IMPROVING THE TECHNO-FUNCTIONAL PROPERTIES OF WHEY PROTEIN THROUGH MAILLARD CONJUGATION WITH LACTOSE VIA SPRAY-DRYING

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ABSTRACT

In this study, spray-drying was performed to induce Maillard conjugation between whey protein (80%) and innate lactose (8.6%) to improve the physicochemical properties and emulsion stability that are efficient for industrial application. The spray-drying process was carried out by controlling the inlet temperature to 210°C, air flow rate to 34 m^3/hour, and feed rate to 7.5 mL/min. The effect of pre-conditioning pH to 6.5, 8.0, and 9.5 prior to spray-drying was evaluated. Pre-conditioning at alkaline pH (8.0 and 9.5) exhibited favorable physical properties and was sufficient to induce Maillard conjugation without the formation of polymerization products. Pre-conditioning to pH 8.0 in particular exhibited superior emulsion heat stability by maintaining their initial viscosity and particle size after heating at 80°C for 20 minutes, as well as the stability during storage, where the occurrence of creaming just started after 25 days of storing at room temperature.

Keyword: Lactose, maillard reaction, spray-drying, whey protein

UPAYA PENINGKATAN SIFAT TEKNO-FUNGSIONAL DARI WHEY PROTEIN MELALUI KONJUGASI MAILLARD DENGAN LAKTOSA VIA SPRAY-DRYING

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INTISARI

Dalam penelitian ini, *spray-drying* dilakukan untuk menginduksi konjugasi Maillard pada whey protein (80%) dengan laktosa (8.6%) untuk meningkatkan sifat fisikokimia dan stabilitas emulsi dengan proses yang efisien untuk aplikasi industri. Proses pengeringan dilakukan dengan mengontrol suhu inlet pada 210°C, laju aliran udara pada 34 m^3/jam, and laju umpan pada 7.5 mL/menit. Pengaruh dari pH umpan sebelum pengeringan pada pH 6.5, 8.0, dan 9.5 dievaluasi. pH alkalis (8.0 dan 9.5) memproduksi bubuk dengan sifat fisik yang baik dan cukup untuk menginduksi reaksi Maillard tanpa membentuk polimer. Perlakuan pH 8.0 secara khusus memiliki stabilitas yang unggul terhadap perlakuan termal dengan mempertahankan viskositas dan ukuran partikel setelah pemanasan pada suhu 80°C selama 20 menit, serta stabilitas selama penyimpanan, dimana pemisahan fase dimulai setelah 25 hari penyimpanan di suhu ruang.

Keyword: Laktosa, reaksi Maillard, spray-drying, whey protein