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Peroxide Oxidation and Compost-Induced Surface Changes in Degradable Plastics

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Abstract: This study examined degradation conditions of biodegradable and oxo-degradable plastics using non-biodegradable plastics as a control. Samples were subjected to different concentrations of hydrogen peroxide at different lighting conditions and showed residual peroxide titrated with permanganate initially decreasing before increasing over time. Oxidizable species are speculated to be produced by the degradation of the polymers. Scanning electron micrographs of strips of plastics mixed in a simulated compost heap showed that biodegradable plastics underwent more pronounced surface changes than non-biodegradable plastics. Thermomechanical analysis indicated biodegradable plastics to be more elastic after exposure to the experimental conditions and broke faster at a lower temperature. Attenuated total reflectance spectra did not indicate significant changes in the plastic strips over the six month period of the experiments.

Key Words: peroxide oxidation of plastic; biodegradable, oxo-biodegradable; thermomechanical analysis