Recrystallization characteristics of high hydrostatic pressure gelatinized normal and waxy corn starch

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Abstract:

High hydrostatic pressure (HHP) can lead to starch gelatinization at room temperature, while the retrogradation mechanism of HHP gelatinized starch is not well known. HHP gelatinized normal and waxy corn starches were stored at room temperature for 192 hours in order to investigate the retrogradation characteristics. The scanning electron microscopy (SEM), polarised light microscopy and differential scanning calorimetric (DSC) analysis showed that the pressurization of normal and waxy corn starch suspensions with concentration of 30% (w/v) at 600 MPa for 15 min resulted in a complete gelatinization. In addition, the pressure-gelatinized normal and waxy corn starch gels were stored and subjected to X-ray diffraction (XRD) analysis, resistant starch content determination, swelling power and pasting behavior. The retrograded normal maize and waxy maize starch showed a substantial loss of A-type crystallinity. Both pressure-gelatinized normal and waxy corn starches showed an increase in resistant starch content and relative crystallinity degree with the increase of storage time. In addition, restricted starch swelling power and lower pasting viscosities were observed for these two retrograded starches. The amylose molecule within starch granules has been regarded as the main factor to affect the structural and physicochemical properties during the retrogradation process of HHP-gelatinized starch granules.

Keywords:

Recrystallization; Resistant starch; Swelling; Pasting

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