

Thermo-Oxidative Degradation of Esterified Starch (with Lauric Acid) - Plastic Composite Assembled with Pro-Oxidants and Elastomers

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Abstract : This research is striving to develop a thermo degradable starch plastic compound/ masterbatch for industrial packaging applications. A native corn starch-modified with an esterification reaction of lauric acid is melt blent with an unsaturated elastomer (styrene-butadiene-rubber/styrene-butadiene-styrene). A trace amount of metal salt is added into the internal mixer to study the effect of pro-oxidants in a thermo oxidative environment. Then the granulated polymer composite which is consisted with 80-86% of polyolefin (LLDP/LDPE/PP) as the pivotal agent; is extruded with processing aids, antioxidants and some other additives in a co-rotating twin-screw extruder. The pelletized composite is subjected to compression molding/ Injection molding or blown film extrusion processes to acquire the samples/specimen for tests. The degradation process is explicated by analyzing the results of fourier transform infrared spectroscopy (FTIR) measurements, thermo oxidative aging studies (placing the dumb-bell specimen in an air oven at 70 °C for four weeks of exposure.) governed by tensile and impact strength test reports. Furthermore, the samples were elicited into manifold outdoors to inspect the degradation process. This industrial process is implemented to reduce the volume of fossil-based garbage by achieving the biodegradability and compostability in the natural cycle. Hence the research leads to manufacturing a degradable plastic packaging compound which is now available in the Sri Lankan market.

Keywords : blown film extrusion, compression moulding, polyolefin, pro-oxidant, styrene-butadiene-rubber, styrene-butadiene-styrene, thermo oxidative aging, unsaturated elastomer

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