Study on Protein Precipitation Methods of Wastewater in Sweet Potato Food Processing

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Traditional process of sweet potato, a popular raw material used for food production, generates a large amount of protein-rich wastewater which is hard to treat and causes water pollution and waste of protein. However, the conventional treatment methods are high-cost and lack protein recovery. This project simulated the extraction process of sweet potato starch in laboratory and used three kinds of methods (salt-out, alkali extraction, and organic solvent) to precipitate protein and compare their effects. According to the results, the salt-out method showed the best effect in comparison with the organic solvent method and the alkali extraction method. The optimal protein precipitation parameters of salt-out method were solid-liquid ratio 1:10 (g/mL), salt concentration 1.8 mol/L and pH7.0. Based on the method, the percentage of residual protein was 4.64%. And when solid-liquid ratio 1:10 (g/mL), salt concentration 0.6 mol/L and pH6.0, the effect was also very well and was more applicable for factories. After separating and purifying the precipitation with dialysis treatment, a large amount of purified protein can be recovered. It can be inferred from electrophoresis analysis that they were rich in sporamin (major sweet potato storage protein) and glycoproteins, both having anti-cancer activity. Hence, the optimal protein precipitation method for wastewater during sweet potato starch process was developed. This study provides a practical approach for comprehensive utilization of sweet potato and has economic and environmental benefits in agricultural and food industries.

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