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SAMPLING AND ANALYSIS OF GLUTARALDEHYDE USING EVACUATED CANISTERS. T. Robinson, D. Cardin, C. Casteel, Entech Instruments Inc., Simi Valley, CA.

A higher sensitivity technique for sampling and analysis of glutaraldehyde by gas chromatography/mass spectrometry (GCMS) using small silonite coated canisters has been developed to meet the lower permissible exposure limit (PEL) of 0.015–0.05 ppmv proposed by OSHA and the California State Health Department. Older technology for sampling and analysis involved collecting an air sample onto a diphenylhydrazine derivitizing sorbent tube with the analysis performed using high performance liquid chromatography. This technique has limitations in the sampling protocol which does not allow for a rapid sample to be taken in the event of an accidental spill or for short-term exposure limit evaluations. The analysis has limitations in the limit of detection due to the dilution performed in sample preparation and cannot meet the proposed PEL of 0.015 ppmv. The whole air sampling approach using evacuated silonite coated canisters is a simplified sampling technique that can take an instant grab sample, a short-term sample, or an eight-hour time-weighted sample. The air sample can then be analyzed by heated canister and preconcentration combined with GCMS. Evacuated canister sampling along with concentrating several hundred milliliters of sample prior to injection into a GCMS has been performed for over 25 years with EPA method TO14 and more recently with silonite coated canisters by OSHA method PV2120. This time proven technology has now been enhanced by heating of silonite canisters prior to analysis to extend the range of compounds recovered allowing heavier polar compounds including glutaraldehyde to be included in the analysis. In this presentation we will discuss the advantages of whole air sampling and evaluate the recovery of glutaraldehyde in canisters. In addition, the operation of the analytical instrumentation used for glutaraldehyde analysis, including instrument calibration and detection limit, will be shown.

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DETERMINATION OF NON-DIETARY ARSENIC IN URINE BY INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICP-MS). L. Blum, E. Bakowska, J. Vinosky, G. Moldavchuk, National Medical Services Inc., Willow Grove, PA.

Arsenic is a known occupational health hazard, and the determination of urinary arsenic is an important aspect for the overall evaluation of arsenic exposure. Occupational exposure to arsenic is common in the smelting industry and in the microelectronics industry. Low-level arsenic exposure occurs through the commercial use of inorganic arsenic compounds in common products such as wood preservatives, pesticides, herbicides, fungicides, and paints, among others.

The toxicity of an arsenic-containing compound depends on its valence state, its form (inorganic or organic), and the physical aspects governing its absorption and elimination. The normal intake of arsenic by adults occurs primarily through ingestion, mostly organic arsenic from seafood. The specific arsenic compounds obtained from these sources are arsenobetaine and arsenocholine, which are relatively nontoxic; however, these compounds are rapidly excreted unchanged and add to the total arsenic level in the urine. The measurement of total urinary arsenic concentrations for purposes of biomonitoring arsenic exposure can be misinterpreted, if dietary influences are not taken into consideration. Therefore, non-dietary arsenic consisting of trivalent and pentavalent arsenic plus their methylated metabolites, monomethylarsonic acid and dimethylarsinic acid, is measured.

Patient urine samples (n = 2138) with no known industrial arsenic exposure were extracted, and then analyzed by inductively coupled plasma mass spectrometry. From this population, 97% had non-dietary urine arsenic concentrations below 20 mcg/L and 99% had less than 35 mcg/L (ACGIH BEI). In two populations with suspected arsenic exposure (n = 394 and n = 188) 82 and 38%, respectively, had urinary non-dietary arsenic levels below 20 mcg/L, and 96 and 54%, respectively, had less than 35 mcg/L. The measurement of urinary non-dietary arsenic eliminates the contribution of organic arsenic compounds usually attributed to seafood consumption and results in a more accurate assessment of arsenic exposure.

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AVAILABILITY OF TRANS, TRANS-MUCONIC ACID AS A BIOMARKER FOR EXPOSURE TO LOW CONCENTRATIONS OF BENZENE. J. Roh, J. Won, C. Kim, H. Kim, H. Kim, D. Koh, Yonsei University, Seoul, Republic of Korea.

The aim of this study was to assess the availability of urinary trans, trans-muconic acid (t,t-MA) as a biomarker for low level exposure to benzene. The airborne benzene concentration was measured using a personal air sampler and determined by GC/FID. The urinary t,t-MA was determined in 40 urine samples collected from 20 workers in a petrochemical factory and from 20 controls with no occupational exposure to benzene. In the exposed group, the urine samples were collected at the beginning and end of the work shift. The t,t-MA concentrations in the urine were determined by HPLC/UVD. The individual whole-shift concentrations of benzene in the exposed group ranged from undetectable to 0.99 ppm with an average of 0.16 ± 0.22 ppm (geometric mean, 0.046 ± 0.12). The average urinary t,t-MA levels for the control and exposed group were 19.67 ± 18.88 μg/g creatinine (geometric mean, 12.44 ± 2.90) and 199.01 ± 64.76 μg/g creatinine (geometric mean, 189.27 ± 1.39), respectively. Significantly higher urinary t,t-MA levels were observed in the exposed workers. A statistically significant correlation was found between the t,t-MA concentrations in the end-of-shift samples and the airborne benzene concentrations($r = 0.63$, $p < 0.01$). According to multiple regression analysis, no significant correlation existed between the urinary t,t-MA level and the demographic characteristics. These results support the availability of urinary t,t-MA as a biomarker for low levels of benzene exposure (< 1 ppm).

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INTERVENTIONS TAKEN AT A HOMELESS SHELTER TO REDUCE TRANSMISSION OF TUBERCULOSIS. C. Coffey, C. Calvert, M. Duling, J. Hudnall, R. Lawrence, S. Martin, NIOSH, Morgantown, WV.

The National Institute for Occupational Safety and Health (NIOSH) provides technical assistance to internal and external partners regarding hazardous work site exposures. NIOSH engineers and scientists responded to a request from the National Center for HIV, STD, and TB Prevention and the Missouri Department of Health and Senior Services concerning a tuberculosis (TB) outbreak at the Salvation Army Harbor Light facility in St. Louis, Mo. Harbor Light is a shelter open to any adult male without a place to sleep. The shelter has three major components: (1) the drug treatment area, (2) the respite program, and (3) the transient, open-to-the-public program. The sleeping quarters in the main building house about 100 clients. The shelter has an "annex" in a neighboring building with sleeping quarters on two floors. Since 2000, there had been 19 confirmed cases of TB at the shelter, with two deaths. Of these 19 cases, 14 were epidemiologically linked to Harbor Light shelter use, particularly the Annex. Eight infected contacts were also linked. As a result of the findings, NIOSH made several recommendations to aid in the prevention of continuing TB transmission, including: improving shelter administrative practices (e.g., routine sign and symptoms review, chest X-rays, purified protein derivative tuberculin skin tests, and sputum screening) so that suspect clients are more readily identified, tested, and isolated; thoroughly cleaning and balancing all heating, ventilating, and air-conditioning systems and updating/retrofitting each to include minimum efficiency reporting value 14 filters, and installing in-duct and upper air ultraviolet germicidal irradiation fixtures. The implementation of these preventative measures gave the shelter an effective filtration rate of about 98% for airborne mycobacterium tuberculosis. Since these improvements were made, no new tuberculosis transmission has occurred at the shelter that assists about 1800 homeless clients per year.

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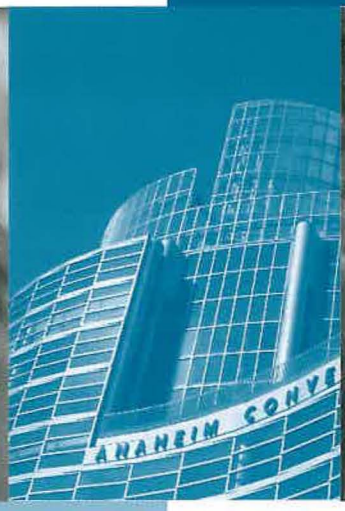


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