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THE INFLUENCE OF BIOTIC AND ABIOTIC ENVIRONMENTS ON THE DEGRADATION OF POLYETHYLENE

ANN-CHRISTINE ALBERTSSON and SIGBRITT KARLSSON

Department of Polymer Technology, The Royal Institute of Technology, Stockholm, Sweden

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1. INTRODUCTION

In almost all surveys of the biological degradation of synthetic polymers it is fairly clearly stated that polyethylene is an inert polymer with good resistance to microorganisms. Several reports mention, however, that fungal growth can occur on the surface of polyethylene.^{1,2}

Conolly³ and Dolezel¹ have reported a change in the tensile strength of polyethylene (PE) exposed to a biotic environment, and Kestelman *et al.*⁴ have demonstrated a higher water uptake in PE overseeded with growing moulds. The increase in water uptake was accompanied by a decrease in the degree of crystallinity.

Jen-Hao and Schwartz⁵ claimed that the number of bacteria that PE was able to support was dependent on its molecular weight. Later, Potts and his collaborators⁶ investigated the relationship between molecular weight and fungal growth. They claimed that PE was not biodegradable, but that linear paraffin molecules with a molecular weight of less than about 500 were utilized by several microorganisms.

Tsuchii *et al.*⁷ suggested, however, that biodegradation was dependent on the availability of a substrate and not affected by the molecular weight. Hueck⁸ emphasized the role of criteria for the inertness of PE: its hydrophobic nature and its large molecular dimensions.