

EFFECT OF METAL IONS ON PHYSICAL PROPERTIES OF THE HOUSEHOLD GLOVES

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ABSTRACT

Natural rubber latex is one of the most important polymer material which is widely used for manufacturing of gloves, balloons and other dipping products. Centrifuge latex is the major raw material of manufacturing of gloves and it is compounded with various compounding ingredients to improve the properties of the latex and final quality of the glove. This latex compound can be contaminated with various metal ions during manufacturing process of gloves and there may be an effect from those metal ions on quality of the gloves, affecting marketing of those gloves. Therefore, study was done to identify effect of the metal ions, especially Cu^{2+} , Fe^{2+} , and Mn^{2+} on properties of the household gloves. Metal analysis were done to raw centrifuge latex to determine available Cu, Fe and Mn ion concentrations in centrifuge latex. Those metal ions were added to the glove compound at 10 ppm, 20 ppm, 50 ppm, 100 ppm, 200 ppm and TSC, pH and viscosity were checked in metal ion compounded latex. There was no effect of metal ions on TSC, pH and viscosity of household glove compound. Tensile strength, aging properties, modulus at 100%, modulus at 300% and swelling were measured by preparing glove films as physical properties. Films developed without adding the metal ions were used as blank samples. The results of metal analysis revealed that Cu, Fe, and Mn were available in small ppm levels in centrifuged latex. Further, the results are indicated that, all the properties were significantly reducing with increasing metal ion concentrations. However, it was more severe in Cu^{2+} ion incorporated glove films and properties had reduced slightly with increasing the Fe^{2+} ion concentration. Properties of Mn^{2+} ion incorporated films also had reduced and 20 ppm can be suggested as the critical value of Mn^{2+} ion concentration. Further there was no an effect of metal ion or metal ion concentration on swelling of the glove films. And also Cu^{2+} and Fe^{2+} gave an effect on discoloration of gloves at 50 ppm and 200 ppm of ion concentrations respectively. Therefore, 200 ppm can be suggested as the critical level of the Fe concentrations and there was no effect of humidity and light on discoloration of metal ion contaminated gloves.

Key words: Concentration, Household gloves, Metal ions, Physical properties