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DEVULCANIZATION OF WASTE TIRE RUBBER BY MICROWAVES**Fabiula D. B. de Sousa^{1,3*}, Carlos H. Scuracchio², Guo-Hua Hu³ and Sandrine Hoppe³**

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ABSTRACT

The disposal of urban solid residues is an enormous problem, especially in the case of vulcanized rubbers like tires. The old practice of landfilling is out of use due to the rising land costs, environmental concerns, fire risks and the possibility of proliferation of mosquitoes and other disease-carrying vectors. Devulcanization is shown to be an effective technique for making rubbers to flow and to be remolded. However, this process not only breaks down sulphur links, but also creates new other bonds, modifying the structure of the material as a whole.

In order to help understand structural modifications of ground tire rubbers (GTR) as a result of devulcanization by microwaves, this work proposes an in-depth study of the chemical modifications, flow and thermo-oxidative degradation behavior as a function of the exposure time of the GTR to microwaves. An important conclusion is that the final temperature reached by the sample is the primary factor responsible for the success of the process. Depending on the final temperature of the sample, different types of sulphur bonds can be broken. During the treatment, there is a balance between break down and formation of new bonds. Therefore, it is important to control the process carefully in order to avoid degradation of the main chains. Tires usually are composed of a mixture of synthetic and natural rubbers, wherein natural rubbers could be more degraded by microwaves because carbon black is mainly found on this phase.

Keywords: ground tire rubber, recycling, devulcanization, microwaves, structure, modification.

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