

606f Supercritical Carbon Dioxide Sterilization of Liquid Foods Using a Membrane System

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Supercritical carbon dioxide (scCO₂) at greater than 31.1°C and pressures exceeding 7.38 MPa exists in a dense liquid state where the CO₂ retains the lower surface tension of a gaseous phase and the increased solubility of a liquid phase. This supercritical state enables CO₂ to extract various organic and inorganic molecules while inactivating numerous microorganisms. This technology has been enhanced using a microporous polypropylene membrane contactor system to saturate pumpable liquids rapidly with dense CO₂. The dense CO₂ is continuously recirculated without depressurization. The nonthermal process effectively inactivated a wide range of spoilage and pathogenic vegetative microorganisms, while spore-forming microorganisms required temperatures exceeding 45°C following membrane CO₂ saturation. Desired changes in product flow rates necessitated consistent control of CO₂ supply in order to balance the required product microbial reductions. The (scCO₂) process was found to be non-toxic to the food being processed, capable of retaining fresh juice flavors, economic, and without solvent disposal problems.