

**A STUDY ON**  
**THE USE OF**  
**ELECTRICAL CONDUCTIMETRY**  
**IN EXAMINATION OF**  
**CENTRIFUGE NATURAL RUBBER LATTICES**

**By**

**Ganga Illanchellien**

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**Date of Submission: - ( 2/2/2006 )**

  
**Dr. Lallean Karunanayake**  
Senior Lecturer  
Department of Chemistry  
University of Sri Jayewardenepura.

The work described in this thesis was carried out by the undersigned at the University of Moratuwa and Rubber Research Institute of Sri Lanka under the supervision of Dr. Shantha Walpalage, Head of Polymer Division, The Department of Chemical and Process Engineering and Mr. H.N.K.K Chandralal, Experimental Officer, Polymer Chemistry Department of Rubber Research Institute of Sri Lanka. A report on this has not been submitted to any university for another degree. Also, I certify that this thesis does not include, without acknowledgement, any material previously submitted for a Degree in any university and to best of my knowledge and belief, that it does not contain any material previously published, written or orally communicated by another person; except where due reference is made in the text.

*P. Ganga*  
Ganga Illanchellien

Date : 02/02/06

We certify that the above statement made by the candidate is true and that this theses is suitable for submission to the university for the purpose of evaluation

*SW*

Dr. Shantha Walpalage  
(Supervisor)  
Head of Polymer Division  
Dept of Chemical and Process Engineering  
University of Moratuwa  
Sri Lanka

Date: 02/02/06

**Dr. Shantha Walpalage**

B.Sc.Eng.(Moratuwa), Ph.D.(U.K.),

Senior Lecturer,

Department of Chemical and Process Engineering  
University Of Moratuwa - Sri Lanka.

*H.N.K.K Chandralal*

Mr .H.N.K.K Chandralal  
(Co- Supervisor)  
Experimental Officer  
Dept of Polymer Chemistry  
Rubber Research Institute  
Sri Lanka

Date: 02-02-06

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## LIST OF ABBREVIATIONS

Ca	- Calcium
CO <sub>2</sub>	- Carbon Dioxide
CO <sub>3</sub> <sup>2-</sup>	- Carbonate ion
cp(s)	- Centipoises
DRC	- Dry Rubber Content
FA(s)	- Fatty Acid(s)
F.H	- Foaming Height
GVA	- Gross Value Addition
HA	- High Ammonia
HCO <sub>3</sub> <sup>-</sup>	- Bicarbonate ion
HFA	- Higher Fatty Acid(s)
Int'l	- International
IRSG	- International Rubber Study Group
LA	- Low Ammonia
LATZ	- Low Ammonia latex preserved with ZnO and TMTD
K/K <sup>+</sup>	- Potassium/ Potassium ion
KOH	- Potassium Hydroxide
KOH No	- Potassium Hydroxide number
Mg/Mg <sup>2+</sup>	- Magnesium/ Magnesium ion
MRPRA	- Malaysian Rubber Producers Research Association
MST	- Mechanical Stability Time
MS	- Mechanical Stability
mS	- Milliseiman
No	- Number

Na/Na <sup>+</sup>	- Sodium/ Sodium ion
NCRT	- National College of Rubber Technology
NH <sub>4</sub> OH	- Ammonium Hydroxide
NR	- Natural Rubber
NRL	- Natural Rubber Latex
O <sub>2</sub>	- Oxygen
RRIM	- Rubber Research Institute of Malaysia
RRISL	- Rubber Research Institute of Sri Lanka
R <sup>2</sup>	- Correlation Co-efficient
VFA	- Volatile Fatty Acid
VFA No	- Volatile Fatty Acid number
TMTD	-Tetra Methyl Thiuram Disulphid
TSC	- Total Solid Content
ZnO	- Zinc Oxide

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# A STUDY ON THE USE OF ELECTRICAL CONDUCTIMETRY IN EXAMINATION OF CENTRIFUGE NATURAL RUBBER LATTICES

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## ABSTRACT

The ever growing innovation of rubber products in diversified fields have made it necessary to find a suitable quality latex rubber for different products. Because, manufacturers of rubber products are insisting on certain range of mechanical stability (usually in the range of 500 – 1000 seconds), there is a continuous research going on to find suitable test methods to assess such a quality of latex.

It has been found that volatile fatty acid number (VFA No), potassium hydroxide number (KOH No) and mechanical stability time (MST) test for quality control test proved to be a suitable methods for making quality products. The objective of this research to simply give quicker results than the usual method for determining VFA No and KOH No.

Current study consists of analyzing the property variation of centrifuge latex from two different rubber growing areas in Sri Lanka, upon soap addition and maturation. And also in finding the correlation between (1) Conductivity and KOH No (2) Conductivity and VFA No (3) Foaming height and Soap Level .

Lattices used for this study were obtained from two different areas. Accordingly a special request was made to centrifuge plant of Lalan Group and Texus Rubber Industry to supply latex without the addition of soap. Soap was added in different strength to the collected latex.

Following properties were investigated at intervals: MST, KOH number, VFA number, Viscosity, Foaming height, Conductivity.

From this study it appears that, viscosity of the latex was decreasing with time while other properties were increasing. Out of the whole investigated properties; response to the soap was remarkable in MST, foaming height, viscosity and VFA number. But for VFA number it was remarkable for certain period, due to the state of preservation.

Results suggest that KOH number and conductivity are responsible for the substance that are present in the ionized form and not the total substance in the medium. However, soap that was added can be identified by variation in the foaming height. Significant relationship that exist between soap addition and foaming height reveals the foreign soap molecules increase the froth formation in latex.

Variation in MST and viscosity due to the deliberate soap addition primarily caused by fatty acid soap ions that are adsorbed at the particle surfaces. Variation in KOH number, conductivity and foaming height has been brought about by consequent changes taking place in the medium. Furthermore, after six weeks (i.e after the natural high fatty acid become constant) of maturation further increase in the properties of MST, VFA number and KOH number are likely to be caused partly by aeration.

Further results showed that there was a strong positive linear correlation between (1) conductivity and KOH number (2) Foaming Height and Soap Level. And also there was a moderate positive linear correlation between conductivity and VFA number. The regression equations to express the relationship between the variables have also been found. Hence, it has become necessary that a number of lattices have to be examined in order to justify the adoption of these equations as a general rule.

## CHAPTER 1 INTRODUCTION

### 1.1 Background motivation

Natural rubber is nature's gift to the industrialized world. This useful industrial raw material is produced in plants cultivated extensively in South-East Asian Countries. Up to the beginning of Second World War, natural rubber was the only raw material available to the rubber goods manufacturing Industry. But at present, a dozen of different synthetic rubbers are also available to the industrialists along with natural rubber.

It is well known that natural latex, as a liquid of biotic origin, may at times shows considerable variation in composition and colloidal structure as the result of biotic, geotic, climatic and other influences. It is these differences which account for the variability in properties of latex and rubber, a variability which is some times the cause of difficulties in processing these materials to a product of well defined and uniform properties.

Mechanical stability of latex is defined as its resistance to destabilization by mechanical agitation or shear force. This characteristic is of the greatest practical importance whenever latex is handled. During concentration, in pumping and transportation, and in compounding and processing, mechanical forces are applied, and the possibility of destabilization exists. The measurement and control of Mechanical stability is therefore, of considerable importance to both producer and consumer of latex.

Changes in some properties of Hevea latex concentrate have been observed on its arrival at the consumer's factory. Many workers have carried out investigation of the changes