

Characterization of mixed gels based on whey proteins-polysaccharides blends

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ABSTRACT

The influence of polysaccharides on the characteristics of whey protein gels formed by heating at the pH range 5.2-6.2 was studied. A synergistic effect of polysaccharides addition on the gelation of whey proteins was observed at pH 6.2 in the case of carboxymethylcellulose, κ -carrageenan or locust bean gum.

INTRODUCTION

Mixed protein-polysaccharide systems are of great importance as a new type of gelling agent where gelling conditions could be controlled to get a product with the desired textural characteristics. When both components in the system can independently form a gel, the texture of the mixed gel can be very different from that of the gels formed by these components singularly. The aim of this study was to examine the rheological properties of mixed whey protein (WP) – polysaccharide gels, induced by heat at pH 6.2 and pH 5.2 and with the different types of polysaccharides (PS).

MATERIALS AND METHODS

Gels were made from mixed systems containing a constant concentration of 10% WP and 0.1 to 1.0% of either κ -carrageenan (κ CA), locust bean gum (LBG) or carboxymethylcellulose (CMC). Rheological properties of mixed gels were evaluated by large deformation method (LABOR

penetrometer) and small deformation method (BOHLIN rheometer with C25 coaxial cylinder, frequency range was 1 Hz, strain 0.02 Pa.) The measurements water holding capacity was performed by centrifugation and filtration method.

RESULTS

Two phase separated network mixed WP-PS gels were obtained with all types of PS. The changes of rheological properties of mixed WP-PS gels showed a synergistic effect of PS addition on the gelation of WP at pH 6.2. The highest shear stress and complex modulus G^* values for the mixed systems were at a concentration 0.6% κ CAR added for WP- κ CAR gels, at 0.7% CMC added for the WP-CMC gels and at 0.4-0.5% LBG for the WP-LBG gels. The kinetics of gelation showed that the value of gelation gradient was the highest at the PS content which exhibited the strongest synergistic effect. Under the same conditions the changes in the polysaccharide content in the mixed WP-polysaccharide gels resulted no significant effect on the water holding capacity of the gels. At pH 5.2 the rheological characteristics of the mixed WP-polysaccharide gels were reduced compared to pH 6.2 and no synergistic effect was observed.