Accepted Manuscript

Influence of colemanite on the fire retardancy of ethylene-vinyl acetate and ethylene-methyl acrylate copolymers

Florian Cavodeau, Amandine Viretto, Belkacem Otazaghine, José-Marie Lopez-Cuesta, Christelle Delaite

PII: S0141-3910(17)30248-3

DOI: 10.1016/j.polymdegradstab.2017.08.016

Reference: PDST 8327

To appear in: *Polymer Degradation and Stability*

Received Date: 12 May 2017

Revised Date: 31 July 2017

Accepted Date: 13 August 2017

Please cite this article as: Cavodeau F, Viretto A, Otazaghine B, Lopez-Cuesta José-Marie, Delaite C, Influence of colemanite on the fire retardancy of ethylene-vinyl acetate and ethylene-methyl acrylate copolymers, *Polymer Degradation and Stability* (2017), doi: 10.1016/j.polymdegradstab.2017.08.016.

INFLUENCE OF COLEMANITE ON THE FIRE RETARDANCY OF ETHYLENE-VINYL ACETATE AND ETHYLENE-METHYL ACRYLATE COPOLYMERS

Florian CAVODEAU[1], Amandine VIRETTO[1], Belkacem OTAZAGHINE[1], José-Marie LOPEZ-CUESTA[1], Christelle DELAITE[2]

[1]*Centre des Matériaux des Mines d'Alès (C2MA), 6 Avenue de Clavières 30319 Alès Cedex, France*

[2]*Laboratoire de Photochimie et d'Ingénierie Macromoléculaires (LPIM), 3bis Rue Alfred Werner, 68100 Mulhouse, France*

Abstract

In the present work, colemanite, a hydrated calcium borate, was used as co-filler in aluminium hydroxide/ethylene-vinyl acetate copolymers (ATH/EVA). The presence of colemanite showed an improvement of the fire properties of composites. However, this additive does not act as a synergistic agent with ATH, but seems to increase significantly fire properties by his own. The formation of an expanded layer during cone calorimetry tests insulates the sample and reduces the heat release rate (HRR) values. The performance is ascribed to the hardening of the barrier layer due to the modification of colemanite structure at high temperature. Moreover, to study its mechanisms of fire retardancy and to investigate its potential synergistic effects, colemanite was also introduced as co-filler in magnesium hydroxide (MH)/EVA, ATH/ethylene-methyl acrylate (EMA) and MH/EMA composites.

Keywords: Flame retardancy, Aluminum hydroxide, Magnesium hydroxide, EVA, EMA, Colemanite

1. Introduction

Ethylene-vinyl acetate (EVA) copolymers are commonly used in the cable industry, due to their properties and processing characteristics. However, as the polymer decomposes under heat, a flame can easily be produced, presenting fire risks. In order to achieve standards of fire reaction, a large amount of fire retardant (FR) systems has to be introduced during the process [1]. In EVA copolymers, hydrated mineral fillers, such as aluminium hydroxide