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| **TITLE** | EFFECTS OF CATALYST TYPES AND HALLOYSITE NANOTUBE ON SILANE CROSSLINKING AND PROPERTIES OF POLYETHYLENE |
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| **ABSTRACT** | Silane-crosslinked polyethylene is commonly used for high temperature applications as it has better heat resistance and dimensional stability than neat material. Tin compound is commonly used as catalyst for the reaction. However, tin is rather toxic. This study aims at studying the feasibility of using amine compound as a more environmental-friendly catalyst for accelerating the silane crosslink reaction. Halloysite nanotube (HNT) was used as a catalyst-supporting material and reinforcing filler. The effects of HNT on silane crosslinking and properties of products were also focused on. Degree and rate of silane crosslinking, mechanical properties, and thermal stability of crosslinked products are reported. The results showed that dibutyltin dilaurate has higher efficiency than 3- aminopropyl triethoxysilane in catalysing the silane crosslink reaction. However, the products with 80 % gel were obtained within 24h of crosslinking in the presence of either tin or amine catalyst. The advantage of using amine was that it provided a better surface quality of extrudate after leaving the die. Compared to uncrosslinked samples, all crosslinked polymers exhibited higher tensile strength and modulus with lower elongation. HNT was found to retard the progress of silane crosslinking. The effect of HNT on mechanical properties of crosslinked products was similar to that found for uncrosslinked systems. Enhancement in thermal stability of polymer was achieved by the introduction of both crosslink and reinforcing filler to the material. Combined effect of HNT and silane crosslink provided the composites with more than 20°C increase in decomposition temperature under oxidative environment. |