

THE EFFECT OF RADIATION ON THE THERMAL EXPANSION OF KAOLIN NANO FILLED -XLPE MATERIALS

AMIN AL ROBAIDI , SHADI AL KHATEEB; RADWAN DWEIRI & TOJAN GAGHBEER

Al-Balq'a Applied University, Materials Eng. Dept., Al-Salt Jordan, Jordan.

ABSTRACT

Nano kaoline as a reinforcement agent in the concentration of 5% was added to different polyolefine materials. Said materials were crosslinked via chemical and Gamma radiation. The expansion coefficient (CLTE) using a linear thermal expansion technique for the cross linked LDPE and HDPE and Polypropylene Random Copolymer (PPRC) in the temperature range of 30 to 220°C was investigated. Prior to radiation the different sample were chemically crosslinked using silane and peroxide crosslinking agent. From the compounded resin; sheet and pipes were produced. Samples were cut and then subjected to gamma radiation at different radiation doses. The thermo elastic properties of mentioned samples, in particular the linear thermal expansion (α) at constant stress and the change in the length with temperature, were studied. It was found that α decreases with the increasing degree of grosslinking for polyethylene similar to elastomer net works; whereby PPRC behaves like ordinary polymer. The thermo elastic inversion was also considered and the experimental observations were easily rationalized. Finally, the results were explained in the light of the change in the polymer micro structure and its change due to the effect of γ ray radiation has been determined in the temperature range of 30 to 220°C.

KEYWORDS: XLPE; PPRC; HDPE, Linear Thermal Expansion Coefficient; DSC, Gamma Ray, Crystallinity