Microcrystalline cellulose effects on the rheology of mixed oleogels structured with candelilla wax and saturated fat

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Abstract

The structuration processes of mixed oleogels produced with candelilla wax (CW, 0 or 3%), fully hydrogenated soybean oil (FH, 5-15%), and microcrystalline cellulose (MC, 0-9%) were studied to define their rheological effects. During the cooling CW crystals performed as nucleation sites for FH. The elastic modulus (G') of oleogels with FH and 3% CW were more than two orders of magnitude higher than those produced with 0% CW. Adding MC to the oleogels increased slightly the G'. Independently of the amount of MC, oleogels structured with increasing amounts of FH and 0% CW showed the elastic properties scaling of colloidal gels. This behavior was lost by adding 3% CW, implying that in mixed FH-CW oleogels, the CW crystal network dominated the oleogel rheology. The flow point and the mechanical reversibility of oleogels and commercial butter (CB) was also determined. CB showed flow points at 44 and 59% strain and mechanical reversibility values of 29 and 35% of G' measured in a pre-shear step. Adding MC to oleogels structured with FH and 0% CW increased their flow point (37.2%) near those of CB. This effect was not produced in mixed FH-3% CW oleogels. The mechanical recovery of oleogels produced with FH, MC, and 0% CW tend to decrease as the FH content increased. CW and MC did not show a simple concentration–effect relationship for the mechanical recovery. Nonetheless, oleogels structured with 3% CW and 10% FH and 6-9% MC showed mechanical recovery (˜60%) close to that of CB.

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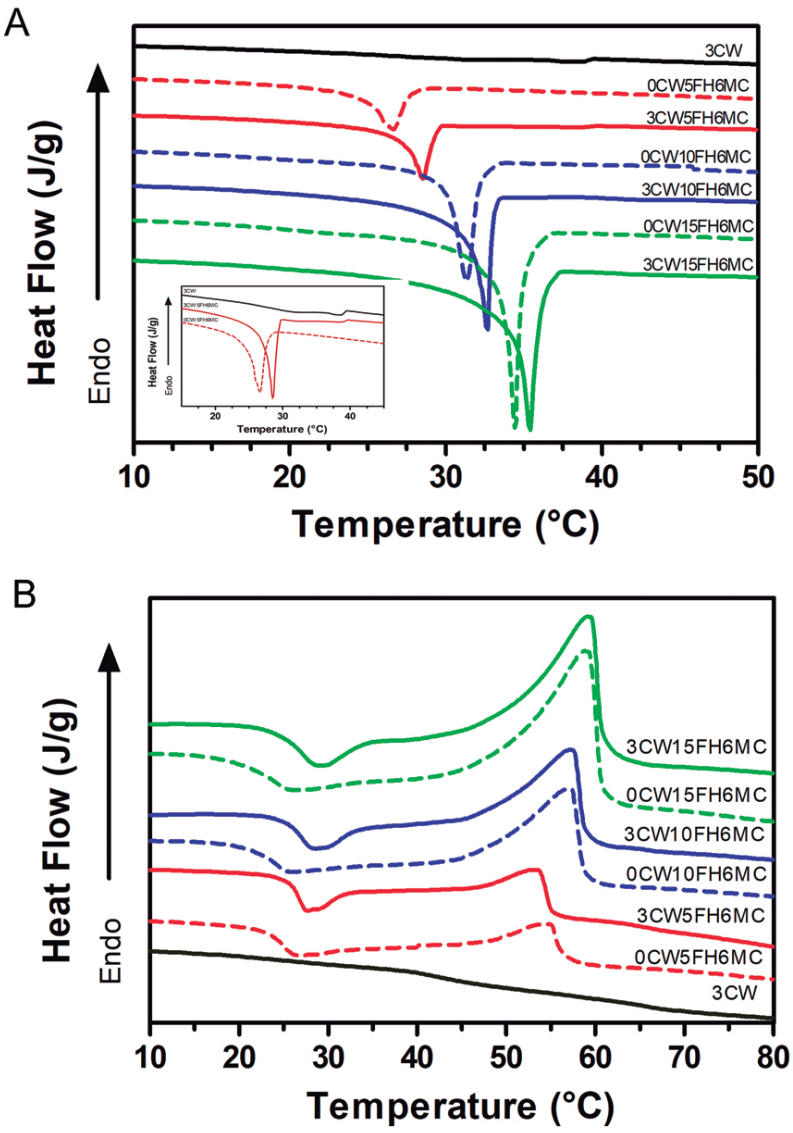

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