CURE CHARACTERISTICS AND VULCANIZATE PROPERTIES OF NATURAL RUBBER/ GROUND TYRE RUBBER BLENDS

Anu Mary Joseph[1], K.B. Salbi[2], K.N. Madhusoodanan and Benny George

[1]Department of Chemistry, Newman College, Idukki-685 585, Kerala, India
[2]School of Chemical Sciences, Mahatma Gandhi University, Kottayam-686560, Kerala, India
Rubber Research Institute of India, Kottayam-686 009, Kerala, India

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This paper presents the potential of blending ground tyre rubber (GTR) with natural rubber (NR) as a strategy to address the management of end-of-life tyres. The present work also investigated the possibility of improvements with respect to vulcanizate properties of NR/GTR blends through two protocols *viz.* mechanical devulcanization of GTR before blending and incorporation of carbon black filler in the blends. The cure characteristics, crosslink density and vulcanizate properties of blends were determined and compared. Results showed that incorporating mechanically devulcanized GTR (DGTR) led to better vulcanizate properties compared to vulcanizates containing an equivalent amount of GTR. Additionally, low loading of carbon black filler improved the properties for both types of blends. The study suggests that the vulcanizate properties of virgin NR/GTR blends can be tailored to meet specific requirements by modifying the incorporation protocols. For meeting high tensile properties, the incorporation of mechanically devulcanized GTR is recommended, while for lower property requirements, GTR with a small amount of carbon black is recommended.

Keywords: Crosslink density, Crosslink scission, Devulcanization, Re-vulcanization, Rubber blends

INTRODUCTION

The problem of used tyre disposal is a significant environmental concern in many parts of the world. When tyres are no longer suitable for use on vehicles, they must be disposed of in a responsible and environmentally benign manner. Unfortunately, many countries lack the infrastructure or resources to deal with the large volumes of used tyres generated each year, and as a result, these tyres often end up in landfills or illegal dumping sites or subjected to environmentally unsound recycling processes. The disposal of used tyres in landfills can lead to a range of environmental problems. Tyres are made from a variety of materials, including rubber, steel, and synthetic fibers, which can take hundreds of years to decompose. As they degrade, they release toxic chemicals and gases into the surrounding soil and air, which can have a negative impact on human health and environment. In addition to environmental concerns, the accumulation

Correspondence: Benny George (Email: benny@rubberboard.org.in; georgebenni@hotmail.com)