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Влияние анионного поверхностно- активного вещества на структурирование серы

В этой работе получены порошки серы с высокой степенью дисперсности в результате диспергирования комовой серы, определены углы смачивания растворов ПАВ на поверхности серы. Начиная с определенной концентрации (0,0625%) наблюдается предельное смачивание. Была определена критическая концентрация структурообразования в зависимости от концентрации серы, и изучено влияние концентрации ПАВ на структурирование серы.

Ключевые слова: *поверхностное натяжение, адсорбция, поверхностно-активные вещества, сульфанол, алкилбензолсульфонат натрия.*

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Effect of anionic surfactants on the structuring of sulphur

In the paper sulfur powders with a high degree of dispersion have been received by dispersing of sulphuric system. The contact angles was determined for solutions of surfactants on the surface of sulfur. It is found that from a certain concentration (0.0625%) is the unlimited wetting is occurred. The concentrations of the critical structure formation was determined at different concentrations of sulfur and the effect of surfactant concentration on the structuring of sulphur was studied.

Keywords: *surface tension, adsorption, surfactants, sulfanol, sodium alkylbensolsulphonate.*

UDK 541.183

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Colloid-chemical properties of polyelectrolitic material composition

Study directed to investigation of colloid-chemical properties of polyelectrolitic material composition on the basis of polyacrylonitrile derivatives. Research results allow scientifically justify their usage in various industry fields, where processes proceed on the interface.

Keywords: *polyelectrolitic materials, polyacrylonitrile derivatives, composition, sodium oleat, modification*

Amongst water-soluble polymers, intended for work with various dispersion systems, the polyacrilonitril derivatives have the special place. They are polyelectrolytes, have the specific composition and construction, as well universal properties. So, they are broadly used in the important branches of industry such as chemical, oil, agricultural chemistry industry.

The possibilities of the modification of polyelectrolyres properties by obtaining of composition with use of different surfactants discovers the new possibilities for their usage. In this connection, study of colloidal-chemical properties of polyelectrolyres and their composition with surfactants is a more urgent for scientifically-motivated approach to rational use and understanding of the mechanism of the action of polymeric compositions in various technological processes.

In this work have been shown the data of research results of colloidal-chemical properties of compositions on base of polyelectrolyres derivatives of polyacrilonitril with sodium salt of oleic acid with purpose of development of the scientifically-motivated approach for their usage that has alongside with theoretical, the important practical importance.

Introduction of the solution of hydrolyzed polyacrilonitril and polyacrilamide into solutions of sodium oleat (OlNa) brings to change of media pH (figure 1), as in the case of inverse titration. This is testifies that order of the mixing of components does not bring to change of the mechanism of their interaction i.e. reaction is a thermodynamic reversible.

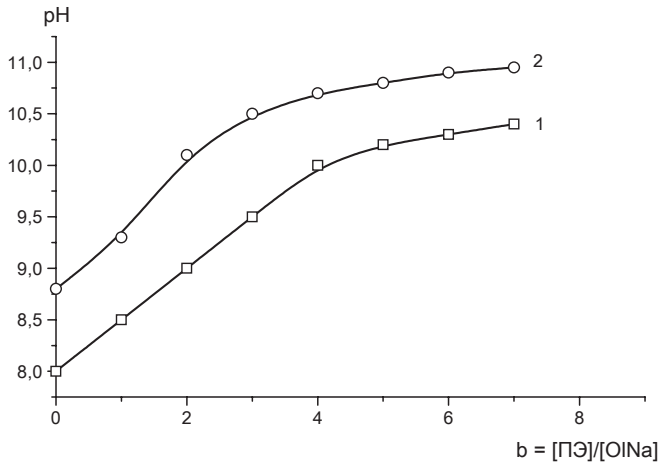

Figure 1 – Dependence of pH of Hydrolized polyacrilonitril- OlNa (1) and Polyacrilamid- OlNa (2) systems from polyelectrolytes relative concentration. Initial concentration of OlNa in system is equal 0,01 mol/l

Degree of electrostatic interaction between Hydrolyzed PAN and OlNa, OlNa and PAA from their relative concentration θ = f (β) (figure 2) reaches rather high meanings. If in reactions of formation of complex at the titration of polyelectrolyres solution by surfactant solution the meaning of does not exceed 15 - 20 % then at the change of the order of the mixing the meaning of = 1 the meaning for system HPAN-OlNa reaches 35 %, but under the further increase of the concentrations of introduced HPAN θ goes up to 65 %. This allows to conclude that between HPAN and OlNa, OlNa and PAA are formed nonstechiometric complexes because of the electrostatic interaction between PE and surfactant.

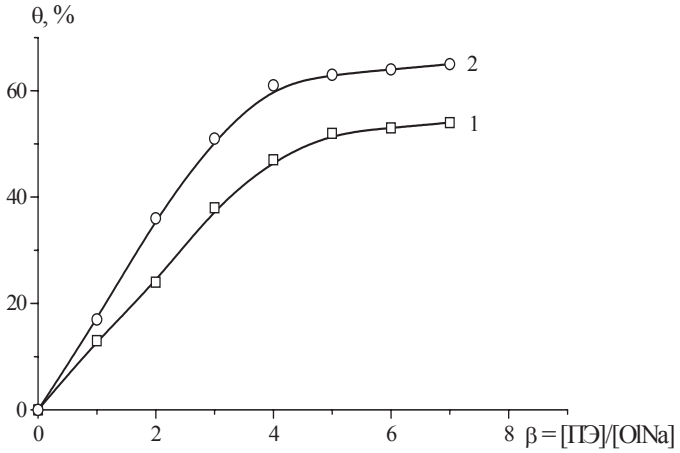

Figure 2 – Dependence of degree of electrostatic bonding of OlNa with HPAN (1) and OlNa with PAA (2) from their relative concentration. Initial concentration of OlNa in system is equal 0,01 mol/l

From results of electrostatic investigation in the field of relative concentration of GPAN β = 1÷2,5 (figure 3) is seen that charge of the complex are defined by sign of the charge of OlNa. Increasing of HPAN concentration in solution lead to increasing of quantity of functional group with electrostatic contacts that are testified by decrease of ξ–potential of OlNa mycelles and it's inversion at β >2,5. In this condition the complex charge sign is defined by sign of HPAN charge that is connected with surplus quantity of macromolecules of HPAN and surplus of positively charged macromolecular polycomplexes.

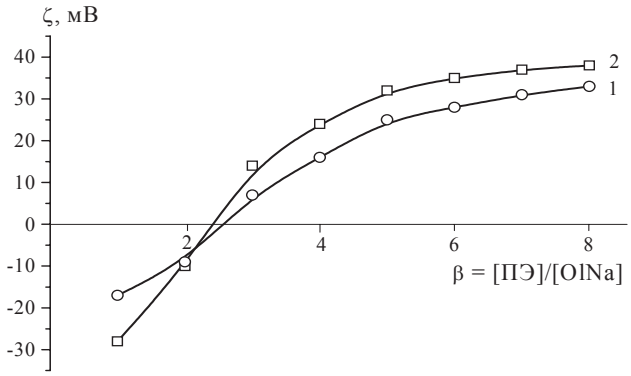

Figure 3 – Electrokinetic potential of HPAN- OlNa (1) and PAA- OlNa (2) polycomplexes at the various meanings of relative concentration of polyelectrolytes at constant concentration of OlNa - 0,01 mol/l

At the β >2,5 the signs of the charge of the complex is defined by sign of the charge of HPAN that is connected with surplus quantity of macromolecules of HPAN and surplus of positively charged macromolecular polycomplexes. Follows to note that such meaning of degree of electrostatic interaction in the case of titration of PAA by solution of OlNa have been achieved only at pH = 4.

Conformation of macromolecules in solution, as well as quantity of aggregations of surfactant ions in mycelles also depend on balance of energy of hydrophobic and electrostatic interaction. From figure 4 is seen that in the field of small meanings β the brought viscosity of the solution of OlNa grows less, but in the field of β = 3÷8 keeps constant. Probably, in the field of 4,5 occurs the increasing of the positive charge of the complex HPAN- OlNa in consequence of protonization of the nitrogen atom because of surplus quantity of the functional groups of polybase.

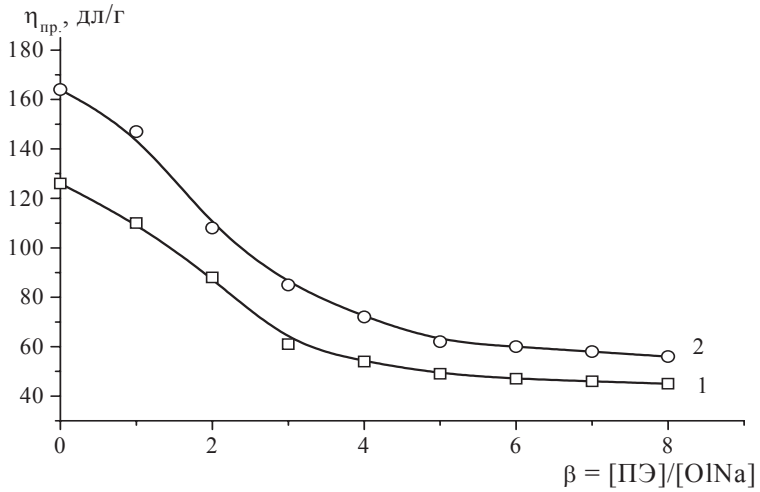

Figure 4 – Dependence of brought viscosity of HPAN- OlNa (1) and PAA- OlNa (2) polycomplexes from relative concentration of polyelectrolytes. OlNa concentration - 0,01 mol/l

Results of the studies show increasing of brought viscosity of compositions of polyacrylonitril derivatives with surfactants that is conditioned by compactization of macromolecular chains, conditioned by formation of polycomplex and reduction of the size of the particles [1, 2].

The profound change of both kinetics of adsorption and isotherm of superficial tension occurs at the addition of surfactant that influence upon the system stability [3-5].

For obtaining of additional information about particularity of the change of surface activity and adsorptions of macromolecules in the course of forming of the compositions, is calculated the meaning of the standard free energy of adsorptions PAA, HPAN and their compositions with sodium oleat, which are also presented in table 1.

Table 1 - Adsorption parameters of PAA, HPAN and their compositions with sodium oleat. T = (298±1) K

Component	$G_{Re}x10^{-1}$, Dj m / Kmol	$\Delta_{ads}G^{o}_{298}$, kDj /mol
PAA	7.8±0.1	-19.1±0.1
GPAN	1,27±0.1	-17.0±0.1
PAA-sodium oleat	14.01±0.1	-23.0±0.1
GPAN- sodium oleat	4,9±0.1	-21.2±0.1

From the calculated values of surface tension of compositions of polyacrylonitril derivatives with sodium salts of oleic acid follows, that formation of a composition leads to increase in surface activity and reduction of standard free energy of polymers adsorption. Increase of pH with growth of polymer concentration in a mix testifies about interaction between sodium salts of oleic acid with polymers by formation of hydrogen bonds that leads to change of macromolecules adsorbtion parameters in mixes.

Reduction of standard free energy of macromolecules adsorption during of complex formation testifies about macromolecular hydrophobization during formation of the compositions, leading to increase in their surface activity and ability to adsorbtion on interfaces.

Thereby, adsorption parameters of compositions of PAA, HPAN with surfactants show that formation of compositions between Hydrolyzed Polyacrilonitril, Polyacrilamide and sodium oleat brings to increase of the surface activity and reduction of standard free energy of polymer adsorption.

Thereby, results of the investigation of colloidal-chemical properties of compositions of PE with surfactants allow to conclude that one of the possibilities to forecast the possibility their efficient use for regulation of physico-chemical characteristics of the dispersion systems can be variation of the nature, correlations of components and conditions of the media.

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Полиэлетролит материалдары композицияларының коллиодты-химиялық қасиеттері

Жұмыс полиакрилонитрил туындыларының полиэлетролит материалдары композицияларының коллиодты-химиялық қасиеттерін зерттеуге бағытталған. Зерттеу нәтижелері фазалар шекарасында жүретін үдерістеріне сәйкес өнеркәсіптің әртүрлі салаларында қолдануды теориялық негіздеуге мүмкіндік береді.

Кілттік сөздер: *полиэлетролит материалдары, полиакрилонитрил туындылары, композиция, натрий олеаты, модификация.*

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Коллоидно-химические свойства композиций полиэлектролитных материалов

Работа направлена на исследование коллоидно-химических свойств композиций полиэлектролитных материалов на основе производных полиакрилонитрила. Результаты исследований позволяют научно обосновать их применение в различных областях промышленности, где процессы протекают на границах раздела фаз.

Ключевые слова: *полиэлектролитные материалы, производные полиакрилонитрила, композиция, олеат натрия, модификация.*