RHEOLOGICAL PROPERTIES OF FOOD FILM-FORMING GELS ON THE BASIS OF UROCONATE POLYSACCHARIDES

N. Kondratjuk, Y. Pyvovarov, A. Padalka, Y. Polyvanov

The effect of the composition of a mixture of uronate polysaccharides on the rheological properties of food film-forming gels was studied. The rheological features of 2% solutions (based on the total solids content) of sodium alginate with a high content of guluronates and low-esterified amidated pectin were investigated. The investigation systems are presented by the viscosity of the plastic matter and possess all the rheological properties of non-Newtonian fluids. In the course of the study we have got to know that the rheological characteristics of such liquids do not depend on the duration of the shear flow and remain constant in time. The dependence of the dynamic viscosity on the time of deformation of food gels at a constant shear rate was studied. From the analysis of the obtained rheological parameters it can be concluded that the structure of the gels is almost completely restored at low shear rates, even in the samples with the highest viscosity. As the shear rate increases, the destruction of the structures begins to predominate over the reduction process, and therefore the viscosity decreases. It is noted that the flow rheograms are non-linear over the whole range of the velocity measurements, which indicates that significant deformation stresses must be applied to destroy the structures. The rheogram shows that taking into consideration both a certain ratio of polysaccharides and the fact that due to the realization of the effect of the electrostatic interaction between the groups having a partially negative charge (-COOH, -OH) and partially positive charge (-COO Na, -CH₃, -NH₂), we can observe the effect of gel consolidation, based on the redistribution of the functional groups within the polysaccharide matrix. At the same time the compounds of hydrogen and water molecules are destroyed and they are removed into the outer layers of the gel matrix. It was shown that the composition of sodium alginate and low-esterified amidated pectin with the ratio of 1.6:0.4 respectively, turned out to be the most optimal by the values of the rheological parameters. The rheological parameters of this system are able to ensure the efficient fluidity from the dosing mechanisms, the ability to spread along the flat surface, and the adhesion to solid food surfaces aimed to fulfil a number of technological and production tasks.

Keywords: pectin, sodium alginate, food gels, rheological properties, uronate polysaccharides.