

Abstract No: MR-17

Finding an efficient solution system for leaching extractable proteins from natural rubber gloves

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Natural rubber latex (NRL) is used to manufacture a large number of useful products such as gloves. Allergy to NRL gloves is caused by latex proteins extractable into sweat. Extractable proteins (EP) come in contact with the skin causing allergic reactions. The protein allergy caused by latex products has become an acute problem to human health. Certain proteins or peptides eluting from NRL products can cause immediate hypersensitivity reactions (Type I allergy) in people sensitized to those proteins. The amount of total EPs in NRL gloves was assumed to reflect their corresponding amount of allergenic proteins. The major objective of this research was to develop an economical method to reduce EPs in finished NRL gloves. The current study was focused on developing a leaching solution system to remove the extractable NRL proteins from the gloves using CaCl₂ solution and sodium dodecyl sulphate (SDS) solution. Rubber films were leached with varying aqueous CaCl₂ (5%, 10%, 15%, w/v%) concentrations followed by leaching with SDS (5%, w/v%). After leaching, the water extractable proteins were analyzed by the analytical methodology based on the modified Lowry method according to ASTM D5712. Distilled water leached samples were used as the reference. When CaCl₂ concentration in leaching was increased, the removal efficiency of EPs was increased. When the samples were leached with CaCl₂ followed by SDS, they illustrated a further reduction of EPs. Thus, the amount of remaining EPs in the product decreased considerably. A maximum removal efficiency could be seen when the rubber films were leached with CaCl₂ (15%, w/v%) followed by SDS (5%, w/v%). The effect of leaching solvents on the final product was analyzed by measuring the mechanical properties such as tensile strength, tear strength and aging resistance. Distilled water leached samples were used as the reference. The mechanical properties did not change to a greater extent when rubber films were leached with CaCl₂ followed by SDS when compared to that of water leached samples. Therefore, leaching rubber gloves with CaCl₂ (15%, w/v%) followed by SDS (5%, w/v%) may be an efficient method for reducing EP content of the final product and thus reducing the allergenic conditions of sensitized people for NRL gloves.

Keywords: Allergy, Extractable proteins, Gloves, Natural rubber latex