

RESPIRATOR VAPOR PROTECTION FACTORS: ACTIVE VERSUS PASSIVE SAMPLING

Menno.De Jonge¹ and David Caretti²

¹) Research Scientist, TNO Defense, Security and Safety, Rijswijk, The Netherlands

²) Research Physiologist, US Army Edgewood CB Center, Aberdeen Proving Ground, MD, USA

The interaction between mask, clothing and other equipment and the effect on the protection of the different components during exercises, which represent actual work activities, is the way to look at the integrated system of protective gear. The separate components each have good systems and protocols to do this evaluation.

For respirator and impermeable clothing combinations traditional simulants like NaCl, corn-oil and SF₆ could very well serve as the challenge-agent for both protective items. For combinations with permeable clothing, these simulants are not suitable. Methyl-Salicylate (MeS) is the most common simulant used for measuring the level of protection of permeable protective clothing. Unfortunately, gas-detection systems that are portable and sufficiently sensitive to measure the low concentrations of MeS inside the mask are currently not available.

Therefore, this study employed a prototype sampling system to sample MeS inside a mask during the inhalation phase of the breathing cycle only. This sampling device was connected to a NIOSH certified CBRN air-purifying respirator and fitted to a dummy-head connected to a breathing machine. Tenax™ patches were placed inside the respirator's oral-nasal mask for passive sampling of MeS. The preliminary results indeed show that the PF obtained by active sampling differs considerably from the PF by passive sampling. The actively obtained PF exceeds the passively obtained PF by a factor of 2 to 4.

The results of this pilot study will determine whether the prototype device is suitable for these measurements and make a comparison between the protection factors of active and passive sampling.