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ORGANICALLY MODIFIED CLAYS AS POTENTIAL STABILISING AGENTS FOR PVC FILMS

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Nanocomposites based on PVC containing 10% organically modified nanofiller montmorillonite CLOISTE 30B (organic fraction – methyl, tallow, bis-2-hydroxyethyl, quaternary ammonium chloride) exhibited a reduced migration of plasticizer – dioctyl phthalate – by approx. 10% in 24 hours. The stability was more obvious in long-term investigation; migration of 15% lower than that of plasticized PVC occurred. The question thus emerging was, whether improvement would also be evident under environmental conditions. Therefore, test films were prepared from PVC and from nanocomposite based on PVC/clay in an aerobic environment in the presence of activated sludge from the municipal wastewater treatment plant.

The following conclusions can be drawn from this study: Films tested under standard conditions showed that nanocomposites containing 10% CLOISTE 30B exhibited 40% biological disposal of plasticizer (dioctyl phthalate). However, 30 % dioctyl phthalate was removed during a 60 days test from plasticized PVC without CLOISTE 30B. A 10% reduction in stability following biodegradation was also proven for samples first subjected to thermal oxidation (50 °C, 7 days – simulating summer conditions in the environment) and then subjected to chemical oxidation in an acid environment (pH=3, 100 hours), when compared with plasticized PVC. After chemical oxidation in a basic environment (pH=10, 100 hours) no difference in plasticizer stability was recorded, and in both cases a 25% biological removal of dioctyl phthalate took place in 40 days. Our results indicate that organically modified montmorillonite (CLOISTE 30B) reduces the stability of plasticizer contained in nanocomposites based on PVC by up to 10% under biotic conditions; thus is not a suitable filler for composites.

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