

A Multifunctional Device for Thermophysical Measurements

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In this work a new multifunctional device is considered. This device enables simultaneous measurements of thermophysical properties such as enthalpies, effective thermal capacities, melting points, differential and integral heat of phase transitions, initial moisture contents, and some other heat and humidity characteristics of the materials and food products at different temperature levels. Theoretical analysis of this device is based on a well-known principle of “regular regime”. The theoretical model of the device and the formulas used for determining different thermophysical properties are given in this article. Samples with volumes from 5 to 100 cc have been used for the measurements.

Another modification of the device allows for the study and calculation of thermal conductivities on plane samples with 1.5 cm thicknesses. This modification uses the same theoretical principle as was mentioned above.

The experimental procedure and treatment of its results was completely automated in both cases. It allows for the study of the kinetics of phase transitions in all kinds of materials both in the solid and liquid states during their freezing and thawing. The duration of the experiment does not exceed half an hour.

The thermophysical property data of different materials and food products in a wide spectrum of temperatures are described.