INCORPORATION OF ACTIVATED CARBON IN NATURAL RUBBER LATEX FOAM FOR IMPROVEMENT IN SORPTION PROPERTY

BY

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DECLARATION

I certify that this dissertation does not incorporate without any acknowledgement any material previously submitted for a Degree or a Diploma in any University or Institution and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due references are made in the text.

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ABSTRACT

Natural Rubber (NR) latex is a colloidal dispersion of NR polymer which is predominantly cis 1,4 -Polyisoprene in an aqueous medium. Various chemicals are added to NR latex mainly as dispersions, at compounding stage to enhance processing characteristics and to obtain desired properties of the final product. The properties of chemicals in dry form or as dispersions are critical for latex compounding for maintaining the overall colloidal stability of the latex mix. Addition of chemical dispersions into latex for compounding are basically governed by particle or droplet size, physical nature, viscosity, pH and stability of the dispersion. Hence, properties of raw materials (compounding chemicals) are very important for making good dispersions for latex compounding and producing desired latex products.

In this study, an attempt was made to use activated carbon as a compounding ingredient to enhance the sorption properties of NR latex foam product. From this study it was found that activated carbon powder which had particle size below 10μ and pH (in 1% solution) having a basic pH or a pH towards neutrality can be made to a stable dispersion of 36% Total Solids Content by ball milling for 18 hours in the presence of a dispersing agent. This dispersion had proper dispersion characteristics such as low particle size (3μ), a pH greater than 7 and low viscosity value. From mechanical and chemical stability studies on latex compound, it was found that up to 2.0% (on dry weight of latex) of activated carbon, the latex compound had good mechanical and chemical stability. At 2.0% activated carbon, the cellular structure of the foam was satisfactory. From physical property testing of foam with activated carbon on compression set and tensile strength, it was found that good foam properties were obtained with the chemical formula for optimum vulcanizing condition consisting of phr 2.55 Sulphur, 1.10 ZDC and 0.85 ZMBT.

The results of sorption property investigations of this study reveal that NR latex foam with 2.0% activated carbon has a significantly higher sorption property compared to standard NR latex foam. Therefore, activated carbon can be incorporated to a NR latex compound in dispersion form at 2.0% dosage to produce a latex foam pillow having higher sorption property.

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LIST OF ABBREVIATIONS

NR	-	Natural Rubber
AC	-	Activated Carbon
T.S.C	-	Total Solids Content
S	-	Sulphur
ZDC	-	Zinc diethyl dithiocarbamate
ZMBT	-	Zinc mercaptobenzothiozole
ZnO	-	Zinc Oxide
SSF	-	Soldium Silico Fluoride
KCl	-	Potassium Chloride
DPG	-	Diphenylguanidine
Ralox	-	A sterically hindered phenolic type antioxidant which is a butylated reaction product of ρ-cresol and dicyclopentadiene
FS 4	-	A non ionic foam stabilizer
$CaCO_3$	-	Calcium carbonate
NH_3	-	Ammonia