Comparative study on the physicochemical properties of κ-carrageenan extracted from Kappaphycus alvarezii (doty) doty ex Silva in Tawau, Sabah, Malaysia and commercial κ-carrageenans

ABSTRACT

ə-Carrageenan is a linear, sulphated polysaccharide that is widely used in the food industry as a gelling agent due to its lack of toxicity and biocompatibility. In this study, the physicochemical properties of ə-carrageenan (TA150) derived from Kappaphycus alvarezii (formerly Eucheuma cottonii) in Tawau, Sabah were investigated and compared to commercial ə-carrageenan (SeaKem CM611, Gelcarin GP812, Gelcarin GP911 NF, and Grindsted® carrageenan CL220). TA150 exhibited the lowest lightness but highest yellowness, with L∗ and b∗ values reported as 82.69 and 17.16, respectively. The rupture strength of ə-carrageenan increased significantly with increasing concentration ($p < 0.05$). The water losses from ə-carrageenan gel increased with increasing storage times. TA150 lost the most water within 10 days of storage time. The water-holding capacity (WHC) of ə-carrageenan gel was reported to be excellent (>90%) under all storage temperatures (25 °C, 4 °C and ī 18 °C). The moisture content, ash, acid-insoluble matter, and sulphate levels of ə-carrageenan samples were reported as 3.65ï 11.41%, 17.75ï 33.18%, 0.22ï 3.74%, and 12.00ï 19.71%, respectively. These samples were low in fat, protein, and crude fibre contents. The potassium content in ə-carrageenan was highest in Gelcarin GP812 (100.42 g/kg), followed by Grindsted® carrageenan CL220 (61.92 g/kg), TA150 (54.60 g/kg), Gelcarin GP911 NF (40.90 g/kg) and SeaKem CM611 (15.76 g/kg). No heavy metals were detected in TA150 and the other commercial ə-carrageenan samples except for lead. However, the concentration of lead detected in the ə-carrageenan samples fell within the acceptable ranges (<5 mg/kg) set by the Joint FAO/WHO Expert Committee on Food Additives (JECFA).

Keyword: Eucheuma cottonii; ə-Carrageenan; Physicochemical properties; Water-holding capacity; Ash; Minerals