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Conformational Heat Capacity of Liquid Biodegradable Polymers in the Absence and Presence Water[1] MAREK PYDA, Department of Chemistry, The University of Technology, Rzeszow, ELZBIETA NOWAK-PYDA, ATHAS-MP Company, 1608 Bexhill Dr, Knoxville, TN 37922,USA — The conformational heat capacity of biodegradable polymers such as amorphous poly(lactic acid) PLA and starch with and without water have been evaluated from a fit of experimental data to a one-dimensional Ising-like model for two discrete states, characterized by parameters linked to stiffness, cooperativity, and degeneracy. For the starch-water system the additional changes in the conformational heat capacity arise from the interaction of the carbohydrate chains with water. The liquid heat capacities at constant pressureC_p, of amorphous PLA and partially liquid state of starch, starch-water have been computed as the sum of vibrational, external, and conformational contributions. The vibrational contribution was calculated as the heat capacity arising from group and skeletal vibrations. The external contribution was estimated from experimental data of the thermal expansivity and compressibility in the liquid state. The experimental liquid C_p agrees with these calculations to better than $\pm 3\%$. The calculated liquid C_p with the solid C_p was employed in the quantitative thermal analysis of the experimental $C_p$of biodegradable polymer PLA, starch, and starch-water. Supported by European Union, grant (MIRG-CT-2006-036558), Cargill Dow LLC

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