Effect Of Ground Colemanite Filler Content On The Fracture Toughness of High Density Polyethylene/Ground Colemanite Composites

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ABSTRACT

That is why, in this study, effect of ground colemanite (GC) substance, whose sieve particle size is 45 μm and average particle size is 14.01 μm, on fracture toughness of high density polyethylene (HDPE) used in pipe manufacture is studied. Pipe practitioners requested, that the stiffness of both pressurized and non-pressurized pipes, that are implemented overground and underground, need to be as higher as possible. The continuous strength (life or time) values of materials are usually obtained as a result of long-term tests also after production. It's known that tensile strength of YYPE based material is decreased depending upon time after production. But changes in fracture toughness of HDPE/GC composites after a long storage period which follows its production are still unclear. To have related results, the aim of this study is to compare the fracture toughness depending upon GC filler amount between pure HDPE and HDPE/GC composites which were stored at a place which have no daylight. Pure HDPE raw material, was filled with GC at different percentage rates (15, 20, 25 and 30) by weight in twin screw extrusion with constant extrusion parameters. Pure HDPE and HDPE/GC composite raw materials were pressed into multi-purpose test pieces by injection molding method under constant injection parameters. These multi-purpose test pieces were stored no-daylight conditions for 18 month and the instrumented Charpy impact test were applied in the Charpy test specimens. The experimental results show that the fracture toughness of HDPE/GC composite material depend on GC filler content. It was identified that the amount of GC filler was expanded the fracture toughness of the pure HDPE material. Also, It was identified that decrease the fracture toughness of the HDPE/CC composite.

Keywords: HDPE, Ground Colemanite, Composite, Fracture Toughness.

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