

Effects of Amylose Content on the Physicochemical Properties of Sodium Carboxymethyl Rice Starches

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ABSTRACT

Nine native rice starches, prepared from different strains of rice with the amylose content between 14.67 and 29.09%, were employed in the preparation of sodium carboxymethyl rice starches (SCMRSs). The reaction was carried out at 50°C for 20 minutes, using monochloroacetic acid as a reagent under alkaline condition and 1-propanol as a solvent. The degree of substitution was determined and the physicochemical properties, including water solubility, pH and viscosity of 1% w/v solution, X-ray diffraction analyses and film-forming property were investigated. The degree of substitution of the prepared SCMRSs ranged from 0.2459 to 0.4034. All SCMRSs were freely soluble in water; the pH of 1% w/v solutions were between 8.6 and 9.9 and the viscosities ranged from 32.7 to 66.0 mPa-s. The degree of substitution showed a significant positive correlation with the amylose content, while the pH and the viscosity did not. The X-ray diffraction of all SCMRSs showed the loss of crystallinity which was possibly due to the pregelatinization of starch molecule by water and heat. At 3% w/v concentration, most SCMRS pastes formed clear films with varying film characteristics, e.g., from flaky and brittle to soft and gluey or elastic, depending on the amylose content of the native starches. The results from this study suggested that amylose content affected the physicochemical properties of not only the native starches but also the corresponding SCMRSs.

Key words: Thai rice, Sodium carboxymethyl rice starch, Amylose content, X-ray diffraction, Viscosity, Physicochemical properties, Compressibility, Film-formation

INTRODUCTION

Rice (*Oryza sativa* L., Gramineae) is the most common crop consumed by people of many Asian countries, including, among others, China, India, Japan and Thailand. Thailand is also one of the major rice growers and exporters of the world. The Royal Thai government has categorized rice as one of the four major produces, along with shrimp, rubber and cassava, that require more research studies to improve the quality, production processes and safety, as well as to create new products and expand their applications. This has led to the establishment of Rice Research Center in many areas throughout the country to conduct field experiments on growing many cultivars of rice. In addition to the grains that are consumed