EXPERIENCE OF MODERNIZING A SPRAY DRYER FOR EXTRACTS OF THERMOPLASTICS

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Given the growing demand for dry extracts from various plant raw materials, the problem of obtaining them by spray drying is taking on new significance and relevance. But there is still no production, for example, of malt extracts still in Ukraine due to the complex thermal engineering aspects of such production and the problems arising during spray drying of plant thermoplastic and hygroscopic materials.

Our numerous studies have shown that high-yield (≥95%) dryers used to produce powders from a variety of plant extracts, mineral water and other liquid products, turned out to be unsuitable for obtaining powder malt and other extracts containing >65% of reducing sugars. A low diffusion coefficient typical for such extracts requires the time of flight of particles to be increased to ensure their complete drying, and in order to prevent adhesive depositing, to improve the structural and mechanical characteristics of the powder and to increase its yield it should be gradually cooled while mixing.

The ***objective*** of this work was to modernize industrial drying unit SUM-1.5 to obtain powder extracts of thermoplastics materials with low moisture and a long shelf life as well as to increase its yield.

Earlier, the Institute of Engineering Thermophysics of NAS of Ukraine developed a technology for producing various dry extracts with characteristic thermoplastic, hygroscopic and adhesion properties, which was tested and completed on spray dryer SUM-1.5. The test results were used to modernize SUM-1.5 taking into account the properties of these products as spray drying objects determined by the features of their chemical composition.

The unit modernization, which included increasing the height of a hopper under a cyclone and installing a powder cooling auger, and determining rational thermal engineering modes for drying, allowed to obtain a powder with a final moisture content of 2.5-3.2%, which contributed to reaching a 2-year shelf life, and to increase the dryer output to 93-95% due to the improvement of its structural and mechanical properties.

The obtained experience of modernizing SUM-1.5 demonstrated the opportunities of using existing industrial spray dryers efficiently after some improvements to the design of individual assemblies for unloading and cooling the powder, taking into account kinetics of drying liquids and their thermoplastic, adhesion and hygroscopic properties.

Modernized SUM-1.5 has been successfully integrated into the production line for dry medicinal plant extracts (althaea root, etc.) at the Ternopil Pharmaceutical Factory (TERNOPHARM LLC).