

**IDENTIFICATION OF A SUITABLE BLEND OF  
RUBBER LATICES IN VIEW OF ACHIEVING  
IMPROVED RESISTIVITY OF CHEMICAL  
PERMEATION OF THEM IN THE FORM OF  
FILMS.**

A dissertation submitted to the  
Faculty of Animal Science and Export Agriculture  
Uva Wellassa University  
In partial fulfilment of the requirements for the award of  
Bachelor of Science in Palm & Latex Technology and Value Addition

By  
**NAWARATHNA MUDIYANSELAGE CHAMINI  
ROSHITHA**

**Palm & Latex Technology and Value Addition Degree  
Programme**

**Faculty of Animal Science and Export Agriculture**

**Uva Wellassa University of Sri Lanka**

**2018**

## ABSTRACT

Gloves are widely used personal protective equipment (PPE) for hand protection in fields like medical, household, general purpose and industrial applications. They are mostly made out of natural or synthetic rubber latices. Based on the application, characteristics of the gloves should be varied. In this research study, the focus was to develop an elastomeric material for an industrial glove for chemical industry having adequate resistance for permeation of targeted three chemicals acetone, methanol and n-heptane. Rubbers used to prepare gloves inherent with different resistance levels for chemicals and one rubber may demonstrate adequate resistivity for one or few chemicals but not for many chemicals. Latices selected for this study, were natural rubber (NR), acrylonitrile-butadiene (NBR), polychloroprene (CR) and isoprene-isobutylene (IIR). At the first stage, each latex was compounded separately, made films and studied the permeation levels for three challenge chemicals. The analytical technique used to analyse chemical permeation of the rubber films was gas chromatography. The test method followed is ISO 16523-1:2015 to detect breakthrough time of each film and the permeation level of each has been decided as per EN 374-1:2016. Target was to achieve permeation level two as minimum for each challenge chemical by one type of film. Films made by selected latices separately have not demonstrated permeation level two for all three challenge chemicals hence attended in blending of latices. Performance of films made by each latex alone for each chemical was used as the guidance to decide the types of latices and the ratio of blending. Method followed to blend is to compound each latex separately and to blend them together as per the decided ratio. Blending of NBR, CR and IIR as per the ratio NBR:CR:IIR (75:10:15), demonstrated permeation level two or above for each challenge chemical. Mechanical properties were studied for the same blend as per EN 388 and achieved level one abrasion resistance. Tear resistance and puncture resistance was poor and achieved only level one. Tensile strength of the film was 13.2 N/mm<sup>2</sup> as per ASTM D412.

*Key words:* Chemical Resistance, Chemical Permeation, Gas Chromatography, Rubber, Polymer Blends