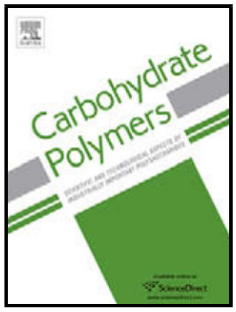

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Characterization of Physicochemical Properties of Carboxymethyl Agar

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Abstract: A series of carboxymethyl agars (CMAs) with different degree of substitution (DS) were prepared, and their properties were determined and analyzed. The results showed that with the increase of DS, the dissolving temperature, the gelling temperature, the gel melting temperature, the gel strength, the gel hardness, the gel fracturability, and the solution apparent viscosity of CMA all decreased, except that its gel cohesiveness and gel springiness increased. The variation process of agar molecules in solution from coil to helix could be observed by measuring the optical rotation of the solution at such a low concentration, at which even the solution could not form a gel. The gel skeleton microstructures of both agar and CMA were of porous network structure, and the pore size of CMA became smaller and denser with the increase of its DS. After carboxymethylation, the agar hygroscopicity was improved, but its thermal stability was lowered.

Key words: agar; carboxymethylation; gelling temperature; thermal stability; optical rotation.

1. Introduction

Agar, the gel-forming polysaccharides extracted from Gelidiaceae and Gracilariaceae species (Freile-Pelegrin & Robledo, 1997), is linear polymers based on a disaccharide repeating structure of 1,3-linked β-D-galactopyranose and 1,4-linked 3,6-anhydro-α-L-galactopyranose units (Labropoulos, Niesz, Danforth, & Kevrekidis, 2002; Lahaye & Rochas, 1991). Agarose and agaropectin are the two components of agar, with the former consisting of neutral polysaccharides with a high gelling ability and the latter consisting of ionic polysaccharides with a low gelling ability (Arnott et al., 1974). Agar is widely used for medical, pharmaceutical, pabular and electronic and experimental