

Extraction and Isoelectric Precipitation of Protein from Hazelnut Meal

Esra Kibar Balballı, Gülşah Karabulut

Food Engineering Department, Faculty of Engineering, Sakarya University, Sakarya, Türkiye

Abstract

This study investigates the two-stage protein extraction from hazelnut meal and the evaluation of isoelectric precipitation efficiency. In the first extraction stage, proteins were extracted at pH 8, 9, and 10 for one hour, followed by a second extraction on the residual solids. The first extraction yielded 9649, 10238, and 10355 mg/mL at pH 8, 9, and 10, respectively, indicating increased solubility at higher pH. The second extraction recovered additional protein but with lower efficiency, yielding 8599, 8677, and 8838 mg/mL at pH 8, 9, and 10, respectively. A two-stage extraction was found to enhance overall protein recovery, but further extractions beyond this point may not be efficient. The study also examined the precipitation efficiency at the isoelectric point ($pI = 4.5$). After the first extraction, supernatant protein concentrations were 291, 279, and 299 mg/mL at pH 8, 9, and 10, demonstrating effective precipitation. Similar results were obtained for the second extraction, confirming the efficiency of the precipitation step. Additionally, proteins extracted at pH 10 were precipitated at different pH values, with supernatant concentrations of 644 (pH 3.5), 341 (pH 4), 336 (pH 4.5), and 347 mg/mL (pH 5). These findings highlight that a pH 9-10 extraction followed by precipitation at pH 4.5 maximizes protein recovery and precipitation efficiency. The study provides insights into optimizing protein isolation from hazelnut meal for potential applications in food processing.

Key Words: Hazelnut meal, protein extraction, isoelectric precipitation, pH optimization, protein recovery.

