

# Transport Properties of Membranes for Lightweight Chemical Biological Protective Clothing

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## ABSTRACT:

There are a plethora of Toxic Industrial Chemicals (TICs) which could be used to attack U.S. Soldiers today and this means that the evaluation of both old and new protective clothing has become a necessity. Test methods for testing the protectiveness of the clothing purpose exist; however, these methods need to be proven through testing. The problem is that testing such a large diversity of TICs is expensive, so it would be beneficial to down-select to a limited number of representative TICs. Due to this, the goal of the project is to evaluate previously developed laboratory test methods to assess the impact of TICs on IPE and COLPRO barrier materials. This would help in assessing the possibility of down-selecting based on chemical class, specifically chloro-alkanes. The first test is an immersion test where a material is immersed in a chemical until saturated. The sample is dried, with its weight loss measured periodically. This will yield results from which the solubility and diffusion coefficient can be calculated. A second test is a permeation test which effectively measures the breakthrough time and the steady state permeability of a material. These tests will help in determining chemical classes and predicting whether chemicals can be tested solely on what group they are in, thus lowering the number of chemicals that need to be tested because one or two chemicals can represent an entire class of chemicals.

**KEYWORDS:** Toxic Industrial Chemicals (TIC), Immersion testing, Permeation testing, Chemical classing

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