Accepted Manuscript

Core-shell expandable graphite @ aluminum hydroxide as a flame-retardant for rigid polyurethane foams

Yintao Wang, Feng Wang, Quanxiao Dong, Mingchen Xie, Peng Liu, Yanfen Ding, Shimin Zhang, Mingshu Yang, Guoqiang Zheng

PII: S0141-3910(17)30334-8

DOI: 10.1016/j.polymdegradstab.2017.10.017

Reference: PDST 8384

To appear in: Polymer Degradation and Stability

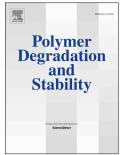
Received Date: 18 August 2017

Revised Date: 22 October 2017

Accepted Date: 28 October 2017

Please cite this article as: Wang Y, Wang F, Dong Q, Xie M, Liu P, Ding Y, Zhang S, Yang M, Zheng G, Core-shell expandable graphite @ aluminum hydroxide as a flame-retardant for rigid polyurethane foams, *Polymer Degradation and Stability* (2017), doi: 10.1016/j.polymdegradstab.2017.10.017.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Core-shell expandable graphite @ aluminum hydroxide as a

flame-retardant for rigid polyurethane foams

Yintao Wang^{a,b}, Feng Wang^{b,*}, Quanxiao Dong^c, Mingchen Xie^b, Peng Liu^b, Yanfen Ding^b, Shimin

Zhang^b, Mingshu Yang^{b, *}, Guoqiang Zheng^{a, *}

a. School of material science and engineering, Zhengzhou University, Zhengzhou 450001, China

b. Beijing National Laboratory for Molecular Sciences, Key Laboratory of Engineering Plastics,

Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, China.

c. Railway Engineering Research Institute, China Academy of Railway Sciences, Beijing 100081,

China

Abstract: To enhance the flame-retardant performance of expandable graphite (EG) in rigid polyurethane foam (RPUF), EG particles were encapsulated with inorganic nanoparticles, namely aluminum hydroxide (ATH), forming complex particles EG@ATH with core-shell structure. After the deposition of ATH shell, the expandability of the particles was enhanced from 163 to 197 ml/g, leading to better flame-retardant performance in RPUF. At a content of 11.5 wt%, the limited oxygen index could be increased from 21.5 % to 29.6 % by EG@ATH, in comparison to 27.5% by the physical mixture of EG and ATH (EG+ATH). Besides, EG@ATH exhibited better performance than EG+ATH on reducing the total smoke release and CO production. It is worth noticing that ATH could react with isocyanate groups, which was confirmed through FTIR. As a result, the interaction between the core-shell particles and the polymer matrix was enhanced, which protected the cell structure of RPUF from destroying by EG particles. The improved flame-retardant performance of EG@ATH, together with their low-cost, easy fabrication and especially friendliness to the environment, make it prospective in applications for flame retardancy of RPUF.

Download English Version:

https://daneshyari.com/en/article/7824253

Download Persian Version:

https://daneshyari.com/article/7824253

Daneshyari.com