SORPTION KINETICS ON INORGANIC ION-EXCHANGE MATERIALS

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ABSTRACT

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A theoretical analysis was conducted, which made it possible to reveal some features of the sorption kinetics of inorganic ion-exchange materials. It has been found that when working in the region of concave isotherms, a significant slowdown of the mass transfer process is possible even on very sorbent granulates. This effect is associated with reversing sorption processes involving highly selective sorbents. In this regard, difficulties can be encountered when using displacement desorption, which is associated with maintaining high concentrations of the displacing agent and the low rate of the ion exchange process. The rate of sorption on inorganic ion-exchange materials depends in a certain way on the concentration of sorbed ions in an external solution. This dependence manifests itself even in the absence of external diffusion inhibition. In this case, the determining factor is the distribution of electrolytes between the pore space of the granule and the free volume of the solution. The rate of mass transfer processes with the participation of inorganic sorbents can be affected not only by the permeability of granulates but also by inhibition at the level of homogeneous sections of the solid phase. The simplest way to detect such deceleration is to compare the data of the kinetic experiment with the theoretical results related to the model that ignores deceleration at the level of homogeneous sections of the solid phase. In such a comparison, it is necessary to consider possible distortions due to the finite width of particle size fractions, the discrepancy between the particle shape and the calculated one, etc.

CONCRETE WITH ACTIVE COMPOSITE ADDITIVE

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ABSTRACT

The article discusses the main aspects of the effective use of the composite additive containing metakaolin and superplasticizer for normal-weight concrete. The results of the influence of the composite additive obtained by the combined grinding of metakaolin and superplasticizer on the properties of the concrete mixture and the concrete strength are presented. The optimal composition of the additive was determined to obtain the minimum stratification of the concrete mixture, maximum strength, and the maximum possible reduction in cement consumption. The dependence on the strength of concrete was obtained, which made it possible to calculate the main compositions of concrete with this composite additive.