MATHEMATICAL MODELING OF THE CARBONIZATION COLUMN IN THE PRODUCTION OF SODA ASH

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The process of carbonization of ammoniated brine is the main process in the production of soda ash and its running has a significant influence on the technical and economic performance of the production of soda ash as a whole.

The main technological appliance of the carbonization section, in which the process under investigation is carried out, is a carbonization column. The complexity of the carbonization process consists in the fact that it proceeds with recurrent reactions, in which several reacting components take part. These components are in the three phases of the state during the process. Also, the complexity is characterized by unstable raw materials.

The change in the concentration of even one of the reacting components in the reaction mixture influents the final result of the process. The main indicator of the quality of the carbonization process is the degree of utilization of sodium. To achieve maximum utilization of sodium, optimal conditions for temperature and pressure are needed, and certain relationships between the reacting components in the reaction completion zone are required [1].

The system of saturation of ammoniated brine with carbon dioxide contains a saturation object (carbonization), which is the main object of production of soda ash by an ammonia method. From his activity depends the functioning of all objects and the performance of production in general, which determines the choice of the leading flow for the implementation of the automated control system. Today, for practically all the world's soda ash production, the flow of carbon dioxide from the conventional carbon dioxide, lime and lime slurry is taken as the main stream to saturate the ammoniated brine.

As a mathematical model of the carbonization process, it is proposed to consider the kinetic model of the reactions [2]. Kinetic equations and corresponding schemes of chemical transformations are described according to the law of acting masses.

Based on the construction of a mathematical model, the control of the carbonization column can be reduced to a temperature channel and, accordingly, a column model described in the form of a transfer function.

References:

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