STUDY OF AGEING PROCESS OF POLY (VINYL CHLORIDE)/MONTMORILLONITE NANOCOMPOSITES

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Abstract

Numerous studies on polymer nanocomposites show remarkable improvements in various properties of polymer matrix upon addition of nanosized additives. However, a large number of parameters influences polymer nanocomposites' performance and service life [1-3].

The nanomaterials based on PVC require, similar to pure polymer, addition of various additives, e.g. stabilizers (lead compounds, barium, cadmium, zinc and calcium stearates), lubricants (stearic acid), plasticizers (phthalates, polymeric). The compositions contain also auxiliary polymeric compounds, which play role of compatibilizer between nanofiller and polymer matrix (e.g. vinyl acetate copolymers) [4,5]. The incorporation of nanosized fillers, especially montmorillonite (MMT), improves thermal stability, enhances mechanical properties of polymer matrix and reduces the flammability. The fine dispersion of hydrophilic montmorillonite in polymer can be achieved by modification of clay by onium salt, e.g. ammonium, phosphonium or imidazolium one [6,7].

A series of PVC/montmorillonite nanocomposites was prepared by melt compounding of polymer, MMT and necessary additives. The samples were then compression molded into sheets with defined dimensions and subjected to further analysis.

The structure of nanocomposites was investigated by wide angle X-ray diffraction (WAXD). Thermal properties were characterized by thermogravimetric analysis (TG)

and differential scanning calorimetry (DSC). The impact of nanoparticles on the ageing behavior of PVC/MMT nanocomposites was analyzed using an Atlas UVCON 2000 weathering device. FT-IR technique was used to monitor the structure changes of aged samples.

The environmental problems with PVC waste management make the process of polymer ageing a very important research issue, especially in regard to advanced nanostructured PVC materials.

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