Carbohydrate Polymers

Effects of stearic acid and irradiation alone and in combination on properties of amylose-lipid nanomaterial from high amylose maize starch

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Abstract

This study determines the effects of stearic acid and gamma irradiation, alone and in combination, on properties of amylose-lipid nanomaterials from pasted high amylose maize starch (HAMS) with and without alpha amylase hydrolysis. HAMS was incorporated with stearic acid (0, 1.5% and 5%, w/w), irradiated at 0, 30 and 60 kGy and pasted under pressure in a rheometer. Isolated materials after thermostable alpha amylase or hot water washing were freeze-dried and characterised using differential scanning calorimetry (DSC), X-ray diffraction (XRD), Atomic Force Microscopy (AFM) and Transmission Electron Microscopy (TEM). The isolated materials contain amylose-lipid complexes (ALCs) as determined by DSC and XRD. Pasting of gamma irradiated HAMS produced type I ALCs, whereas that for un-irradiated HAMS produced type II ALCs. The ALCs occurred at nanoscale with sizes ranging from 10 to 110 nm as observed with AFM and TEM. Tailor-made ALCs nanomaterials can be produced from HAMS (with and without added stearic acid).