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INNOVATIVE SOLUTIONS TO RESEARCH IN DRYING

TECHNOLOGY OF FOOD RAW MATERIALS

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Reasons over of growing interest are brought in the processes of drying, and also some aspects of cooperation of industry and scientific university collectives in embodiment and application. The tendencies of research of processes of drying, that appear on the joint of different areas of science with the use of forward possibilities of technical process, are examined.

Key words: drying, intensity, efficiency, power aspects, dry food foods.

The main purpose of drying in food industry is preservation of dried product. Improving of drying technology provides increasing of technical and economic indexes, taking into account environmental considerations, improvement of product quality.

The growing interest in drying is recently observed in developing countries to compare with relatively stable in other continents [1, 2]. Also the interest to the drying process the amount of received patents on drying in the U.S. in the last two decades, up to 240 per year shows. [3] Considering the direction of the agrarian economy of Ukraine, development of drying technology is an attractive and promising. As a lot of different dried products are exported to Ukraine, the question of its own production is extremely acute.

Ways to intensify the process of drying. Reducing capital and operating costs of dryers depends on the feasibility of drying rate increasing with the following of product quality demands. It is known that the raw material for drying is characterized by surface and internal moisture. Drying rate in removing surface moisture depends on the value of the external heat transfer and mass transfer coefficient, because the mass transfer resistance is outside the dried material. The increasing of turbulence of drying agent, mechanical vibration or flow oscillations leads to high rates of drying. Ultrasound or sound effects increase the drying rate, but complicate the mechanisms of intensification. When using overheated steam at a temperature of inversion as desiccant drying rate becomes higher than the hot air, but at temperatures below the critical, we can see the opposite – it becomes lower. The use of an electromagnetic field can heat volume polar liquid that will evaporate. This virtually eliminates the heat transfer resistance of the material.

Most of these options of intensifying drying are tested [4]. However, not all ideas can be applied today, as most of them are associated with changes in quality of products. Moreover, the introduction of new technologies leads to a complication of equipment, requiring a pre-feasibility study to industrial application.

The use of multi-stage dryers. In the presence of surface and internal moisture in the material for effective following of the process of drying drying mode and even

type of dryers in some cases should be different to remove these two different types of moisture. Zoning of dryers along their length is typically used in conveyor and tunnel facilities to ensure optimum drying heat-sensitive materials with the intensification of the drying process. [4] Removal of surface moisture is even more intensive process, which requires a short residence time of the product in the dryer, while the removal of internal moisture is a slow process that requires a long exposure time and therefore, larger dryers. To extract mainly surface moisture are fluidized bed, roller, spray dryers, etc. For long-stay of raw circulation, tunnel, belt dryers, etc. are used. For the successful use of multistage drying raw material should have both types of moisture in sufficient amounts for two-stage drying process duration is sufficient for industrial implementation. In some cases, the first step can be used to remove surface moisture to reduce the adhesive properties of the product, sufficient for further drying, for example in a fluidized bed [5].

The use of modern trends intensify drying requires an integrated systems approach to multidimensional and multidisciplinary modeling of concurrent processes of impulse, energy and mass. Also, studies will need more active collaboration of researchers in order to achieve an effective contribution to basic research and industrial application. Future developments should take into account the constant increase in environmental and economic requirements, provided a high quality of finished product.

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