

Accepted Manuscript

Structure and improved thermal stability of phenolic resin containing silicon and boron elements

Shan Li, Fenghua Chen, Boxing Zhang, Zhenhua Luo, Hao Li, Tong Zhao



PII: S0141-3910(16)30224-5

DOI: [10.1016/j.polyimdeggradstab.2016.07.020](https://doi.org/10.1016/j.polyimdeggradstab.2016.07.020)

Reference: PDST 8022

To appear in: *Polymer Degradation and Stability*

Received Date: 26 May 2016

Revised Date: 18 July 2016

Accepted Date: 22 July 2016

Please cite this article as: Li S, Chen F, Zhang B, Luo Z, Li H, Zhao T, Structure and improved thermal stability of phenolic resin containing silicon and boron elements, *Polymer Degradation and Stability* (2016), doi: [10.1016/j.polyimdeggradstab.2016.07.020](https://doi.org/10.1016/j.polyimdeggradstab.2016.07.020).

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.

Structure and improved thermal stability of phenolic resin containing silicon and boron elements

Shan Li^{a,b}, Fenghua Chen^a, Boxing Zhang^a, Zhenhua Luo^a, Hao Li^{a*}, Tong Zhao^{a*}

^aLaboratory of Advanced Polymer Materials, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, P. R. China

^bUniversity of Chinese Academy of Sciences, Beijing 100049, P. R. China

* Corresponding author.

E-mail addresses: tzhao@iccas.ac.cn (Tong Zhao), lihao306@iccas.ac.cn (Hao Li)

Abstract: Phenolic resin modified with silicon and boron (SNBA) was prepared by a simple two-step method: silane was firstly grafted onto phenolic resin, with silicon modified phenolic resin (SN) obtained; and then boric acid was introduced into SN. Boric acid, acting as a curing agent, catalyzed the self-polymerization of the silane in SN, and induced phase separation in the cured SNBA systems. Thermal stability was evaluated by thermogravimetric analysis (TGA). In air, the maximum decomposition rate (D_{\max}) decreased about 2 %/min and the residual weight at 900 °C (R_{900}) increased 16.7 % after the introduction of boron and silicon. Oxyacetylene flame ablation also confirmed the improved ablative properties of the hybrids. The flame retardancy was studied by cone calorimeter. The total heat release (THR), the total smoke produce (TSP) and the rate of mass loss (RML) were decreased after the modification. The structure of the oxidized resin was characterized to study the mechanism of the improved thermal stability and flame retardancy. The oxide compounds of silicon and boron were formed during high temperature oxidation,

Download English Version:

<https://daneshyari.com/en/article/5200977>

Download Persian Version:

<https://daneshyari.com/article/5200977>

[Daneshyari.com](https://daneshyari.com)