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COMPARATIVE STUDY ON THE FACTORS DETRIMENTAL TO THE QUALITY OF THE CONCENTRATED NATURAL RUBBER LATEX FOR USE IN THE DIPPED PRODUCT INDUSTRY AND ASSOCIATED LATEX PROTEIN ALLERGY ISSUES

BY

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THE WORK DESCRIBED IN THIS THESIS WAS CARRIED OUT BY ME AT THE RUBBER RESEARCH INSTITUTE OF SRI LANKA AND LALAN RUBBER COMPANY ,WARAKAPOLA UNDER THE SUPERVISION OF DR. W.M.G.SENEVIRATNE AND A REPORT ON THIS HAS NOT BEEN SUBMITTED TO ANY UNIVERSITY FOR ANOTHER DEGREE

DATE : 24.02.2006

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I CERTIFY THAT THE ABOVE STATEMENT MADE BY THE CANDIDATE IS TRUE AND THAT THIS THESIS IS SUITABLE FOR SUBMISSION TO THE UNIVERSITY THE PURPOSE OF EVALUATION

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ABSTARCT

Continuous growth of the rubber manufacturing industry was observed over the last few decades in Sri Lanka. As at today local consumption of rubber is approximately 70% of the total production leaving only crepe rubber grades of NR for exports.

Latex product industry too has expanded significantly over the last few decades and presently, it attributes to around 35% of the local consumption of NR. Surgical, household, agricultural and examination gloves, balloons, Halloween masks and rubber toys are among the major products manufactured by the Latex product industries in Sri Lanka. One of the important issues in the latex manufacturing industry is the quality of the centrifuged latex. Low quality as indicated by high VFA number and the regular quality variations of centrifuged latex were found to be main causes and constrain affecting the quality of the manufactured product. Improper and variations of addition of chemical preservatives to latex affect the quality of latex.

First section of this study is focused on the addition of chemical preservatives such as TMTD/ ZnO, DAHP, and NH_3 at various stages to field latex and centrifuged latex, before and after centrifuging is carried out. Results indicate that all of those preservatives have important bearing on the stability of latex. Quality of latex was found to be highly dependant on the time, amount and the stage of addition of these preservatives. This study clearly distinguishes the latex quality parameter variations with change of addition of preservatives in comparison with the standard procedure of manufacture of centrifuged latex.

Apart from the quality of latex, one of the other major threats faced by the NR latex industry is the protein allergy issue associated with the manufactured products particularly the glove industry. In order to reduce the suspected allergenic leachable proteins to comply with the international standards the industry commonly use hot water leaching subsequent to controlled chlorination which is expensive and environmentally hazardous.

This study looks at various alternative methodologies which could be used to reduce leachable proteins from NR lattices. Effects of Protein reduction enzymes, Water Soluble polymers such as Poly Vinyl Alcohol, level of sludge removal by DAHP, quantities Ammonium Laureate, level of Ammonia in latex have been studied in relation to the extent of leachable protein removal from the NR lattices. All methods found to have different levels of effects on the removal rates of leachable proteins.

ABBREVATIONS

VFA	**Volatile Fatty Acid**
TMTD/ZnO	**Tetramehyl Thiuram Disulphide**
DAHP	**Dihydrogen Ammonium Hydrogen Phosphate**
NH3	**Ammonia**
NR	**Natural Rubber**
FL	**Field Latex**
PVMA	**Poly Vinyl Methyl Alcohol**
CL	**Centrifuge Latex**
MST	**Mechanical Stability**
TSC	**Total Solid Content**
Kg	**Kilogram**
MT	**Metric Ton**
Ha	**Hectare**
LS	**Latex Stability**
NRL	**Natural Rubber Latex**
DRC	**Dry Rubber Content**

KOH	**Potassium Hydracids**
HA	**High Ammonia**
BA	**Boric Acid**
ZDC	**Zinc diethyldithiocarbamate**
LATZ	**Law Ammonia TMTD/ZnO**
EP	**Extractable Protein**
LP	**Leachable Protein**
RVNRL	**Radio Vulcanized Natural Rubber Latex**
PA	**Protein Allergy**
PRE	**Protein Reduction Enzymes**
PVA	**Poly Vinyl Alcohol**
PaP	**Papa in**

TO MY BELOVED HUSBAND ,

DAUGHTER , SON,PERENTS,

TEACHERS & TRAINERS.

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