

Development of A Novel Energy-Efficient Adsorption Dryer Using Activated Natural Zeolite for Carrageenan Production

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Abstract

Drying is a significant step in the production of carrageenan. However, current drying process still deals with low energy efficiency (40-45%), high operational cost, and low product quality. The drying with air dehumidified by activated natural zeolite has a potential for drying carrageenan. In this concept, air as drying medium will be contacted with zeolite to reduce its relative humidity. Hence, the driving force of drying increases and the process can be conducted at moderate temperature (30-50°C) to retain carrageenan quality. This research looks into the effectiveness of adsorption dryer with zeolite for drying carrageenan. The natural zeolite is activated by heating 300-400°C for 2-3 hours. The zeolite is then used to dehumidify the ambient air as drying medium. In this work, the effect of air flow, and drying temperature, on energy efficiency, as well as drying time, is observed. Results showed with air velocity 1.0-1.5 m/sec, weight of wet carrageenan in dryer 1.0 kg, and temperature 40°C, the drying time can be 1.5 hours (0.5-1 shorter than that of conventional dryer), and improvement of energy efficiency can be 5-10% higher than the conventional dryer. This result is very promising to develop the dryer for industrial application.