such as: pressure of shift, local turbulence, cavitations effects, and shock waves of pressure or depression, alternating impulses of pressure, forcing and dumping of pressure [4, 5].

It was established that velocities of shift of a stream should be equivalent to 2,0 $\cdot 10^5 s^{-1}$ for the first spinning rotor and 2,5 $\cdot 10^5 s^{-1}$ for the second spinning rotor. Such values of the velocities of shift of a stream provide intensive movement of the continuous phase such as aqua or aqueous solutions. The significance of pressure of shift of a stream must be 230 Pa for the first spinning rotor and 250 Pa, for the second spinning rotor. Tthroughout the processing of aqua and aqueous solutions in the conditions of hydrodynamic treatment differentiated as ΔP = 350 kPa near an outside surface of an internal spinning rotor; ΔP = 250 kPa near an outside stator surface; ΔP = 150 kPa near an internal stator surface; ΔP = 200 kPa near an internal surface of an outside spinning rotor. It was established that the significance of the linear velocities of a stream should be within 22 m/s for the first spinning rotor and 24 m/s for the second spinning rotor. There are many slits on the spinning rotors and stator. For the duration of the treatment slits can coincide on the rotors and stators. Significant pressures of the shift and microcirculation streams emerge as a result of the treatment of liquid heterogeneous solutions in working chamber and parts of the apparatus. These trying hydrodynamic conditions provide the opportunity to treat aqua and aquatic solutions with the initialization of the creation of structure formation and intermolecular interacting such as appearance volume three-dimensional structure from the hydrogen bonds. The character and rapidity of many physical and chemical processes which take place in such aquatic solutions converts. Moreover, the activity of the aqua depends from the transformations and hydrogen bonds which can shape connecting molecules. The change of physical and chemical properties and parameters of aqua and aqueous solutions has been established at processing application of hydrodynamic treatment which it is possible to explain change of reactionary ability, owing to beginning of carrying over of a proton in allied liquids such as water, aliphatic alcohols, water-ethanol mixtures with different percentage of ethanol and configuration of a grating of hydrogen bonds which in turn influences the structural transformations and a configuration.Throughout aqua processing by hydrodynamic treatment the potential of hydrogen, the potential of reduction-oxidation reaction and reactionary capability of aqua varies. For carrying out of process of hydrodynamic treatment of aqua it gave in to processing during exceptional time from 1s to 600 s. A significance of the potential of reduction-oxidation reaction in the course of processing by hydrodynamic treatment depending on processing time decreases on 60-65%. The consequences of researches are presented that the potential of reduction-oxidation reaction of aqua and aqueous solutions is significance actable and at interaction with atmospheric air rises. In the isolated without full of atmosphere systems the increase suggests itself a large amount more slowly.

Conclusions. Multifacetedexperimental, theoretical and analytical investigational studies demonstrated that hydrodynamic treatment of aqua and aqueous solutions may be appropriate for processing in technological processes of food industry, where hydrodynamic treatment are found to be an alternate to traditional processes. A complete study of experimental data showed that the use of hydrodynamic treatment of aqua and aqueous solutions allows obtaining solutions with improved physical and chemical parameters.

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RHEOLOGICAL PROPERTIES OF SUSPENSIONS FOR MEDICAL AND COSMETIC PURPOSE

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Annotation – an analytical review of the rheological properties of dispersed systems, which are part of soft dosage forms and decorative cosmetics, was conducted. The purpose of the study is to determine the types and properties of dispersion media used to obtain suspensions of medicinal and colorimetric purposes to determine the type of grinding machine. The main classifications of dispersed systems are analyzed depending on their rheological properties, as well as some of the most important characteristics of systems for technological and constructive equipment choices. Recommendations are made regarding the choice of equipment depending on the rheological type and characteristics, such as the adhesive-cohesive property, coagulation and sedimentation.

Introduction. The rapid growth of the level of diseases and the development of the pharmaceutical industry, as well as consumer demand for cosmetic products in connection with the development of the beauty industry, necessitates an increase in production and improvement of the quality properties of products.

Soft medicines such as ointments, pastes, liniments, gels, and decorative cosmetics (lipsticks, lip glosses, nail polishes and gel polishes, correctors, etc.) are concentrated dispersed colloidal suspensions or liquid-like substances, and are defined as non-newtonian fluids. They have a spatial structure that, under external influence, is capable of being destroyed and restored.

The main part. There are a large number of classifications of products depending on the rheological properties. Depending on the classification of real dispersed systems by structural and mechanical properties according to P.A. Rebinder, there are two main classes of dispersed systems:

- coagulation structures are formed by the interaction between particles and molecules due to Van der Waals cohesive forces. Have the property of thixotropy. As an example of such structures, you can specify ointments, pastes (dental, external use and concentrates pigment blanks), lip gloss, liquid lipstick. The optimal equipment for grinding this type of structure is beaded, jet, three-roll, colloid mills.
- coagulation crystallization structures are typical for coherently dispersed systems - systems with a solid dispersion medium. They give bodies strength, brittleness and are not restored after destruction. As an example of such structures, you can specify metals, alloys, ceramics, concrete, stick lipstick, nail polish (including gel polishes). The optimal equipment for grinding this type of structure is beaded, jet, three-roll, colloid mills.Among dispersed products more often Total meet coagulation system structure. In addition, it is worth considering the fact that most of the soft dosage forms and cosmetic products are suspensoids and require the use of stabilizers.

Among dispersed products, systems with a coagulation structure are most common. In addition, it is worth considering the fact that most of the soft dosage forms and cosmetic products are suspensoids and require the use of stabilizers.

One of the most important properties of disperse systems is the adhesion property, i.e. sticking and sticking of particles of the system among themselves and on the working surface of the equipment due to molecular interaction Allocate adhesive character, cohesive and mixed, adhesive-cohesive (stickiness). For strongly sticky systems, it is recommended to use three-roll mills. Some suspensions such as Bingham, pseudoplastic or viscoelastic bodies, which are characterized by cohesion, are recommended to be ground using bead, colloid and jet mills.

Based on a generalized classification, the selection of grinding equipment was made depending on the group of non-Newtonian fluids (Table 1).

Table 1 - Choice of grinding equipment depending on the rheological type of dispersed systems

№	Title	Properties	Examples	Recommended Equipment
	Non-newtonian fluids with rheological characteristics that do not depend on time			
1	Bengam plastic	The structure is completely destroyed and flows. Later the structure is restored. Characterized by adhesion	Margarine, chocolate mixes, liquid soap and detergents, oil paint, toothpaste.	Bead, three-roll, vibration, jet mills
2	Pseudoplastic	The viscosity of the fluid decreases with increasing shear stresses. Characterized by adhesion	With acharic solutions, candy masses, starch suspensions, mayonnaise, nail polish, paints, blood, glue	Bead, three-roll, colloid, jet mills
3	Dilatant fluids	Viscosity increases with increasing shear strain rate	Condensed milk, solutions of corn flour, sugar, starch, polymer glue	Three rolls, jet mills
4	Imperfect plastic fluids	Plastic flow, during which there is a disproportionate relationship between shear rate and stress. characterized by adhesion	Butter, waffle dough	Three-roll, colloid, jet mills
	Non-newtonian fluids with rheological characteristics that depend on time			
1	Thixotropic liquids	The ability to reduce viscosity from mechanical stress and increase viscosity at rest	Minced meat, cocoa mass, praline and truffles, cell cytoplasm	Bead, vibration, colloid, jet mills
2	Reopectic liquids	Sequential structure formation during shear (inverse tixotropy property)	Gypsum, plaster paste, printer ink, some lubricants	Bead, vibration, colloid, jet mills
3	Viscoelastic fluid	Materials exhibit both viscous and elastic properties. Characterized by adhesion	Viscous resins, dough, polypropylene and polyamide polymers	Three-roll , colloid and jet mills

Conclusion. An analysis was made of the rheological types of suspensions and their properties, as a result of which it is possible to draw the following conclusions:

1. All food, pharmaceutical and cosmetic disperse systems have to some extent adhesive and cohesive character. For suspensions with strongly pronounced stickiness, the use of three-roll mills is recommended. For suspensions with less pronounced stickiness, it is recommended to use colloid, jet and bead mills.
2. Suspensions have coagulation properties (coalescence of particles due to Van der Waals cohesive forces). The most striking example of coagulation is pigment pastes for the production of decorative cosmetics, especially titanium dioxide

suspension. Such suspensions are not recommended to be crushed by other mills, except for three-roll ones. However, using a stabilizer or adding, for example, resins for paint products, it is possible to use bead mills.

3. Most of all components and finished suspensions have sedimentation, because are suspensions and require the use of stabilizers. For the production of paints and concentrated pastes for decorative cosmetics using stabilizers based on surfactants.

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К ВОПРОСУ ОПРЕДЕЛЕНИЯ АДГЕЗИОННОЙ ПРОЧНОСТИ ПОКРЫТИЙ НА ЖЕЛЕЗНОЙ ОСНОВЕ ПОСЛЕ ЛАЗЕРНОГО ЛЕГИРОВАНИЯ

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Резюме − Исследовано влияние режимов лазерной обработки клеевых и газотермических покрытий из порошков на железной основе после лазерного модифицирования B_4C *на адгезионную прочность покрытий.*

Увеличение требований техники и промышленности к свойствам поверхностных слоев вызывает необходимость создания композиционных многокомпонентных покрытий, включающих в свой состав химические соединения различных металлов. Лазерное легирование широко используется как при изготовлении новых, так и при восстановлении изношенных деталей машин. Для этой цели широко используются такие материалы как карбиды бора [1], карбиды вольфрама [2], молибден и оксиды циркония [2].

Самофлюсующиеся сплавы на железной основе чувствительны к энергетическому воздействию и добавлением легирующих элементов. При лазерном легировании появляется реальная возможность для увеличения точности дозирования подвода энергии и легирующих элементов [4, 5].

При единичном и мелкосерийном производствах может быть затруднительно изготовление деталей с покрытиями методами плазменного напыления. Это связано, прежде всего, с высокой стоимостью и технологической сложностью применяемого для напыления оборудования. В этом случае покрытия и легирующие материалы могут быть нанесены на части деталей клеевым методом, который заключается в применении связующих веществ в порошковой композиции.

Кроме того, покрытия, нанесенные на детали, подвергаются воздействию механических нагрузок, а прочность сцепления является лимитирующей для их использования. Лазерный переплав клеевых композиций повышает их адгезию, при этом максимально сохраняя исходные свойства порошка и его структуру.

Цель работы – изучение влияния параметров лазерной обработки и дополнительного легирования на адгезию покрытий системы Fe−Cr−B−Si, получаемых методами плазменного напыления и нанесения клеевой композиции, оплавленных лучом лазера.

Клеевым и плазменным методами наносили порошок ПР-Х4Г2Р4С2Ф. Покрытия исследовались методом штифтовой пробы. После подготовки поверхностей на них нее наносили кисточкой следующую композицию – 3% клея БФ –2 и 97% ацетона. Во втором случае, порошок наносился с помощью плазменной установки УПУ-3Д с источником питания ИПН-160/600 и плазмотроном ПП-25 на режимах: I = 250 А, U = 80 В, P = 60 МПа. Толщина слоя, в обоих случаях, составляла 0,6 мм. Далее на два покрытия наносили желтую гуашь. Для одной из серий экспериментов вместо желтой гуаши на клеевую композицию использовали обмазку на основе карбида бора.

Оплавление покрытий, нанесенных клеевым и плазменным методами осуществляли непрерывным лазером ЛГН-702 мощностью N = 800 Вт при диаметре пятна лазерного луча от $d_{l} = 1{,}0 \cdot 10^{-3}$ м до $d_l = 3{,}0 \cdot 10^{-3}$ м со скоростями перемещения $V_1=0{,}83 \cdot 10^{-3}$ м/с, $V_2= 1{,}67 \cdot 10^{-3}$ м/с, $V_3= 2{,}5 \cdot 10^{-3}$ м/с, $V_4= 3{,}33 \cdot 10^{-3}$ м/с, $V_5=5 \cdot 10^{-3}$ м/с и коэффициентами перекрытия k = 0,8 и k = 1,2 с целью получения единого фазового состава и заданных свойств по всей толщине покрытия.

Исследования проводили с применением разрывной машины «RIEHLE» . Усилие плавно изменялось от 0 до 50000 Н. Применяли штифты из стали 40Х, которые были вставлены один в другой и притертые друг к другу. Форма торцевых поверхностей конусов – кольца концентрической формы конусов кольца концентрической