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Analysis of the Properties of Composite Materials by Atomic Force Microscopy

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Abstract

In recent years, the automotive industry, particularly tire manufacturing, has experienced significant development and transformation from a simple rubber strip to a complex system composed of dozens of different materials. This complexity aims to significantly enhance tire performance, with a focus on increasing longevity, durability, and adaptability to various operational conditions. These improvements require a detailed study of the materials used and their manufacturing processes.

In this study investigate the effect of carbon black with different grades on the rheological, mechanical and physical properties of rubber blend SBR/NR.

Carbon black is widely used as a reinforcing filler in rubber composites, enhancing their properties. The grades added and chosen for the various formulations of rubber compounds are N234, N375, N660.

The study evaluates how these three specific grades influence key properties such as tensile strength, elongation at break, hardness, abrasion resistance.

Résumé

Ces dernières années, l'industrie automobile, en particulier la fabrication de pneus, a connu un développement et une transformation significatifs, passant d'une simple bande de caoutchouc à un système complexe composé de dizaines de matériaux différents. Cette complexité vise à améliorer considérablement les performances des pneus, en mettant l'accent Abstract sur l'augmentation de la longévité, de la durabilité et de l'adaptabilité à diverses conditions de fonctionnement. Ces améliorations nécessitent une étude détaillée des matériaux utilisés et de leurs processus de fabrication.

Cette étude examine l'effet du noir de carbone de différents grades sur les propriétés rhéologiques, mécaniques et physiques du mélange de caoutchouc SBR/NR.

Le noir de carbone est largement utilisé comme charge de renforcement dans les composites en caoutchouc, améliorant ainsi leurs propriétés. Les grades ajoutées et choisies pour les différentes formulations de mélange de caoutchouc sont N234, N375, N660.

L'étude évalue comment ces trois grades spécifiques influencent les propriétés clés telles que la résistance à la traction, l'allongement à la rupture, la dureté et la résistance à l'abrasion.

الملخص

شهدت صناعة السيارات في السنوات الأخيرة، وخاصة في مجال تصنيع الإطارات المطاطية، تطورًا وتحولًا كبيرين، حيث انتقلت من شريط بسيط من المطاط إلى نظام معقد يتكون من عشرات المواد المختلفة. تهدف هذه التعقيدات إلى تحسين أداء الإطارات المطاطية بشكل كبير، مع التركيز على زيادة العمر الافتراضي، والمتانة، والقدرة على التكيف مع ظروف التشغيل المختلفة. وتتطلب هذه التحسينات دراسة مفصلة للمواد المستخدمة وعمليات التصنيع الخاصة بها

في هذا العمل ، تم دراسة تأثير الكربون الأسود بدرجاته المختلفة على الخصائص الريولوجية والميكانيكية والفيزيائية لمزيج المطاط SBR/NR.
يُستخدم الكربون الأسود على نطاق واسع كمادة مالئة معززة في مركبات المطاط، حيث يُحسن من خصائص وإضافتها إلى تركيبات مختلفة من مركبات المطاط تم اختيار الدرجات N234, N375, N660

تُقيِّم الدراسة كيف تؤثر هذه الدرجات الثلاثة المحددة على الخصائص الرئيسية مثل قوة الشد، الاستطالة عند الانقطاع، الصلابة، ومقاومة التآكل

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