MASSTRANSFER APPARATUSES WITH A MOVING NOZZLE IN A THREE-PHASE FOAM LAYER FOR GAS PURIFICATION

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The improvement of heat and mass exchange equipment for sorption processes in the countercurrent contact of gas and liquid in combined block elements with a weighted spherical nozzle, as well as a more in-depth study of this process, is an urgent task for gas purification technology. Heat and mass transfer processes between gas and liquid are widely used in the chemical, oil refining, and energy industries. One of the promising directions of intensification of the mass transfer process is the development of devices using the principle of interaction of gas-liquid flows in a layer of moving bodies, so-called foam devices with a three-phase fluidized layer of an irrigated nozzle. The modern trend is to combine and combine plate and plug contact devices in one device. To increase the productivity of columns sectioned by plates, drop-type plates with a large free cross-section are used. However, such plates have low efficiency because they work at large values of splashing. In order to reduce the impact of splashing on the efficiency of the plate, in addition to the weighted nozzle, separators of a special design are placed in the separation space between the failed plates, which work as stabilizers of the three-phase foam layer when the apparatus is operating in the advanced bubbling mode.

Therefore, the mass transfer process, both in the gas and liquid phases, is significantly influenced by hydrodynamic parameters - the gas velocity in the apparatus and the specific load on the liquid, which indirectly affect the height of the liquid layer on the plate and the gas content of the layer, as well as physical chemical properties of interacting systems. For gas purification systems for gaseous components, it is necessary to ensure low liquid loads while maintaining a high degree of purification. This can be achieved by using a slump plate with a small or medium free cross-section and a newly developed spherical nozzle and stabilizer when the device operates in an advanced foam mode with stabilization.

The analysis of a number of studies shows that a promising direction for intensifying the mass transfer process is the development of devices with a three-phase fluidized bed of irrigated nozzles of complex shapes made of mesh materials. For gas purification systems from gaseous components, it is necessary to ensure low fluid loads while maintaining a high degree of purification. This can be achieved by using a slump plate with a small free cross-section and a newly developed nozzle.

The increase in the number of diverse and complex emissions into the atmosphere, which accompanies the growth of a number of industries, creates a need for efficient and reliable gas treatment plants. The intensification of foam devices has become possible thanks to the use of new designs with a foam layer stabilizer. The wave mode does not occur on the stabilizer grids, so the gas velocity in the full cross-section of the unit can be more than doubled and reach 5 m/s. Elimination of the foam layer oscillations leads to a significant increase in the height of the foam and the outlet liquid layer, and the degree of poorly soluble gases capture increases.