

Lifetime prediction of polymers. Hamid, S. H.; Amin, M. B. Res. Inst., King Fahd Univ. Petroleum Minerals, Dhahran, Saudi Arabia. *Journal of Applied Polymer Science* (1995), 55(10), 1385-94. Publisher: Wiley, CODEN: JAPNAB ISSN: 0021-8995. Journal written in English. CAN 122:189070 AN 1995:388339 CAPLUS (Copyright (C) 2008 ACS on SciFinder (R))

Abstract

Natural and artificially accelerated weathering trials were carried out on low-d. polyethylene samples used for agricultural and disposable purposes. Modifications in polymer characteristics were studied using FTIR spectroscopy, DSC, gel-permeation chromatog. (GPC), SEM, and mech. properties testing. The natural exposure trials were conducted at 5 locations in Saudi Arabia. The artificially accelerated exposure trials were carried out in a Weather-Ometer for 5000 h, whereas the natural exposure was for 24 mo. Rates of photo-oxidative and thermal degrdn. have been detd. by measuring the formation of non-volatile carbonyl oxidn. products which absorb in the IR region with a max. absorbance level at 1710 cm^{-1} . Thermal characteristics were noticed to vary in terms of the shape and size of melting peak for both the natural and artificial weathering. This implies a change in crystallinity, which has indicated an increasing trend with exposure time. The cryst. melting temp. remains almost steady for both exposure tests. The drop in mech. properties and the modification in polymer chain length were also monitored. The GPC anal. indicated the change in mol. wt. distribution, which shows the formation of lower mol.-wt. species. Surface modifications were revealed in terms of abrasion effects apparent from SEM micrographs. A correlation between natural and artificial weathering was considered for lifetime prediction in a short exposure time. It was found that the confidence level of predicting lifetime on the basis of artificially accelerated exposure trials is dependent on many parameters, which include time, material, equipment, etc.