

Value Addition to Rejects from Natural Rubber Based Foam Rubber Industry

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Introduction

Latex foam rubber is found in a wide range of applications, used as a cushioning material and its major outlets are therefore in the toys, footwear, furniture, bedding and automotive industries (Adhikari, and Maiti, 2000). Foams are made by forming gas or air bubbles in a plastic mixture, with the use of a blowing agent (Abraham *et al.*, 2011). Foam manufacture is either a continuous process for making laminate or slab stock or a batch process for making various shapes by cutting or molding. The aim of this research was to study an effective way to devulcanize scrap generated during cutting and molding process and reuse devulcanize scrap in manufacturing of technological products.

There are several devulcanizing methods available in the rubber industries. But Dry ambient grinding method was used in the current research to devulcanize the scraps due to the simplicity, relative easiness and inexpensiveness (Debapriya *et al.*, 2005). Finally devulcanized foam scrap was added as filler in hot water bottle formulation.

Materials and methodology

Table 1: Hot water bottle original formula for injection moulding

Chemical	Original formula
Natural Rubber	100
Zinc Oxide	5
Stearic acid	1
Coated CaCO ₃	60
Precipitated CaCO ₃	30
Red Ochre	2
Antioxidant	1
TMTD	1.2
MBTS	1.1
NN'- dithiobismorpholine	1

According to the Table 1, one part of NN'-dithiobismorpholine contained in hundred parts of natural rubber. Instead one part of NN'-dithiobismorpholine, 0.5 parts of sulphur was used for the current research. Red ochre is a pigment and use for color the product. In the research the pigments were not used. Then using the modified formula, 300 g total weight of sample A, B, C, D and control were prepared. The sample A, B, C, and D were contained 5, 10, 15 and 20 parts of devulcanized scrap for each 100 parts of NR respectively. After that the raw materials were milled and the large sheets were prepared using milling machine. Then the prepared sheets were placed in an air conditioned room for 24 hours. After conditioning, small pieces were cut from each sheet and vulcanization characteristics were tested using rheometer. Then each sample was cured using hydraulic hot press machine for relevant T90 time at 150°C. The physical properties of prepared samples were measured according ISO test methods.

Results and Discussion

Different types of test methods used to compare the properties of the control and the other four test pieces are given in Figure 1.

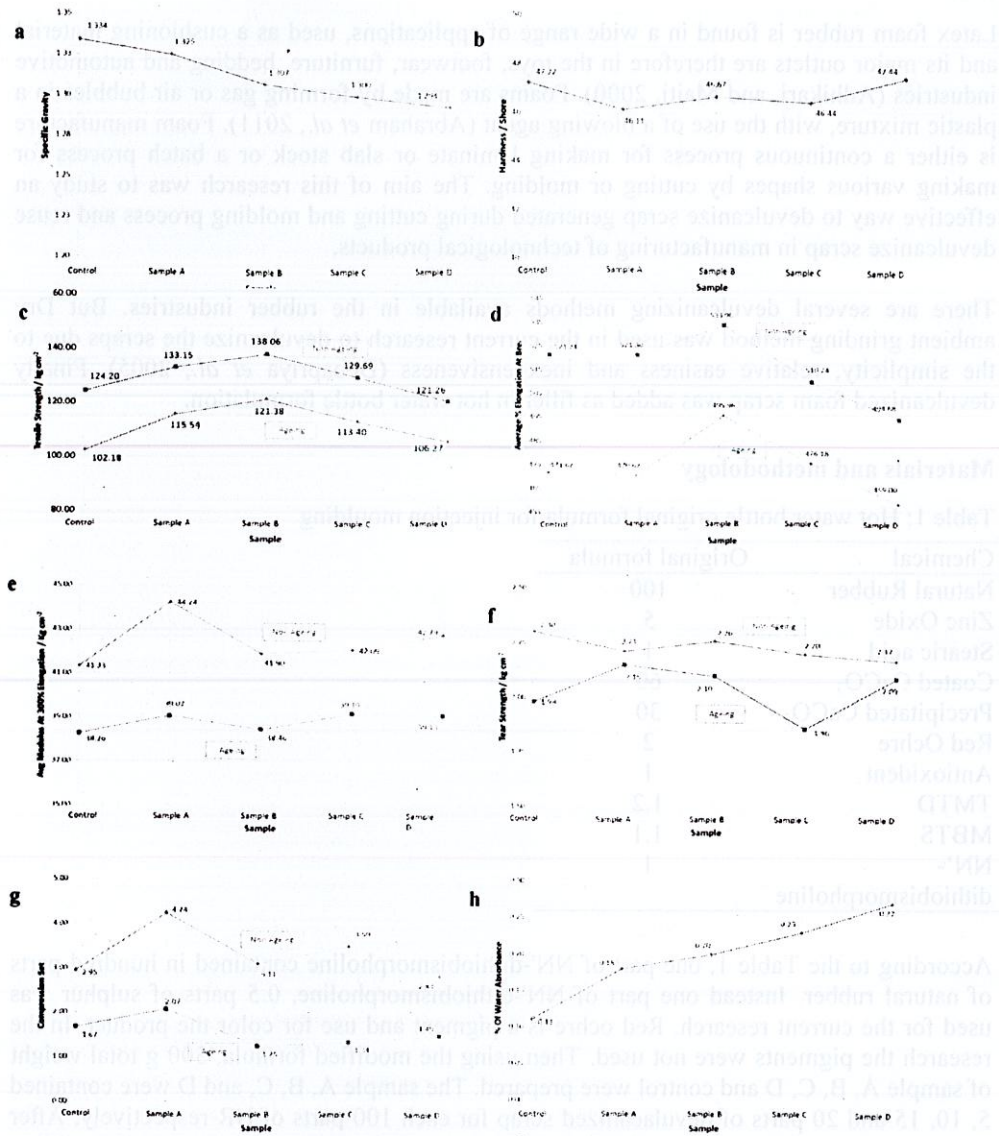


Figure 1: Different types of test methods used to compare the properties of the control and the other four test pieces (a) specific gravity (b) hardness (c) tensile strength (d) average elongation at break % (e) average modulus at 300% elongation (f) tear strength (g) compression set (h) water absorption %

Conclusion

This study showed that except water absorption property all the other properties of sample B has improved values compared to the control sample. Therefore it can be concluded that addition of 10 phr of devulcanized foam scrap in hot water bottle compound can be achieved with mechanical property enhancements such as tensile, tear, modulus and compression test.

References

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