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Moisture sorption isotherms of chitosan-glycerol films: Thermodynamic properties and microstructure

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Abstract

The sorption isotherms of chitosan-glycerol films and of pure chitosan films using the static gravimetric method were performed. The experimental data were adjusted by several sorption models, and the GAB equation was the one that best represented the experimental data, being chosen to predict the adsorption and desorption behaviors of the films for the ranges studied of water activity (0.043–0.888) and of temperatures (20–50 ° C). The chitosan-glycerol films presented higher values of monolayer moisture and lower heat involved in the monolayer compared to the pure chitosan films. The values of net isosteric heat and of differential entropy for the films increased exponentially with the moisture content decrease. Dry films with moisture content (X_e) lower than 0.10 kg kg⁻¹ (dry basis) presented morphological changes according to the isosteric heat and entropy curves, indicating water sorption more easily and the more amorphous material (crystallinity of 9%). While dry films at $X_e = 0.40$ kg kg⁻¹ (dry basis)

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