

## PHYSICAL RESEARCHES OF MODIFIED STARCHES SWELLING IN WATER

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The use of different methods of starch processing enables significantly alter its structure and properties. Hydrophilicity primarily belongs to these properties. Starches with modified hydrophilic properties form a large group of modified starches that tend to swell. The study of the modified starches properties is topical. These properties have to satisfy the technological requirements: serve as a thickener, stabilizer and gelling, have resistance to high temperatures, and be well assimilated and meet sanitary requirements.

The aim of the research is to determine the optimal concentration of starch in water in the swelling process by using a mechanical method of free torsional vibrations and dielectric method for the development of sustainable technologies of food concentrates of fast preparation, which are based on the modified starch raw materials.

The object of the research is modified potato and wheat starches.

We researched dependencies of damping decrement (a measure of internal friction) and electric capacity (a measure of electric dipole-dipole interaction) on the concentration of starch in solution to determine the optimal ratio of solvent and starch.

These dependencies are not linear for research starches.

Experimental curves can be divided into three zones. The first zone is characterized by the complete swelling of starch particles in water, which are in a suspended state considering its large number while their molecules are placed far apart from each other. This is confirmed by low values of damping decrement and electric capacity of the solutions. Swelling particles begin to touch each other in the second zone. This zone is characterized by the increasing the level of intermolecular interactions, which is leading to intensive growth of the damping decrement and capacity. Starch grains begin to stick surfaces due to the lack of solvent in third zone. Viscosity of system increases sharply and capacity reduces due to partial loss of dipole moments as a result of their compensation. That is why, the optimal concentration of the solvent and starch should be measured in the second zone, where there is the beginning of a sharp increase of the internal friction and maximum capacity of the solution.

Thus, the use of physical methods of swelling process is appropriate to determine the optimal concentration of starch in water.

**KEY WORDS:** Modified starch, optimal concentration, damping decrement, electric capacity