INFLUENCE OF ANTIOXIDANT LOADING ON THE γ-EXPOSURE OF ETHYLENE-PROPYLENE TERPOLYMER

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The long term applications of polymers require the improvement in material native resistance upon oxidation. One of the most convenient procedures for the achievement of high chemical strength is the addition of antioxidants. The material performances are directly related with the ability of antioxidant for to scavenge of hydrocarbon radicals formed during radiolysis.
The use of ethylene-propylene elastomers in nuclear energy applications is possible due to the protection activity of some additives. In this work EPDM rubber was loaded with different antioxidants at the concentration of 0.5 phr, these additives act as chain breakers by replacing hydroxyl proton with radiolytic radicals.
Samples of polymer under different states of modification were prepared by addition of appropriate amount of stabilizer into EPDM chloroform solution. Films of 40 μm were obtained by removal of solvent. Gamma exposure was accomplished in an irradiator provided with ^{137}Cs source at room temperature. Dose rate was 0.4 kGy h^{-1}. A large dose range was covered up to 500 kGy for the illustration of advanced stabilization effect exhibited by several antioxidants during a nuclear event.
The radiochemical yields, G, of the main oxygenated molecular configurations appeared during radiation oxidation were calculated for the evaluation of stabilization contributions of the tested antioxidants. The efficiency in radiochemical stability was evaluated by chemiluminescence measurements of oxidation induction times (isothermal determinations) and onset oxidation times (nonisothermal determinations). FTIR spectroscopy was applied for characterizing the modification in oxidation states along γ-irradiation.
The discussion on the stabilization efficiency related to the chemical structure of used additives is presented. This study is complementary of other previous investigations, when the spectral evolution during polyolefin degradation under γ-irradiation was investigated[1-3].

REFERENCES

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