Interactions in the multicomponent system comprising polycationic gel, star-shaped polyanion and cationic surfactants

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Procedure S1

The amount of the cationic groups in the gel sample was calculated using the sample mass and gel swelling ability values.

The value of the equilibrium swelling ability for cationic gel was estimated as

$$H = (m_{sw} - m_d)/m_d,$$

where m_{sw} and m_d are the weights of an equilibrium swollen and dried to a constant weight gel samples, respectively, and the mass of the dry gel sample can be calculated as

$$m_d = m_{sw}/(H+1)$$

The molar amount of the cationic groups in the sample is

$$\nu_0 = m_d/Mr,$$

where Mr is the molecular mass of the amine monomer unit, and finally

$$\nu_0 = m_{sw}/Mr(H+1).$$

Procedure S2

In order to measure the sample mass during the reaction, the samples were taken out from the solution, the surface moisture was carefully dried with absorbent paper, and then the samples were immediately weighted; after that the samples were returned back into the surfactant solutions.

Procedure S3

The kinetic curves of the reactions of surfactant sorbtion by the equimolar interpolyelectrolyte complexes of the cationic gel and anionic star are presented as the dependence of the relative amount of surfactant sorbed (ν/ν_0) on time. Here the ν value represents the amount of surfactant sorbed by the time t, and the ν_0 value represents the amount of the carboxylate groups of the star-

shaped polyanion or the mole amount of the network amino groups in the complex sample (those are equal values as the initial IPCs contain the same amounts of cationic network groups and anionic groups of the polyacid star).

The amount of surfactant sorbed was calculated by the difference between the amount of the surfactant initially added to the solution and found in the solution after a period of time t.

The v_0 value which is equal either to the amount of carboxylic groups of the star or to the cationic groups of the gel was calculated as follows:

In the case of carboxylic groups of the star:

The amount of negatively charged groups incorporated into the initial complex was estimated by the polyanion concentration decrease in the solution during the complex formation between the cationic gel and anionic star-shaped polyelectrolyte. The concentration of anionic star was measured by potentiometric titration.

In the case of amino groups of the gel:

The amount of amino groups in the gel samples were determined as described in the **Procedure S1** above.
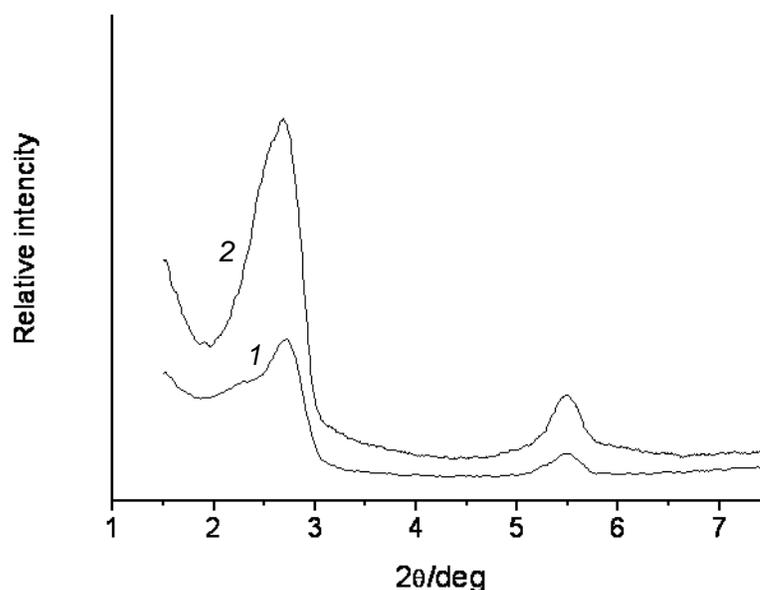

Figure S1 X-rays diffraction patterns for the product of cetyltrimethylammonium bromide sorbtion by the complex of cationic network with anionic star (1) and for the complex formed in the binary system anionic star – cetyltrimethylammonium bromide (2).

From the data obtained the interplanar distances d were calculated as

$$D = 2\pi/Q,$$

where Q is the scattering vector,

$$Q = (4\pi/\lambda) \times \sin\Theta,$$

Θ being the scattering angle and λ=1.54Å the wavelength of the incident beam.

The d_1/d_2 ratio (interplanar distances ratio for two peaks) was found to be equal to 2, which indicates the existence of lamellar structure.