

Polyampholytic resins derivatives of polyalkylenepolyamines and dimethylphosphinic acid and their application as metal cation sorbents

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A review of the scientific and technical literature shows that despite its similarity to the aminomethylphosphonic group, which has excellent cation binding properties, the aminomethylphosphinic group is rarely used as a functional group in ionites. The aminomethylphosphinic group has only one -OH group and two P-C bonds, unlike the aminomethylphosphonic group which has two -OH groups and one P-C bond. Although the smaller number of -OH groups reduces the ionic capacity of the ionites for cations, the presence C-P-C fragment allows easy synthesis of cross-linked polycondensates without the need for other cross-linking agents. For the synthesis of polyampholytes derived from polyalkylenepolyamines and dimethylphosphinic acid, the aminomethylation reaction of phosphinic acid with formaldehyde and polyamines can be used to obtain polyampholytes in which the chain or network is formed exclusively from functional groups. In this work 20 polyampholytes with varying in structure were obtained, using phosphonomethylated polyamines, carboxymethylated polyamines and two inexpensive and easily available amino acids.

A screening study of copper(II) cations binding by the obtained polyampholytes and their modified forms was carried out to select the best polyampholytes for copper(II) ion removal. Subsequently, a study was conducted to determine the process parameters, which included: the effects of temperature, initial concentration of copper(II) cations, contact time of the polyampholyte with the solution containing copper(II) cations and the presence of other cations on the copper(II) cation binding efficiency of these polyampholytes.

Obtained results of this study show that these polyampholytes are suitable for use as metal cation sorbents. Based on the results obtained, the technology of polyampholytes derived from polyalkylenepolyamines and dimethylphosphinic acid and the technology copper(II) cations binding by polyampholytes derived from polyalkylenepolyamines and dimethylphosphinic acid were proposed.

