

性的胶料的交联密度相对低于其他偶联剂改性的胶料,反而使其拉伸强度最大。

3 结论

(1) 白炭黑的两种表面处理方式为原位改性和常温处理。采用原位改性后,白炭黑在HNBR胶料中分散更加均匀,白炭黑与橡胶大分子间的界面作用增强,胶料的门尼粘度降低,加工性能改善,硫化胶的拉伸强度增大,压缩永久变形减小。

(2) 对比不同种类偶联剂原位改性白炭黑填充HNBR胶料的性能发现,偶联剂WD80改性胶料的Payne效应最弱,分散效果最好,橡胶大分子和填料间界面作用最强,门尼粘度最低,加工性能最好;但含硫的硅烷偶联剂影响过氧化物硫化,降低交联密度,使压缩永久变形增大,因此偶联剂WD80不适用于过氧化物硫化体系。

(3) 偶联剂WD70和A151改性胶料的加工性能和物理性能良好,压缩永久变形较低,改性效果较优。

参考文献:

- [1] 梁磊,赵素合,朱伶俐,等. 纳米填料填充氢化丁腈橡胶的性能及压缩形态特征[J]. 合成橡胶工业,2012,35(1):17-21.
- [2] 陈琪,辛振祥. HNBR4种补强填充体系的研究[J]. 特种橡胶制品,2013,34(1):17-20.
- [3] 陈杰,王经逸,李峰,等. 氢化丁腈橡胶补强体系的研究进展[J]. 橡塑技术与装备,2013,39(8):17-23.
- [4] 李硕,赵素合,朱伶俐,等. ZDMA/白炭黑填充HNBR的结构与性能[J]. 橡胶工业,2010,57(2):69-75.
- [5] 李硕,赵素合,潘岩. 加工工艺对ZDMA/N550/HNBR复合材料结构与性能影响[J]. 特种橡胶制品,2009,30(6):19-23.
- [6] 王增林,李再峰,孙宝全,等. 甲基丙烯酸锌/炭黑增强氢化丁腈橡胶的性能[J]. 合成橡胶工业,2011,34(3):218-222.
- [7] 潘岩,赵素合,李硕. 增强氢化丁腈橡胶的结构与性能[J]. 合成橡胶工业,2009,32(3):232-237.
- [8] 黄安民,王丹丹,王小萍,等. 补强剂填充HNBR胶料的结构和性能[J]. 橡胶工业,2008,55(2):69-74.
- [9] 刘丽,张如良,刘辉,等. 炭黑/蒙脱土并用对HNBR复合材料性能的影响[J]. 材料科学与工艺,2011,19(2):100-107.
- [10] Ye X, Tian M, Zhang L Q. Some Interesting Phenomena in Silica-Filled HNBR with the Addition of Silane Coupling Agent[J]. Journal of Applied Polymer Science,2012,124(2):927-934.

收稿日期:2016-01-12

Properties of HNBR Composites Filled with Silica In-situ Modified by Silane Coupling Agent

ZHOU Yang, ZOU Hua, FENG Yuxing, LIAO Kun, HUANG Conggang, ZHANG Liquan

(Beijing University of Chemical Technology, Beijing 100029, China)

Abstract: The properties of HNBR compounds filled with silica fillers which were pre-treated by room temperature process and modified through in-situ modification were compared, and the effects of type of silane coupling agent applied in silica in-situ modification on the properties of HNBR compound were investigated. The results showed that, the Mooney viscosity of HNBR compound filled with in-situ modified silica decreased, the processing property was improved, and the Payne effect was weakened. The tensile strength of the vulcanizates increased, and the compression set decreased. The HNBR compound with silica in-situ modified by silane coupling agent A151 or WD70 possessed better processing property, better physical properties and lower compression set, showing good modification effect.

Key words: HNBR; silica; silane coupling agent; in-situ modification; dynamic mechanical property

一种阻尼橡胶

中图分类号:TQ336.4⁺2 文献标志码:D

由王红亚申请的专利(公开号 CN104672639A, 公开日期 2015-06-03)“一种阻尼橡胶”,涉及的阻尼橡胶配方为:氯化丁基橡胶 55~70,溴化

丁基橡胶 20~28,叔丁基酚醛树脂 10~16,白炭黑 8~10,硬脂酸锌 6~9,增塑剂DBP 3~5。该发明通过调整聚合物的共混比,可使阻尼橡胶在吸声、隔热和防震等方面得到提高。

(本刊编辑部 赵 敏)