crosslinked hydrophilic polymer membranes were prepared by radical copolymerization of 2-(2-hydroxyethoxy)ethyl methacrylate and ethylene dimethacrylate. After modification with the chelating groupings of iminodiacetic acid, they showed a relatively high capacity in the sorption of metal ions (Ni^{2+}, Cu^{2+}, Fe^{3+}). Their possible use in metal ion removal from wastewaters can be envisaged.

5 GENERAL BENEFIT OF THE WORK

The results of the study revealing the dependence of the specific IgG_1 binding on both, the inner structure of the polymeric support and the type and spatial arrangement of the chelating ligands could be useful in designing new IMA sorbents for purification of monoclonal antibodies.

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