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Supramolecular systems based on amidoammonium and amidoaminocalix[4]resorcinarenes and polyacrylic acid



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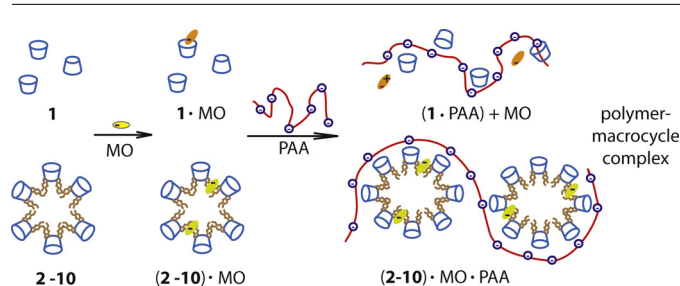
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HIGHLIGHTS

- Amphiphilic calixresorcinarenes form polymer-colloid systems with polyacrylic acid.
- Size and properties of colloids depends from amine and alkyl groups of macrocycle.
- Triple systems are formed by interaction of polymer with macrocycle-dye aggregates.

GRAPHICAL ABSTRACT



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ABSTRACT

In the solutions of polyacrylic acid (PAA) the amphiphilic calix[4]resorcinarenes **1–10** and their complexes with Methyl Orange (MO) form binary (**1–10**)-PAA and tertiary (**2–10**)-MO-PAA supramolecular complexes which are water-soluble in the case of amidoammonium (**1–5**) and water-insoluble in the case of amidoamino (**6, 7**) or amido(dimethylamino) (**8–10**) calixresorcinarenes. Almost 90% of removal of MO from the aqueous solution is achieved by the formation of the water-insoluble systems (**6–10**)-MO-PAA. In aqueous solution the particles of the (**1–5**)-PAA systems have average hydrodynamic diameters which values vary depending on the length of the alkyl substituents of macrocycles.

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1. Introduction

One of the approaches for creating nanoscale materials is the formation of the supramolecular polymer-colloid systems. They represent the supramolecular complexes formed by the water-soluble polymer and the molecules such as surfactants and the water-soluble macrocycles due to the noncovalent interactions such as electrostatic, H-bonding, hydrophobic effect etc. [1,2]. A

lot of scientific articles on the polymer-containing supramolecular systems relate to a surfactant-polymer complexes, in which the surfactant micelles are immobilized on the polymer surface. Such systems are widely used in biomedicine, catalysis, cosmetics, oil industry, etc. [3].

The separate part of the polymer-colloid systems is related to the macrocycle-polymer complexes. The aim of the study of the noncovalent macrocycle-polymer systems is to provide novel supramolecular catalysts [4–6], polymers with controlled rheology or thermal properties [7,8], drug delivery systems [9] etc. Known macrocycles, which are non-covalently bound with polymers, are the amphiphilic calixarenes [4–6,10], pillararenes [7] and cyclodextrins [8,9,11]. These macrocycles are primarily known as

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