safekin, blue, and purple nitrile gloves would be rated as "Good" while the sterling nitrile gloves would receive a rating of "Poor" according to the chemical resistance rating system for disposable gloves by Kimberly Clark.

SR-128-02

Permeation of 2-Ethoxyethanol through Purple Disposable Nitrile Gloves

S. Banaee, UCLA, Arcadia, CA; S. Que Hee, UCLA, Los Angeles, CA.

Objective: The purpose of this study was to investigate the permeation of 2-ethoxyethanol (99% purity) through a disposable powderless, unlined, unsupported purple nitrile exam glove material. The goal was to investigate the protective capability and reliability of the gloves during occupational exposures.

Methods: Glove materials were conditioned for 24 h in a desiccator at a relative humidity of 52 ±1%. Four 1-inch diameter permeation cells (3 experimental cells with 2-ethoxyethanol as challenge and one air blank) were used with water as collection fluid in a protocol based on the American Society for Testing and Materials (ASTM) F 739 - 99a closed-loop permeation method. Aliquots of 0.1 mL were taken at permeation time intervals of 20 min, 1, 2, 4, 5, 6, and 8 h. The analytical method was based on gas chromatography-mass spectrometry (GC-MS) using the internal standard method (4-bromophenol as internal standard) and selected ion monitoring (m/z 59 and 172) and injection of 2-uL aliquots.

Results: The ASTM normalized breakthrough detection time corresponding to 0.25 ug/cm^2 occurred at <20 minutes. The permeation rate stabilized at 6.3 ± 0.61 ug/cm^2 from 1 through 8 hours. The material swelled noticeably into the collection chamber, but reverted to its original state on reconditioning.

Conclusions: These disposable purple nitrile exam gloves should not be used as personal protective equipment for exposure to 2-ethoxyethanol even for short period exposures.

CS-128-03

Surface and Skin Fiber Sampling Related to the use of a Cut-Resistant Sleeve

D. Ceballos, L. Tapp, D. Wiegand, NIOSH, Cincinnati, OH.

Situation/Problem: NIOSH received a health hazard evaluation request from union representatives at a steel mill. They were concerned with skin and upper respiratory irritation, and safety and hygiene issues regarding the required use of cut resistant protective sleeves containing fiberglass, Kevlar®, and cellulose. Of particular concern was the potential for inhalation of fiberglass from the use of the protective sleeves after sleeves have been laundered.

Resolution: We collected surface samples using either Stick-To-It lift tape (SKC Inc., Eighty Four, Pennsylvania) or vacuuming with a polycarbonate filter from work surfaces, worker's skin, and worker's clothing, including the surface of new and laundered protective sleeves. We also collected bulk samples of new and laundered protective sleeves and other potential sources of fibers at the steel mill (i.e., insulation materials). These samples were analyzed by stereomicroscope and polarized light microscopy for identification of fiberglass, Kevlar®, and cellulose particles, as well as for particle morphology and size.

Results: All vacuum filter surface samples contained fiberglass and/or cellulose particles. All tape samples contained fiberglass, Kevlar®, and/or cellulose particles. The Kevlar® particles averaged 20 micrometers (μm) in width and the fiberglass particles averaged 10 μm in width; both had variable lengths. There were no differences in particle size or shape depending on whether the sample was collected from a laundered sleeve or a new sleeve. None of the Kevlar®, fiberglass, or cellulose particles seen in these surface samples had sharp edges. No fibers from insulation were found on surfaces or skin.

Lessons learned: We concluded that the fiberglass particles discovered on work surfaces did not pose an inhalation hazard. However, these particles may cause reversible upper airway irritation and reversible skin irritation for some individuals.

ABSTRACTS

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