

## **Increasing DMF Leaching Efficiency in Polyurethane Dipped Gloves Manufacturing Process**

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N,N-Dimethylformamide (DMF) is used in glove industry as a solvent to mix the polyurethane (PU) resin to form the polyurethane compound that is used as the coating in knitted and dipped gloves. N,N-Dimethylformamide is considered to affect human health. Hence it is essential to leach out the residual (DMF) content from coated gloves. The present invention provides a method to leach out the residual DMF content more efficiently in polyurethane coatings in knitted and dipped PU gloves. This investigation comprises two approaches, leaching the dipped glove in methanol-water mixtures and in DMF-water mixtures at 5 different percentages by varying the leaching time and temperature of the mixture. Methanol was used for these trials due to its close polarity index compared to that of DMF, thereby it facilitates leaching of more DMF into methanol-water solution. Blank sample was leached in pure water as the usual practice.

Adding pure DMF to water tend to increase the residual DMF content in the glove when its percentage in water-DMF mixture is greater than 5%. The use of methanol-water mixture as a leaching solution has shown a significant 90 % reduction of DMF content in the gloves than using water as the leaching solution at 25 ° C. Both optimum percentages of DMF and methanol in their respective leaching solutions were chosen and thereafter, the effect of temperature and leaching time were also examined. Optimum DMF percentage in leaching tank which gave preferable low residual DMF content in PU gloves were marked as 5% while the optimum leaching time was 60 minutes and optimum temperature was 25 ° C. Optimum methanol percentage in leaching solution which gave low residual DMF content in PU gloves were marked as 10% while the optimum leaching time in that was 20 minutes and optimum temperature was 35° C. Physical parameters such as abrasion, cut index, tear force and puncture force were not significantly varied in gloves treated with both methods and remain at same levels as in the blank. Gas chromatographic analysis was used to quantify the residual DMF content according to EN 16778 test method.

Keywords: Polyurethane; Gloves; N,N-Dimethylformamide; Leaching; Methanol

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