

# **EFFECT OF PROCESSING PARAMETERS ON CHEMICAL PERMEATION OF NITRILE GLOVE**

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## ABSTRACT

Chemical permeation is an important factor when interpret the chemical resistance of gloves which provides protection against solvents. Nitrile gloves are used are generally unsatisfactory for use against aromatic or halogenated solvents. Therefore, assessing processing parameters affect the chemical resistance of Nitrile gloves was interested in this study. Maturation time and ZnO content, curing temperature and time of the compound were selected as the key processing parameters which affect the chemical resistance of Nitrile gloves and each parameter was evaluated using four separate experiments. Nitrile glove compounds were prepared and matured for 96 hours and gloves were prepared at 12, 24, 36, 48, 60, 72, 84 and 96 hours maturation times keeping 48 hours maturation time as the control. New compound series was prepared incorporating ZnO at 0, 4, 8 and 12phr levels, keeping 4phr level as the control. Another compound was prepared with 4phr ZnO level and after 48 maturation time, the effect was evaluated varying curing temperature and time at 80, 100, 120, 130, 140 and 160°C and 30, 45 and 60 minutes respectively. Then chemical resistance of the gloves was determined following EN16523-1:2015+A1:2018 test method using 96% Sulfuric acid, Methanol and Acetic acid. Results revealed that the acceptable chemical resistance (breakthrough time in minute) towards above solvents can be achieved at 24 hours maturation time though control was 48 hours. The maximum chemical resistance for sulfuric and acetic acid was shown at 8phr level of ZnO while 4phr of it was enough to give the chemical resistance to methanol.

The highest breakthrough time for methanol was shown in 160 curing temperature with 45 minute for sulphuric acid 140 temperature with 45 minute and for acetic acid 100 temperature with 30 minute. Overall, chemical resistance of Nitrile gloves can be improved varying the above parameters within the identified limits. Tensile and modulus properties also measured at according to the above factors.

**Keywords:** Chemical permeation, Maturation time, ZnO, Curing temperature, Curing time