Investiration of Effectiveness and Mcchanism for the Inactivation of Microorganism in Supercritical Carbon Dioxide

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In this study, SC-CO_2 was applied to *Escherichia coli*, sanitary indicative bacteria, to investigate the effect and the mechanism of inactivation. When increasing the pressure and temperature, the time for sterilization (zero CFU) was decreased. By increasing the treatment pressure, both the time lengths of the first stage and the second stage were reduced. But the effect of pressure was more significant on the first stage than on the second stage. And increasing the pressure over 120 bar was not effective. When increasing the temperature from 35℃ to 40℃, first stage were decreased. But such a temperature effect was not noticeable above 40℃. Using the E. coli cells treated with SC-CO_2, morphological changes were observed. Treated cells were mostly in crushed shape, and some were completely burst. Also, the UV absorbance and the pH of the cell suspensions increased and decreased significantly, respectively, after the treatment. The inactivation of *E. coli* by SC-CO_2 is possibly caused by acidification of cell suspension, disruption and extraction of cellular components due to the powerful solvation and diffusing properties of SC-CO_2.