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Sucralose Interaction with Protein Structures. NIMESH SHUKLA, Wesleyan University, ENRICO POMARICO, MAJED CHERGUI, Ecole Polytechnique Federale de Lausanne, J.S. CODY, ERIKA TAYLOR, CHRISTINA OTHON, Wesleyan University — Sucralose is an artificial sweetener that appears to destabilize protein native structures in contrast to its natural counterpart, sucrose, which enhances the stability of biomolecules against environmental stress. We explored the molecular interactions of sucralose as compared to sucrose to illuminate the origin of the differences in their bio-preservative efficacy. We show that the mode of interactions of sucralose and sucrose in bulk solution differ subtly using hydration dynamics measurement and computational simulation. At high concentrations (>0.2M) or in the thermally stressed state, sucralose appears to differ in its interactions with proteins leading to the reduction of native state stability. We explored the difference in the preferential exclusion model using time-resolved spectroscopic techniques and observed that both molecules appear to be effective reducers of bulk hydration dynamics. However, the chlorination of sucralose appears to slightly enhance its hydrophobicity, which reduces the preferential exclusion of sucralose from the protein-water interface. We propose this as a possible origin for the difference in their bio-preservative properties.

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