Bast crops colloid systems for future agrarian industry

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Abstract

Accordingly the phased consideration of such complex multifunction systems starts with models of constant pressure and constant volume with detailed consideration of each phase and the improved technologies being offered.

In the initial phase we plan modelling exercises to transfer already existing supramolecular compositions of polysaccharides to unsteady state via their formation from existing biological entities, represented by any plant with different composition and types of structural formations of cellulose and with different speed of its synthesis. (option for future production). The objective of the first phase is a possibility to control the structural changes which, according to the preliminary studies, can reduce the instability in a number of fibre properties.

This structure defines the morphology of fibre and energy of interaction between the structural elements. The properties of fibres and anisotropy of these properties are largely dependent on supramolecular (nanolevel of structural organization).

This study offers the development of new approaches, (model designs) and tools, as a mechanism for development of new technologies. Therefore, it is necessary to carry out a system of researches for studying the processes of structural changes during processing of native cellulose fibres. Development of such scientific instrumentation is associated with the consideration of molecular processes proceeding during secondary crystallization.

Systematisation and coordinated arrangement of realization of processes of secondary crystallization are the very objective of these researches. Without doubt, such processes as relaxation of internal stresses with specially selected plasticizers at elevated temperatures and their components; alternating thermal "swaying" of supramolecular and amorphous compositions; impact of pressure bring about the change of properties over a wide range.

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One of the basic peculiarities of this study is an effort being taken to perform a system modification of the properties of supramolecular structure of fibres at the phase immediately upon maturation of plant or (in the long term) detection of the moment the most favourable in structure formation for further directed modification of supramolecular structure.

Up to present these processes were performed by the nature itself and this is not just a month of "nature processing" due to complexity or just impossibility of removing products from amorphous phase. Photo (leaching out). While the components of this amorphous phase are unique in their chemical, physical/chemical, biochemical, general medical (presence of fatty acids), therapeutic, germicidal, immunoactive properties and other unique natural compositions. Tables - well-known comparative charts: plant — chemistry.

In the preceding studies, functional properties of surface active agents were activated and modified and as a result a possibility of realization of solution process for common and complex salt was created – dilution of inorganic and organic compounds, formation of adducts and associates.

Science team developed an approach for creation of universal solvent having the above mentioned properties on the basis of the agent with very frank cation acceptor properties.

As a result a compound is created, being less toxic than the solution of common salt. Such solvents can be (patent) one or several agents with the pronounced zwitterionic properties (picture of obtaining dimethyl sulfoxide), featured with a polar chart on the electronic acceptor bond of oxygen atom and availability of two electric repellent methyl groups (Photo).

Topical problem is a study of processes - without destructive extraction of the components from amorphous phase of polysaccharides and determination of diffusion rate of complex solvent and its fractional selectivity is a final objective.

Thus, for the combined researches on selective diffusion a resorption followed by dehydratation of system is offered — (carrying properties). Such "assistant" in the process of transportation of the dissolved components can be dimethyl formamide. It is necessary to mention the importance of considering the possibility of selective deposition of some agents in the systems under study that can result into creation of unique, natural membranes with radio and photo protecting properties.

The most well-known plant for more than 10,000 years is cannabis, cultivated almost in all ecological zones of the world. A considerable contribution to significant facilitation of apprehension of hemp plant capabilities was made by our partner, "Academic Selection Institute of Bast Crops of Ukraine" that fancied a crucially new type of hemp plant with a minimum content of narcotic components.

Due to the researches carried out on model samples it was found out that plasticization effect resulted into additional arrangement of structure providing a possibility for task-oriented change of deformability, and thus, durability of natural cellulose fibres under projected scope of use.

Increase in uniformity of properties makes it possible to suggest that as a result of plasticization the relaxation processes are also followed by the change in the heterolength of chains at the amorphous sections of structure. The study of such properties is a principal trend in the establishment of methods of physical and chemical impact on the modification of structural formations

Keywords: Wholegrain, Antioxidant, Phytonutrient, shelf life.

Immubilization kit

This nontrivial phrase was formed spontaneously during comprehensive consideration of new approaches for management of performance potentials of different structural forms of plant polysaccharides. All possible components contained in a plant during its maturation were taken as the initial ones and all possible forms of their application were considered. Possible options of their separation were then threshed over provided for preservation of functional properties. These properties come often internally into collisions and these collisions help on extraction of these unique substances though along with another, not less important, component. Among many relevant colloid/chemical tools we selected the following — wetting hysteresis, salting out, solubilization, sublimation, lyophilization, reverse osmosis,... Wetting hysteresis we'd rather demonstrate in the figures.

We offer an interpretation of "PACKING" as some kind of system like "COCOON", which protects, preserves, creates work environment (ability to carry out functional responsibilities – this includes mustardproof clothing and condoms, and tampons, and so on..

This study, during design of experiment, has the task to develop a research not only in terms of rational statistics but multidimensional modelling of interrelations between tensor values of stress and system components as well, where the destructions of materials take place, at least plastic deformations occur (a flow state is being set). And these very materials stop following Hook's law. Already long before destruction a flow property can be observed, large deformation without sensible increase in forces affecting the material. It is interesting that a stress corresponding to occurrence of flow property, further after referred to as tensile strength, appears to be one and the same during testing both for stretching and compression.

In that case in the course of research it is necessary to rely on representations of viscoplastic and viscoelastic body mechanics.

The suggested concept and procedure of setting a problem solution transform profoundly the existing patterns, and reconsider and modify age-old practice in this field.

Theoretical patterns of colloid and chemical formations for lyophilic colloids were taken as the basis for the study of the suggested concept.

Having chosen as the basis the existing formations of Staudinger, Flory and others, we propose to reconsider the processes of formation of the desired compounds already at the level of colloid lyophilic systems.

The basic idea is to combine and form the properties with the processes of macromolecule aggregation in polymer solutions, gels and others.

The similarity of ultimate fibres of cotton and flax stipulated the creation of hypothesis on transformation of the latter into cottonized "flax-like" fibre.

The need of improvement and development of new technologies is associated with imperfection of equipment for

flax preprocessing and with coarsening of flax fibre being observed for the current years. The two-time increase of metric count, increase of diameter of common fibres by 1.3-1.4 times, their hardness, high content of non-cellulose infusions yielded that from total volume of extracted fibre (25-30% of rotted straw weight) for the production of textile goods referred not more than 1/3, the rest of coarse raw material is not fully recalled.

The techniques of fibre adaptation to the techniques of cotton processing were based on the destruction of adhesive composite of middle lamellas and obtaining a mass of thin ultimate fibres looking like cotton for their processing pursuant to the cotton system of spinning.

Brief description and possibilities of new technology

The offered process charts are distinguished with contact free multifactor impact on the raw material using biochemical, physical and chemical effects within the environment of active water solutions, both individual and adopted ones.

While arranging the impact by means of currents of ionic conduction in local domains combined with electromagnetic radiation, from ultraviolet to infrared and low frequency band — we are able to produce multiple wedging effects during streamer formation, local ebullition of surfaces, forming interphase active hydraulic flows. These active flows are combined with alternating ranges of reversed physical and chemical pressure and create an interphase active tool for controlled variation of output properties, i.e. the properties of the desired permselective or filtering membrane – COCOON

The listed physical and chemical influencing factors initiate the formation of additional short-living active particles in the form of oxygen ions, OH-, compounds of HO2, H2O2, O3 and so on. The occurrence of particles and residuals of certain type can be intensified with electrically active water solutions – anolyte (pH 4-5) and catholyte (pH 12-13).

During treatment of raw materials in anolyte having oxidation chemical activity, the destruction of pectic substances and tissue lignin take place, followed by bast fibre and wood tissue. The shock waves and cavitation boost this process, ensure wedging out and abstraction of the cracked elements, and they also deliver solution into proximity spacings between fibre bundles (capillary effect). In addition to purification from accessory agents (unnecessary at a given instant), such processing stage provides the basis for ensuring required softness of fibre (if appropriate). Collateral effect of this processing of fibre materials using the offered technique is provided as their thorough asepsis due to bactericidal properties of anolyte, intensified by pulsed electric discharges.

At the following processing stage of fibre material – in catholyte, having reducing properties and containing a bigger number (than in anolyte) of such compounds as ions of OH- and hydrogen dioxide, further destruction of lignin and partial bleaching of fibre take place. Under effect of shock waves and cavitation hydrogen dioxide with present OH- resolves to ions of perhydroxyle of HO2, having higher bleaching properties. Besides, catholyte has higher dissolving, extracting and adsorptive/chemical activity facilitating further purification and separation of large fibre bundles. The result is an achievement of the desired softness, capillarity and degree of fineness (if required).

Thus, damage to ultimate fibres is excluded (occurs within conventional mechanical techniques of processing) and unique natural properties are preserved, such properties include high strength comparable to the best grades of steel with a degree of fineness similar to natural silk. The technology will make it possible to manufacture products with different features by means of simple change of the designed parameters. On top of everything else — our amorphous phase is filled with fatty acids 3, 6, 9, omega and their content in these cultures is considerable.

Stages for implementation of process solutions

Stage 1:

An indispensable requirement for introduction of the proposed technology is an INSTANT (harvesting time) processing of amorphous (fluid phase) of the plant injection of dissolving systems and active exploration in order to evolve the process of dissolution of the whole amorphous phase, it refers to ALL cellulose forming plants and their peeling (shell).

Stage 2:

Extraction and fractionation of a fluid phase into component parts and their conservation for further testing.

Stage 3:

Injection of bioactive, surface active, ion active solvents into the remaining matrix of polysaccharides. Activation of solubilization and salting out processes, i.e. formation simplification for lyophilic colloids in the modes of isochoric change of temperature parameters and vice versa, change of pressure during isothermal adsorption.

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