294

ACTIVE/PASSIVE AIR SAMPLERS MADE FROM ACTIVATED CARBON FOAM. C. Manning, S. Green, Assay Technology, Pleasanton, CA.

Activated carbon combines efficient adsorption and retention of volatile organic compounds (VOCs) with the ease of desorption for analysis. In NIOSH and OSHA test methods, granular charcoal has been the preferred form, however, other forms have found application. These forms include porous discs, tubes, fibers, and foams, each of which may have advantages in sampling and analysis.

Porous discs used in diffusive samplers have superior mass transport characteristics compared to granular carbon, and the discrete disc is handled more easily in the laboratory. Small-diameter carbon tubes, with attenuated inner surfaces, afford efficient sampling of vapors and aerosols. Carbon fibers can collect a tiny VOC sample and then be placed directly into the injector of a gas chromatograph.

Recently, we have acquired activated carbon foams which were used to make a single device capable of active or passive sampling. The carbon foams are discrete structures presenting an open-pore structure such that significant air flow is accomplished at minimal back pressure using a small sampling pump with high collection efficiencies afforded by the intimate contact achieved in foam. This material was also used as a reservoir in a diffusive sampler by capping the foam with a sampling grid.

Active/passive samplers in several configurations were prepared as follows. Carbon foam was cut into cylindrical forms and installed in an inert tube capped at either end. 25-mm, 37-mm tubes were prepared having depths of 3–9 mm. By removing the caps, the air sampling tubes were able to sample at rates from 5–500 ml/minute with breakthrough volumes exceeding 50 liters for many VOCs. The same air sampling tube, fitted with a diffusive sampling grid, was used for diffusive sampling at 5–50 ml/minute. Recoveries of 90–100% were found for most VOCs consistent with other activated carbons.

295

CHEMICAL CHARACTERIZATION OF LABORATORY SIMULATED ROAD PAVING-LIKE ASPHALT FUME GENERATED BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY AND HIGH PERFORMANCE LIQUID CHROMATOGRAPHY-FLUORESCENCE TECHNIQUES. B. Law, S. Stone, D. Frazer, P. Siegel, NIOSH, Morgantown, WV.

Workers in the paving and roofing industry are potentially exposed to asphalt fumes. Asphalt fume composition varies dependent on source of asphalt and application temperature. Polyaromatic hydrocarbon (PAH) content is of particular interest due to potential carcinogenic effects. The characterization of asphalt fume poses technical analytical problems. First and foremost it is a complex mixture. It is very difficult to identify and measure the small quantities of specific PAHs in such complex mixtures. A degree of isolation/separation must be achieved to quantify individual compounds from asphalt fumes. Many methods have been used to evaluate asphalt fume composition, however, they have involved either multiple difficult steps and/or lack specificity to the point that a confident chemical identification is not possible. The method used in this study utilizes a polyvinyl dibenzyl (PVDB) high performance liquid chromatographic (HPLC) column to separate aliphatics from the PAHs with subsequent analysis using gas chromatography-mass spectrometry (GC-MS). The PVDB-HPLC method can also, potentially, be used to quantify the total amount of PAHs by differential fluorometric detection following class separation by the column. A significant reduction in background interferences of the laboratory-generated asphalt fume extracts has been achieved following simple HPLC-single fraction collection that allows GC-MS identification and quantification. Inline fluorescent analysis of the PAH fraction may also provide total PAH quantification, however, comparability to established, accepted total PAH fluorescent measurement following solid phase extraction has not yet been assessed. In conclusion, this HPLC preparatory method is simple and its utility for analysis of specific PAHs has been demonstrated using asphalt fume generated under simulated road paving conditions.

296

THE USE OF FIELD PORTABLE X-RAY FLUORESCENCE (XRF) TO EVALUATE LEAD IN SOIL AROUND 1950S ERA RESIDENTIAL STRUCTURES. T. Zdeb, URS CORP, Vista, CA; D. Clark, PCR Laboratories, San Marcos, CA.

The use of field portable X-ray fluorescence (XRF) analyses (EPA Method 6200) is capable of providing essentially real-time information regarding the concentrations of many metals of potential environmental concern including lead in soil. Such information can allow investigations related to concentrations of metals in soils to be optimized since turnaround time typically associated with having samples analyzed by a stationary laboratory is effectively eliminated. In addition, because the results of properly conducted XRF analyses are accepted by many, if not most regulatory agencies, the need for further confirmatory laboratory analyses may be substantially reduced and/or eliminated. A case study is presented which includes the results of over 180 soil samples analyzed for lead to depths of 6, 12, and/or 18 inches around six homes built between 1940 and 1960 in Southern California. The soils surrounding each dwelling were investigated using a minimum of two samples collected at the dripline on each side with stepout samples collected at several locations 5 and 10 feet perpendicular to the face of the structure. The use of multidepth sample locations at multiple distances away from the structure allowed a three dimensional characterization of the lead concentrations in the soils around each dwelling to be completed. Per the State of California "School Site Testing Guidelines," selected samples containing concentrations of lead above 255 mg/Kg were also sent to a stationary laboratory for confirmatory analyses by either EPA Method 6010B or 7421. The results of soils analyzed with the XRF compared favorably to the results of soil samples analyzed by the stationary laboratory showing an overall correlation coefficient of approximately 0.90.

297

DETERMINING THE MOST SIGNIFICANT PREPARATION PROCEDURE FOR THE CONSISTENT ANALYSIS OF LEAD IN SOIL AND DUST. S. Roda, S. Clark, P. Succop, J. Buchanan, S. Spalding, University of Cincinnati, Cincinnati, OH.

Today, laboratories prepare soil and bulk dust samples for analysis using various sample preparation procedures that may or may not include drying, homogenization, grinding, or particle size fractionation. A previous study clearly demonstrated that the Pb concentration of the sieved < 125-µm particle size fraction of the samples consistently yielded the highest Pb value except in several cases where the overall Pb value was above 1000 ppm. In addition, excess variability existed for the analysis of both soil and bulk dust when using fractions < 2 mm and < 500 µm in particle size.

Sieving a soil or bulk dust sample may be more indicative of present exposure and thus be the better correlate to present measures being obtained, whereas, grinding the larger particles produces a result indicating potential future contamination. In a second study, samples were ground and then placed through a < 125-µm sieve. A dilution affect of grinding was evident at Pb levels below approximately 1000 ppm. Above all federal levels of concern the concentration began to increase in the ground portion and often exceeded the sieved < 125-µm particle size fraction.

Due to lack of precision, the bioavailability of Pb from smaller particles, the bioaccessibility of smaller particles to children, and the significantly lower ground sample result at federal levels of concern, the preparation and analysis of the < 125-µm particle size fraction of soil and bulk dust samples is recommended. We have demonstrated in two studies that a number of various answers can be derived from soil and bulk dust samples depending on the choice of preparation method. A consistent and universal procedure is critical for both risk assessment and subsequent remediation of contaminated areas. In addition, conclusions from past and present studies may be affected and dependent on the preparation procedures used for both soil and bulk dust.

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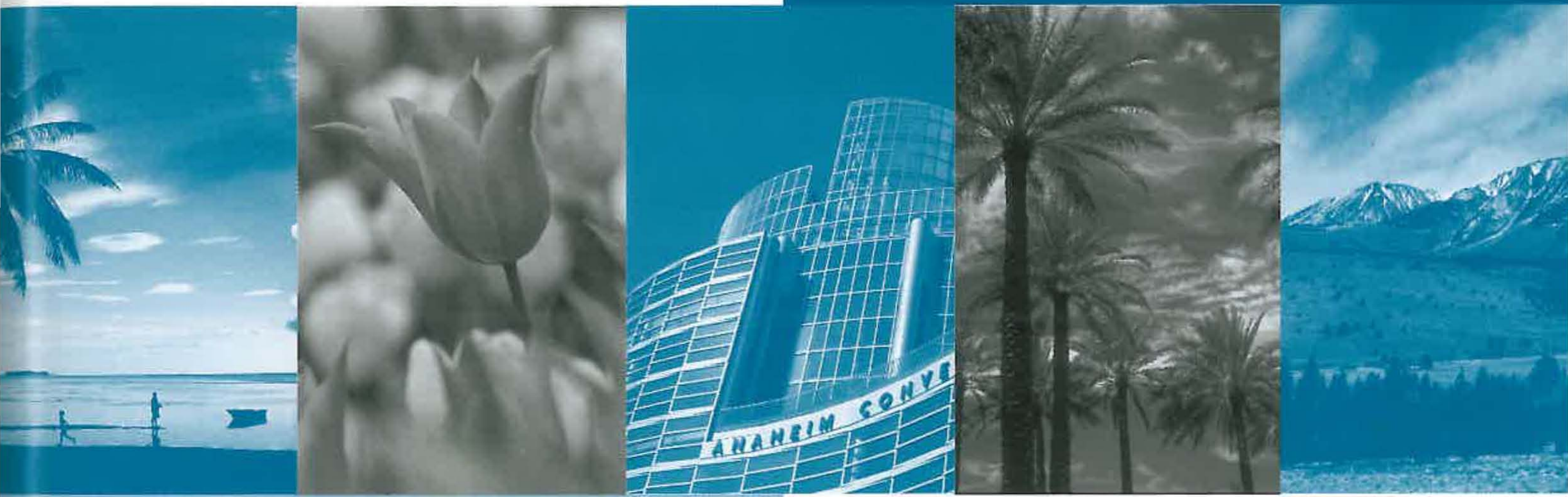

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