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A NEW SYSTEM FOR SAMPLING AND CHARACTERIZING PLASTER IN THREE DIMENSIONS SIGNIFICANTLY REDUCES THE NUMBER OF SAMPLES REQUIRED TO DECLARE PLASTER ASBESTOS FREE. R. Morse, Dyanki, Inc., Poestenkill, NY; T. Ouimet, Yale University, New Haven, CT.

EPA and OSHA regulations require that the asbestos content of plasters be determined before demolition or renovation. A typical survey looks at plaster in a building in two dimensions, basing sampling requirements upon observable surface characteristics. Unfortunately, a single type of plaster can be applied with various textures. As a result, large numbers of samples are frequently required to characterize the asbestos content. This is particularly true when a plaster is free of asbestos and the AHERA minimum number of samples is required. The authors have developed a method of looking at plaster systems in three dimensions. This significantly reduces sampling requirements. Plaster samples are collected using a small core-drill attached to a HEPA filtered vacuum cleaner. The samples are cleaned in a simple glove box using HEPA filtered local ventilation so that the layers of plaster are exposed. Each layer is then characterized into homogeneous areas based on the color, texture and composition of cement and aggregate. In a typical building, plaster systems that appear very different frequently are shown to have a single homogeneous type of plaster base coat with a single finish plaster that has various applied surface textures. This system has been used successfully on a large number of buildings. Robust standard operating procedures have been developed for plaster characterization, sample collection, and data logging. Material standards and an atlas of plaster types and plaster materials has been developed.

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COMPARISON OF DIRECT AND INDIRECT SAMPLE PREPARATION METHODS FOR ASBESTOS ANALYSIS. L. Burrelli, J. Spencer, Environmental Profiles, Inc., Baltimore, MD.

Industrial hygienists must clearly understand the procedures encompassed within the various analytical methods to properly conduct health hazard assessments. It is imperative that the industrial hygienist selects the appropriate standard analytical method for an assessment to obtain meaningful results; assures that the assessment was conducted in accordance with federally mandated guidelines; and obtains results that are conducted using verifiable and quality assured processes. A study was conducted to compare the effect of a "direct" filter preparation technique (NIOSH Analytical Method 7400) with an "indirect" filter preparation technique (ASTM Method D5755-95) that utilizes ultrasonic treatment and re-deposition of collected particulate. The airborne sample materials used for the analysis were generated from non-friable asbestos-containing gaskets. The dust generation technique was developed only to produce material for collection on the filter cassette, and was not reflective of likely occupational airborne fiber values when working with the gasket products. The results of the study showed that the use of the indirect sample preparation method as described in ASTM Method D5755-95, disassociated bound asbestos fibers from the non-friable gasket matrix material, and also dispersed fiber bundles rendering discreet "countable" asbestos structures. Analysis of the indirect sample preparations revealed an increase in the number of fibers detected and countable by phase contrast microscopy. Samples analyzed by the direct preparation methodology as required by OSHA showed that fibers were generally encapsulated in bundles and matrices. Therefore, air samples prepared by an indirect analytical methodology presented results that were not reflective of the actual fiber concentration in the air. In all cases, the fiber in air concentration by indirect preparation exceeded the companion sample analysis prepared by the direct methodology by a factor of 20 to 26 times.

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FIELD COMPARISON OF IOMS AND IMPINGERS FOR SAMPLING OF TOTAL ALIPHATIC ISOCYANATES IN AIR WITH THE MAP REAGENT. D. Bello, S. Woskie, F. Youngs, University of Massachusetts at Lowell, Lowell, MA; R. Streicher, NIOSH, Cincinnati, OH; Y. Liu, J. Sparer, Yale University School of Medicine, New Haven, CT.

Results of a comparative field study on the performance of 25-mm inhalable samplers (IOM) and midget impingers for the collection of total isocyanates in air using the MAP reagent are presented here. Air sampling and analysis was performed according to the NIOSH MAP draft method 5525. Midget impingers, filled with 15 ml 1 × 10-4 M MAP in butyl benzoate, were operated at 1l/min. IOM cassettes, loaded with 25-mm quartz fiber filters impregnated with 500mg MAP, were operated at 2 l/min. Filters were field extracted with 10 ml 1 × 10-4 M MAP in acetonitrile. 34 impinger-IOM pairs were collected in three shops during spray painting tasks. Regression analysis demonstrated that impingers and IOMs perform equally in their collection efficiency for both the monomer and total oligomer of biuret/isocyanurate (Y=1.0X, R2=0.98). A paired t-test comparing the IOMs to impingers for both the monomer and oligomer proved insignificant (Pr >0.9 two-sided), and remained so even after including three outliers (Pr>0.2). Intra-sampler variability was calculated from the individual coefficients of variation (CV) for the pairs. The CV was close to 10% (SD = 9%) for both samplers at typical total isocyanate concentrations of £ 400mg NCO/m3 and almost doubled at unusually high concentrations of ³ 1mg NCO/m3 due to the outliers. Previous field comparisons of impingers and filter samplers have found impingers to give higher results than filters. Explanations for the observed sampler agreement may include the following factors: 1) Slow curing aliphatic isocyanates derivatize completely on the filter; 2) Field extraction of filters; 3) Short sampling time (GM = 25 min, GSD=2.4); 4) Expected particle size was mostly 2-20mm. It is concluded that MAP impregnated filters can be successfully used for sampling of total aliphatic isocyanates in air.

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DEVELOPMENT OF AN ANNULAR SORBENT CARTRIDGE FOR AIR SAMPLING. K. Hofacre, A. Wang, Battelle Memorial Institute, Columbus, OH.

Current air sampling cartridge designs rely primarily on a cylindrical-shaped packed bed sorbent that is characterized by a relatively small cross-sectional area and deep bed. An annular shaped sorbent bed design has been assessed to determine the feasibility of developing a low airflow resistance sorbent tube. Annular sorbent bed inner diameters ranged from 0.5 to 1.0 cm with an outer diameter of 2.0 cm; sorbent bed lengths ranged from 4 to 8 cm. The annular shape permitted radial airflow through the sorbent bed; thus, the available surface area for airflow was 10 to 20 times greater, and the bed depth was about one-fourth that of a 2.5-cm diameter cylindrical bed containing an equivalent sorbent volume. Consequently, the corresponding face velocity through the bed was reduced by a factor of 10 to 20, while maintaining residence time equivalent to that of a cylindrical design. The performance of the annular cartridges was characterized by measuring the airflow resistance as a function of volumetric flow rate and the adsorption of organic vapors. Sorbent bed characteristics of capacity, breakthrough, and channeling were investigated to characterize adsorption performance. Airflow resistances less than 1 in. H2O were measured, which was more than an order of magnitude lower than that of equivalent cylindrical-shaped cartridges. The adsorption performance, and the ability to recover analytes by thermal desorption or solvent extraction, of the annular design were comparable to standard cylindrical cartridges. The results demonstrate that it is feasible to design annular sorbent cartridges that have an airflow resistance more than an order of magnitude lower than cylindrical cartridges containing the same quantity of sorbent while maintaining comparable adsorption characteristics. Thus, lower power, smaller, and/or higher volumetric flow rate sampling pumps are possible, which can improve the air sampling capability/performance for air monitoring.

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RAPID IDENTIFICATION OF INDOOR MOLDS TO SPECIES OR GROUPS BY REAL-TIME POLYMERASE CHAIN REACTION (PCR). R. Miller, C. Martinez-Miller, Aerotech Laboratories, Phoenix, AZ.

PCR is a relatively simple technique by which genetic material is amplified many thousand to million-fold quickly and reliably. It is this amplification that makes it such a powerful technique, often allowing the detection of as few as one to ten cells. One major attraction to PCR in the environmental microbiology field is its ability to identify and quantify a microbe, often to the species or even strain level, within a few hours compared to the several days or even weeks required for conventional microscopic or cultivation methods. Utilizing primers and probes developed and patented by the U.S. Environmental Protection Agency, we tested a real-time, probe-based PCR method on mold spores obtained from indoor environments. Comparisons made between mold species obtained on PTFE filters for PCR testing correlated well to results obtained from Air-O-Cell (Zefon) cassettes and agar plates impacted via a single stage sampler. The PCR method confirmed the presence, depending on the specific sample, of Cladosporium cladosporioides, Aspergillus niger, Aspergillus glaucus group (Eurotium rubrum, E. repens, E. herbarorium, E. amstelodami, and E. chevalieri), and Penicillium chrysogenum group (P. chrysogenum, P. expansum, P. coprophilum, P. gladicola, P. griseofulvum, and P. aethiopicum). The individual members of the groups, such as the species of Eurotium in the A. glaucus group, are molecularly indistinguishable from each other in the ITS (internal transcribed spacer) region of the nuclear ribosomal DNA. Species within groups might be resolved using genes from other regions or may prove to be molecularly the same, in which case morphological speciation may prove erroneous. The PCR technique provides a very rapid method for speciation, and concomitantly reduces the non-instrument variability

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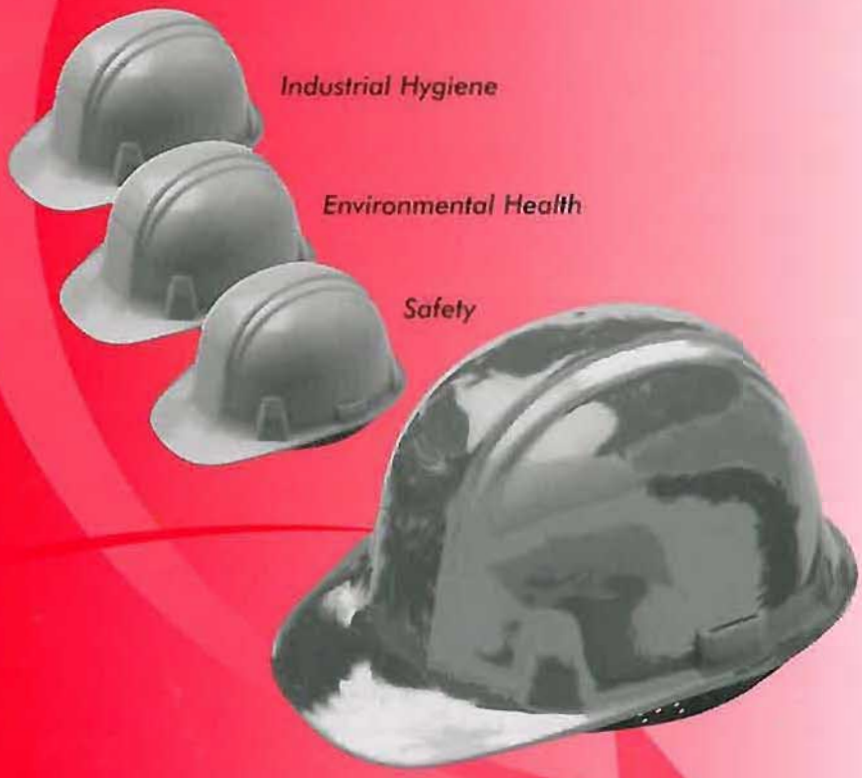

ABSTRACTS