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Understanding the effects of different polysaccharides on swelling of whey protein hydrogels

Sirvan Sultan Uguz and Mecit Halil Oztop
Middle East Technical University, Turkey

Hydrogels are highly hydrophilic polymer gels with macromolecular three dimensional networks. Primary use of hydrogels in food industry is encapsulation of bioactive compounds. They swell by absorbing and retaining large amount of water without dissolving and losing their integrity. In this study, our objective is to examine the effects of different polysaccharides on swelling of heat set gels which are composed of whey protein and different types of polysaccharides. Heat set gels were prepared by using whey protein (15%), polysaccharide (alginate, xanthan gum or citrus pectin) (0.5%). Swelling and NMR experiments were performed for the hydrogels. Swelling ratio (SR %) for each gel was calculated by using based on the solvent uptake. For NMR experiments, T2 (spin-spin relaxation times) were measured. Swelling experiments showed that pectin had the highest swelling ratio whereas xanthan gum had the lowest. Solvent uptake data of the gels were fitted to a power law model ($M_t/M_{inf}=k \cdot t^n$). Power indices (n) changed between 0.03-0.16. Based on the n values it was concluded that solvent uptake was controlled by diffusion, "k" values were also found significantly different from each other for gels with different polysaccharides ($p < 0.05$). T2 results showed that T2 values increased in time with solvent uptake. Moreover, significant correlation was found between T2 and SR%.

Biography

Sirvan Sultan Uguz is an undergraduate student in Food Engineering department and also Researcher in Food Bio NMR laboratory in Middle East Technical University.

e168074@metu.edu.tr

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