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ADSORPTION EQUILIBRIUM AND EFFECTIVE DIFFUSIVITY IN CYLINDRICAL ALUMINA PARTICLES IMPREGNATED WITH CALCIUM CHLORIDE

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Abstract

Adsorption equilibrium and effective diffusion coefficients of water vapor, in cylindrical particles of activated alumina (A) and activated alumina impregnated with calcium chloride (MCA), are experimentally determined. The experiments were conducted at 303 K and 323 K using cylindrical particles with 2.5 mm in both length and diameter. Diffusion coefficients were determined from the kinetics of water sorption. The measurements were conducted in a constant pressure unit based on a magnetic suspension balance (Rubotherm) under isothermal conditions. The sorption capacity depends on temperature and it was found to be higher by 25 % for the MCA material compared with the A material. The water diffusion coefficient depends itself on the adsorption equilibrium taking into account the local slope of the water sorption isotherm. The effective diffusivity of water is almost 2 times lower in impregnated than in non-impregnated alumina. The obtained diffusion data could be used to model the dynamic adsorption.

Key words: adsorption equilibrium, composite alumina - calcium chloride, effective diffusion coefficient

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