

## CURRENT STATE OF PROTECTIVE AND DECORATIVE PROPERTIES OF WATER-DISPERSION ACRYLIC COMPOSITIONS

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**Abstract.** *Introduction.* The rapid progress of water-dispersion paints from the water-diluted group is due to a number of their advantages over other paint and varnishes from the category of environmentally friendly. The formulations of paintwork materials are dominated by aqueous dispersions of acrylic copolymers, acrylic styrole copolymers, homo- and copolymers of vinyl acetate. One of the main methods of targeted regulation of the properties of polymer composite materials and coatings is the use of surfactants (surfactants). As a result of adsorption phenomena, their physical interaction with the surface of dispersed particles and substrate, associations with film-forming molecules can significantly change the deformation-strength, insulating, adhesive, coloristic and other properties of paint coatings. *The purpose* of the work is a reasonable choice of polymer surfactants for obtaining water-dispersion acrylic coatings with a given set of properties. This determines the relevance of research. *Objects.* Film former - acrylic polymer, inorganic pigment - rutile-shaped titanium dioxide, modifying additives - polyestersiloxane copolymer (PES) and sodium polyacrylate (PAN), aqueous solvent. *Conclusion.* Analysis of the state and current trends in paint and varnish materials indicates the prospects of using water-dispersion acrylic compositions. The study of the physical and chemical regularities of processes involving surfactants, developed both in the volume of film-forming and at the interphase boundaries of its interface with pigment and air, is an important prerequisite for the formation of scientifically based approaches, when obtaining effective protective and decorative properties of coatings of water-dispersion compositions.

**Keywords:** paint and varnish materials, water dispersions, acrylic polymers, surfactants, dispersed particles, adsorption, titanium dioxide, polyestersiloxane copolymer, sodium polyacrylate

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## 1. Introduction

Currently, when using paint and varnishes (paints), great attention is paid to environmental aspects, which leads to a large-scale replacement of organ-diluted paints with water-diluted paints.

As is known, in technological practice there are primary and secondary aqueous dispersions of polymers, in which the dispersed phase consists of spherical polymer particles with a diameter of less than 1  $\mu\text{m}$ , and the dispersion medium is water. In the paint and varnish industry, primary dispersions obtained by emulsion polymerization are the most common. As a result of emulsion polymerization, unlike polymerization in a solution (secondary dispersion), polymer macromolecules contained inside dispersed phase particles are obtained. This allows the use of high-molecular polymers as filming agents for water-dispersion paint and varnish materials (WD-PVM), which cannot be used as solutions due to their high viscosity. As world experience shows, the formulations of paintwork materials are dominated by aqueous dispersions of acrylic copolymers, acrylic copolymers, homo- and copolymers of vinyl acetate. Due to the multi-stage synthesis processes, polyacrylates are more expensive than styrene and vinyl acetate, but have a number of significant advantages. Acrylic coatings are almost transparent for ultraviolet rays, so the processes of destruction of the filming agent in them are much slower, as a result of which they are not prone to yellowing and retain shine under prolonged weathering.

However, despite the advantages of acrylic coatings, they, like all kinds of water-diluted paints, are inferior to organ-dilutable ones in anti-corrosion properties.

The organization of reliable and long-term coating protection is one of the priorities in WD-PVM technology. Modern technological solutions are focused on the introduction into their composition of surfactants (surfactants), which have the ability to purposefully change the surface energy of film formers at the interface with contacting phases (air, steel substrate, pigment), to regulate the processes of wetting of pigment particles, their disaggregation and stabilization. This allows you to obtain dense, impermeable to aggressive environments insulating films of acrylic coatings. In addition, increasing the wetting capacity of paint and varnish compositions of the steel surface increases the adhesion of the coatings they form. High adhesive strength, in turn, prevents the formation and spatial growth of corrosion products under the WD-PVM film, which improves the protective capacity of coatings. However, there are no universal multifunctional action modifiers.

## 2. Protective and decorative properties based on water-diluted paint compositions

Various parameters characterizing the protective properties of water-dispersion paint coatings (vapor permeability, moisture absorption, resistance to

atmospheric factors and aggressive media) depend on the quality of dispersion of pigments and fillers. According to modern ideas, the process of penetration of various substances through the coating consists of sorption (dissolution), diffusion and desorption on the back of the film. When filling polymers, factors not related to interphase interactions make a certain contribution to their insulating ability. These include an increase in the length of the diffusion pathway of penetrant molecules associated with the need to bend the filler particles and a decrease in the cross-section of the matrix available for penetration [1]. On the basis of model ideas about the process of penetration of gases, vapors and liquids through media containing impermeable inclusions, a number of mathematical expressions linking the barrier and diffusion characteristics of filled polymers with the volume fraction, shape and packaging density of dispersed phase particles were obtained and tested in practice [2]. The protective effect of coatings depends on the specific properties of individual pigments, for example, on photochemical activity, which can change when dispersion changes. Thus, the size of pigment and filler particles also affects the protective and diffusion properties of coatings, and, in most cases, the increase in dispersion helps to increase the protective effect of paint coatings. Adhesive strength plays a special role in the protective and decorative action of coatings. In general, adhesive strength is a multifactorial indicator, depending on the nature of the polymer and substrate and the conditions of coating formation. The highest adhesive strength is provided by coatings made of monomeric or oligomeric film formers, which are converted into a polymer (three-dimensional) state directly on the substrate. Monomers and oligomers are in some cases capable of chemisorption on the surface of metals; their subsequent polymerization or polycondensation leads to the formation of vaccinated polymers chemically associated with the substrate [3]. In the case of polymers, there is often a relationship between the adhesive strength and the cohesion of the film material. Adhesive strength increases with the increase in the content of functional polar groups in the film (-OH, -UN, -SON, -SONH<sub>2</sub>, -SON, -OSONN), the cohesion energy of which is 25-65 kJ/mol.

The increase in the polarity of the monomer ensures an increase in the adhesive properties of films. Thus, when 4.3% methacrylic acid is introduced into the acrylic copolymer, adhesion to glass increases from 8.2 MPa to 12 MPa [4], with an increase in the methacrylic acid content first leading to increased adhesion, and then the coating begins to crack and peel off. The existence of a "critical" concentration characteristic of all polar hydrophilic monomers, above which there is a deterioration of properties, is due to the rapid evaporation of water during film formation and a significant increase in internal stresses due to strong intermolecular interaction. To a lesser extent, this is manifested in copolymers containing etheric groups.

Among polymer protective colloids, polyvinyl alcohol with varying degrees of acetylation, amides of polyacrylic and polymethacrylic acids, polyvinylpyrrolidone, copolymers of maleic anhydride with styrene, copolymers

of methyl methacrylate with methacrylic All these compounds have low surface activity, but when they are adsorbed on the interphase surface, a protective structural and mechanical layer with viscoelastic properties arises. Depending on the specific conditions, the molecules of protective colloids on the interphase surface can take different conformations. At increased concentrations of protective colloids necessary for the formation of stable emulsions, they form gel-like three-dimensional structures at the phase interface, and not all molecules of the protective colloid are in direct contact with the surface.

The appearance of three-dimensional structures determines the stability of the resulting emulsions, which is directly related to the mechanical properties of interphase layers. However, a direct correlation between the structural and mechanical properties of adsorption layers and their stabilizing effect is not always observed. This is due to the fact that at high mechanical strength of the adsorption layer, its components of the macromolecules of the protective colloid have limited mobility. Under dynamic conditions of emulsion polymerization, defects in the adsorption layer resulting from its deformation are eliminated very slowly, which leads to a decrease in the stability of the emulsion [5]. It is believed that there should be a three-dimensional structure with optimal mechanical properties that ensure the formation of a viscous adsorption layer while maintaining its mobility.

The action of another group of stabilizers, suspensions of finely dispersed powders of water-soluble mineral compounds, is also based on the creation of a structural and mechanical barrier at the phase interface that prevents the coalescent of monomer drops [6]. For emulsion polymerization, such compounds as  $\text{CaSO}_3$ ,  $\text{Ca}_3(\text{PO}_4)_2$ ,  $\text{CaF}_2$ ,  $\text{Mg}(\text{OH})_2$ ,  $\text{MgCO}_3$ ,  $\text{Mg}_3(\text{PO}_4)_2$ ,  $\text{Al}(\text{OH})_3$ ,  $\text{BaSO}_4$ , etc. are used as stabilizers of this type. The main ideas about the mechanism of action of such stabilizers are formulated by Rebinder [7]. The surface of mineral stabilizer particles has a complex structure. Most of it is hydrophilic and well wetted with medium. At the same time, there are hydrophobic areas on the surface of the stabilizer particles, thanks to which it is possible to contact the particles with the monomeric phase due to the adhesion of particles by hydrophobic areas of the surface to the drops of the monomer, a protective shell is formed on their surface, which serves as a structural and mechanical barrier against the processes of their coalescence. This protective shell can be a multi-layer coating that creates a spatial coagulation frame that strengthens the protective layer. Mineral stabilizers are often used in combination with low molecular weights, the role of which is to partially hydrophobize the surface of stabilizer particles. It should be noted that surfactants during emulsion polymerization can be formed directly in the reaction system. It is shown that emulsion polymerization of styrene in the presence of  $\text{K}_2\text{S}_2\text{O}_8$ , along with the simultaneous use of an oil-soluble initiator, leads to the formation of small amounts of oligostyrene with terminal sulfate groups due to partial polymerization of styrene in an aqueous solution.

Oligomeric molecules are essentially surfactants modifying the particles of the  $\text{Ca}_3(\text{PO}_4)_2$  stabilizer. This technique has not yet been widely used, which may be due to the risk of partial flow of the emulsion polymerization process, which is known to be implemented even in the absence of surfactants when initiating a reaction with water-soluble compounds such as persulfates.

In the future, protective coatings may not contain anti-corrosion pigments and corrosion inhibitors used in our time, providing protection for the substrate due to its excellent barrier properties. The structure of the coating, which provides optimal barrier properties, is influenced by the chemical structure of the polymer filming agent, the quality of dispersion of pigments and fillers, as well as the affinity of the surface of the substrate and the polymer matrix. Improving the structure of the coating leads to a decrease in its permeability to water, electrolytes, gases, increased adhesion, resistance to cracking and other mechanical damage. It is believed that modern development in the field of anti-corrosion water-dispersion paints and varnish materials is aimed, to a large extent, at improving the barrier properties of coatings through the use of high-quality new generation filming agents and pigmentation additives, however, still prevailing, quantitatively and effective, in terms of time, money and achieved technological indicators, were a variety of methods of modifying water-dispersion paint and varnish compositions by various modifiers.

The introduction of various modifiers into the formulation of water-dispersion paints allows to improve technological (storage resistance, defect-free application) and operational (adhesive strength, light, thermal, water, abrasion resistance, scratch resistance) properties of coatings, intensify technological processes, reduce raw material consumption, reduce the duration of the technological process, energy and labor consumption per unit of produced paint material, increase the environmental completeness of paints used in industry and construction, contributing to the intensive replacement of traditional organ-dilutable paint and varnish materials with these materials [8].

The theoretical basis for the effective use of additives, practical tests assessing the effectiveness of their action in paintwork materials are the chemistry and physicochemistry of polymers, the theory of surface phenomena and colloidal chemistry [29]. One of the promising ways in this direction is to improve the quality of water-dispersion paint and varnish compositions with the help of various types of surfactants, which reduce production costs and are quite easy to operate. The effectiveness of the modifier in a specific formulation depends on the correct choice (according to the function that is required), on its presence in the formulation at the optimal concentration and in the appropriate phase state (molecule, associate, microstructure), on the presence of the additive "in the right place" in the required concentration (wetting agent - at the border with the pigment or substrate, etc.).

The effectiveness of the surfactant can be judged by its minimum concentration in the recipe, which provides the desired result [9]. The action of

surfactants is due to the formation of an adsorption layer on the surface of the pigment and filler, the properties of which, in turn, are determined by the formation of its internal and external parts. The inner part of the adsorption layer is formed by the interaction of polar groups of surfactants with the active centers of the surface, which contributes to the peptization of aggregated particles of pigment and filler and the formation of elements of the coagulation structure. The outer part of the adsorption layer is formed when the hydrocarbon radicals of surfactant molecules are oriented into a polymer medium, increasing the lyophilicity of the surface of pigment particles combined with it [10]. When introducing polar hydrophilic pigments into non-polar hydrocarbon media, modifiers with long hydrocarbon chains (hydrophobic agents) are used, for example, saturated carboxylic acids, acrylates or their salts, as well as quaternary ammonium salts and other compounds. For polar dispersion media, surfactants are used as modifiers of the pigment surface, the molecules of which contain polar groups in the hydrocarbon radical that are lyophilic in relation to the polymer dispersion medium (i.e. bifunctional compounds of various types) [11]. This applies to all types of paint and varnish materials containing as a binder solutions of polymers in organic solvents (or in water for water-soluble polymers), water-dispersed binders. In recent years, polymer surfactants have been developed and used, which, due to their high affinity for polymer filming, can be even more effective than their low molecular weight analogues. An important role is played by the nature of polar groups of surfactants and the structure of hydrocarbon radicals of their molecules, as well as the chemical nature of the polymer and the presence of polar functional groups in its molecules. In suspensions of water-dispersion paints, the development of aggregation and disaggregation processes depends both on the surface properties of the solid-phase particles themselves and on the quantitative and qualitative composition of film-forming, solvents and surfactants.

### **3. Modernization of paintwork forms based on the use of new film formers**

The priority of a solvent is determined by its solvent and dilution capacity in relation to filming agents, their impact on the technological characteristics of suspensions during storage and operation (spraying, delamination), freshly applied films on the substrate (fluidity, wetting of the substrate), dynamics and quality of formation of coatings of paintwork coating. In recent years, there has been a steady trend in the formulations of water-dispersion paints and varnishes in the content (up to the complete exclusion) of a number of traditional solvents (solvent, toluene, xylene) due to their toxicity, as well as the economic feasibility of using paints and varnishes with high dry residue [12]. The size of dispersion particles affects many important properties of the filming agent, such as film-forming ability, coating shine and the ability to penetrate porous substrates. Moreover, the particle size strongly affects the area of the inner surface of the

system and thus determines the required amount of stabilizer. The simplest experimental method of determining the size of particles is to measure the turbidity or light transmission of diluted solutions (0.01%) of dispersions: when the size of particles decreases, their light transmission increases. In addition, the color of the undiluted dispersions varies from milky white at a particle size of more than 200 nm through light blue at a particle size of less than 100 nm to almost transparent for dispersions with a particle size of less than 30-40 nm.

Dispersion producers often cite the light transmission value (the ratio of turbidities of 0.01% of dispersion and water) as a parameter characterizing the size of the particles. However, light transmission depends not only on the size of the particles, but also on the difference in the refractive indexes of polymer and water. Due to the higher refractive index of polystyrene compared to poly(methyl)acrylates, styryl dispersions are characterized by lower light transmission than pure acrylic ones, with the same average particle size. Currently, accurate determination of the size of dispersion particles is carried out by laser scanning. More complex methods such as analytical centrifugation, electron microscopy with image analysis or capillary hydrodynamic fractionation are used to obtain information on particle size distribution [13]. As noted above, among aqueous paints, the most common materials are the dispersions of acrylic copolymers (individual acrylates), acrylic copolymers (styrene acrylates), as well as homo- and copolymers of vinyl acetate (with ethylene, ethylene vinyl chloride, acrylic or methacrylic acid esters) [14]. The main components for their production are methacrylic and acrylic acid compounds, acrylic acid esters, etc.

Acrylate links in the composition of the copolymer give the film elasticity, and this effect increases with the increase in the length of the alkyl radical. The copolymer can be introduced into ionogenic or non-ionogenic polar monomers (acrylic and methacrylic acids, acrylamide, etc.) in large quantities leading to water solubility, and in small ones (up to 5%) - to increased adhesion and the ability of the copolymer to sew intermolecularly [15].

Improving the water resistance of films formed from a copolymer containing methacrylamide is associated with the fibrillary orientation of the polymer in the film, which leads to the greatest implementation of interaction between the polar groups of the polymer [16]. The industrial production of acrylic acid and its derivatives is well mastered: they are obtained from propane, and methacrylic acid and its esters are obtained from 2-hydroxy-2-methylpropyl nitrile, isobutane or isobutyraldehyde as a result of multistage processes. It should be noted that the listed monomers have a higher cost than styrene and vinyl acetate [17]. It should be noted that methacrylic compounds have found the main application in the production of solid polymeric materials and products based on polymethyl methacrylate, and plasticized polymers of acrylic acid esters are mainly used in the production of aqueous dispersions obtained by emulsion polymerization [18]. Such dispersions during drying form aging-resistant polymer films that have good adhesion to most surfaces. Their disadvantages include low hardness (when using

acrylic acid and its derivatives), as well as incompatibility with some functional additives for paint and varnish materials.

Improving the water resistance of films formed from a copolymer containing methacrylamide is associated with the fibrillary orientation of the polymer in the film, which leads to the greatest implementation of interaction between the polar groups of the polymer [19]. The industrial production of acrylic acid and its derivatives is well mastered: they are obtained from propane, and methacrylic acid and its esters are obtained from 2-hydroxy-2-methylpropylonitrile, isobutane or isobutyraldehyde as a result of multistage processes. It should be noted that the listed monomers have a higher cost than styrene and vinyl acetate. It should be noted that methacrylic compounds have found the main application in the production of solid polymeric materials and products based on polymethyl methacrylate, and plasticized polymers of acrylic acid esters are mainly used in the production of aqueous dispersions obtained by emulsion polymerization. Such dispersions during drying form aging-resistant polymer films that have good adhesion to most surfaces. Their disadvantages include low hardness (when using acrylic acid and its derivatives), as well as incompatibility with some functional additives for paint and varnish materials.

This problem is solved by copolymerization of acrylic compounds with a number of other substances: siloxanes, vinyl acetate, simple esters, including styrene, which further reduces the cost of dispersions obtained. In connection with the above, it can be argued that the use of acrylic dispersions as a binder WD-PVM allows to obtain coatings characterized by increased water resistance, moisture permeability, hardness, gloss, it is worth noting that the cost of paints obtained on their basis is much lower than that of materials on poly(met)acrylic emulsions. Acrylate-based dispersions are among the most common paints on the market, thanks to a good combination of price/quality criteria. As for pigments, the increase in their nomenclature was carried out mainly due to the use of materials with universal functional properties that provide effective mechanical protection of the metal substrate from prolonged exposure to mechanical and chemically aggressive media, as well as high decorative characteristics [20].

#### **4. Conclusion**

Analysis of the state and current trends in paint and varnish materials indicates the prospects of using water-dispersion acrylic compositions. Modern technological solutions for their improvement, in order to organize reliable and long-term protection, are based on the modification of aqueous dispersions of polymers with surfactants for multifunctional purposes.

Modification with the use of surfactants is favorably characterized by multifunctionality and at the same time selectivity of the action, which is due to the peculiarities of their composition, the possibility of localization (restriction) of their functional activity within one effect due to their insignificant quantitative



consumption or ensuring a complex manifestation through the simultaneous introduction of several different-type additives into The role of surfactants in the direct improvement of the protective and decorative properties of coatings of water-dispersion compositions is to reliably isolate the substrate from contact with aggressive media (oxygen, water) through the formation of impermeable, dense coatings based on targeted dispersion of pigments and stabilization of fineness states.

The range of surfactants with inhibitory and barrier mechanisms varies in their type of functional groups and hydrocarbon radicals.

The stabilizing and dispersing activity of surfactants is determined by the size and nature of adsorption (strength, orientation in radical space, packaging density of surfactant molecules and thickness of the adsorption layer) respectively on the substrate and pigment and generally depends on the composition of both the modifier (type and structure of add The mechanism of formation of surfactant adsorption coatings is based on the general provisions of the theory of adsorption of them from solutions; at the same time, in real paint systems, it is necessary to take into account the adsorption of other components of water-dispersion paint and varnish materials - filming agents competing with surfactants. From the standpoint of resistance to long-term weathering and UV irradiation, the shine of the formed coatings, as well as physical and chemical prerequisites for modification, film-forming based on acrylic polymers are the most preferable.

## СУ ДИСПЕРСИЯЛЫҚ АКРИЛ ҚҰРАМДАРЫНЫҢ ҚОРҒАУ ЖӘНЕ СӘНКЕРЛІК ҚАСИЕТТЕРІНІҢ ҚАЗІРГІ ЖАҒДАЙЫ

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**Түйіндемe.** *Кіріспе.* Сумен сұйылтылатын топтағы сулы-дисперсиялық лак-бояу материалдарының (ЛБМ) жылдам ілгерілеуі экологиялық қолайлы санаттағы басқа лак-бояу материалдарымен салыстырғанда олардың бірқатар артықшылықтарына байланысты. ЛБМ рецептураларында акрил сополимерлерінің, акрил стирол сополимерлерінің, гомо - және винилацетат сополимерлерінің сулы дисперсиялары басым. Полимерлі композициялық материалдар мен жабындардың қасиеттерін мақсатты реттеудің негізгі әдістерінің бірі беттік белсенді заттарды (ББЗ) пайдалану болып табылады. Адсорбциялық құбылыстардың, олардың дисперсті бөлшектер мен субстрат бетімен физикалық өзара әрекеттесуінің, пленка түзуші молекулалармен байланысының нәтижесінде деформацияның беріктігі, оқшаулау, адгезия, колористикалық және бояу жабындарының басқа қасиеттері айтарлықтай өзгеруі мүмкін. *Жұмыстың мақсаты* – берілген қасиеттер кешені бар су-дисперсиялық акрил жабындарын алу үшін полимерлі ББЗ негізделген таңдау. Бұл зерттеудің өзектілігін анықтайды. Суспензиялардың сипаттамалары, беттік белсенді заттармен модификацияланған сулы-дисперсиялық акрил лак-бояу материалдары пленкаларының құрылымдық-механикалық және қорғаныш-сәндік қасиеттері зерттелді және ұсынылды. *Объектілер.* Пленка түзуші-акрил полимері, бейорганикалық пигмент –рутильді пішінді титан диоксиді, модификациялаушы аддитивтер – полиэфирсилоксан сополимері (ПЭС) және натрий

полиакрилаты (ПАН), сулы еріткіш. *Қорытынды.* Лак-бояу материалдарының жай-күйі мен қазіргі тенденцияларын талдау су-дисперсиялық акрил композицияларын қолданудың перспективалылығын көрсетеді. Сенімді және ұзақ мерзімді қорғауды ұйымдастыру мақсатында оларды жетілдірудің заманауи технологиялық шешімдері көпфункционалды беттік белсенді заттармен полимерлердің су дисперсияларын өзгертуге негізделген. Пленка түзуші көлемде де, оны пигментпен және ауамен бөлудің фазааралық шекараларында да дамытын баз қатысатын процестердің физика-химиялық заңдылықтарын зерттеу су-дисперсиялық композициялар жабындарының тиімді қорғаныш-сәндік қасиеттерін алу кезінде ғылыми негізделген тәсілдерді қалыптастыру үшін маңызды алғышарт болып табылады.

**Түйінді сөздер:** бояулар мен лактар, су дисперсиясы, акрил полимерлер, беттік белсенді заттар, дисперсті бөлшектер, адсорбция, титан диоксиді, полиэфирсилоксан сополимері, натрий полиакрилаты.

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## СОВРЕМЕННОЕ СОСТОЯНИЕ ЗАЩИТНО-ДЕКОРАТИВНЫХ СВОЙСТВ ВОДНО-ДИСПЕРСИОННЫХ АКРИЛОВЫХ КОМПОЗИЦИЙ

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**Резюме.** *Введение.* Быстрый прогресс водно-дисперсионных лакокрасочных материалов из группы водоразбавляемых обусловлен рядом их преимуществ по сравнению с другими лакокрасочными материалами из разряда экологически благоприятных. В рецептурах ЛКМ преобладают водные дисперсии акриловых сополимеров, акрилстирольных сополимеров, гомо- и сополимеров винилацетата. Одним из основных методов целенаправленного регулирования свойств полимерных композиционных материалов и покрытий является использование поверхностно-активных веществ (ПАВ). В результате адсорбционных явлений, физического взаимодействия их с поверхностью дисперсных частиц и подложки, ассоциации с молекулами плёнообразователя могут значительно изменяться деформационно-прочностные, изолирующие, адгезионные, колористические и другие свойства лакокрасочных покрытий. *Целью работы* является обоснованный выбор полимерных ПАВ для получения водно-дисперсионных акриловых покрытий с заданным комплексом свойств. Этим определяется актуальность исследований. Изучены и представлены характеристики суспензий, структурно-механических и защитно-декоративных свойств пленок водно-дисперсионных акриловых лакокрасочных материалов, модифицированных поверхностно-активными веществами. *Объекты.* Пленкообразователь – акриловый полимер, неорганический пигмент – диоксид титана рутильной формы, модифицирующие аддитивы – полиэфирсилоксановый сополимер (ПЭС) и полиакрилат натрия (ПАН), водный растворитель. *Заключение.* Анализ состояния и современных тенденций лакокрасочных материалов свидетельствует о перспективности применения водно-дисперсионных акриловых композиций. Современные технологические решения по их совершенствованию, с целью организации надежной и долгосрочной защиты, базируются на модифицировании водных дисперсий полимеров поверхностно-активными веществами многофункционального назначения. Исследование физико-химических закономерностей процессов с участием ПАВ, развиваемых как в объеме пленкообразующего, так и на межфазных границах раздела его с пигментом и воздухом, является важной предпосылкой, для формирования научно-обоснованных подходов, при получении эффективных защитно-декоративных свойств покрытий водно-дисперсионных композиций.

**Ключевые слова:** лакокрасочные материалы, дисперсия воды, акриловые полимеры, поверхностно-активные вещества, дисперсные частицы, адсорбция, диоксид титана, полиэфирсилоксановый сополимер, полиакрилат натрия.

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