is a powerful method for analyzing respirable TiO2 samples. Further validation of the XRD method was performed by comparing the results of 177 respirable personal samples collected on 25 mm MCE filters using Casella-HD cyclone samplers at nine TiO2 production plants with ICP-MS data gained from the same samples. Excellent correlations were obtained between the XRD and ICP-MS data for each sampling site but observed consistent site-dependent deviations explained by differences in crystallinity of the TiO2 phases and the presence of titanium-containing minerals other than rutile and anatase.

Abstract citation ID: wxac087.024

85 Workers' Exposure to Respirable and Inhalable Particles During Filling of Containers with Bulk Material and Efficacy of Protective Measures

Ralph Hebisch, Jörg Karmann, Ulrich Prott, Anita Woznica
Federal Institute for Occupational Safety and Health (BAuA), Dortmund, Germany

Containers are filled with bulk material in many enterprises. To assess workers' exposure to respirable and inhalable particles we have performed workplace measurements in ten enterprises. Beside personal air sampling stationary samplers were used in the filling zone at the exhaust ventilation and in the work area. Additionally, the PIMEX system with a direct reading light scattering photometer was used for visualisation of exposure. Workers filled containers with automatic and semi-automatic filling stations or manually using hand shovels. For all solids the dustiness for boths particle fraction has been determined using the continuous drop method (EN 15051). The estimated dustiness for both particle fractions shows a good correlation for their conversion using an exponential function. The results were splitted into two similar exposure groups: manual filling and semi-automatic/automatic filling. For personal air sampling, no correlation was found between airborne concentration of the respirable particle fraction and the corresponding dustiness. On the other hand, the measurement results for the inhalable particle fraction and dustiness correlate well for both SEGs. Therefore, the exposure potential may be categorised using dustiness of the inhalable particle fraction. Furthermore, for conversion of inhalable to respirable particle fraction a power function proved to be most suitable. This conversion is much better suited for more standardised activities such as automatic/semi-automatic filling compared to manual filling where workers' individual behaviour is determining their exposure. Nine video clips have been produced showing the efficacy of protective measures. For visualisation, the videos are superimposed by signals of a light scattering photometer.

Abstract citation ID: wxac087.025

86 Fungi and Mycotoxins Occupational Exposure – Unveiling the Contamination in Different Settings from Portugal

Carla Viegas[1,2,3], Renata Cervantes[1], Marta Dias[1,4,3], Bianca Gomes[5], Pedro Pena[5], Elisabete Carolino[5], Magdalena Twaruzek[6], Robert Kosicki[6], Liliana Aranha Caetano[7,8], Susana Viegas[1,2,3] [1]H&TRC – Health & Technology Research Center, ESTeSL – Escola Superior de Tecnologia e Saúde, Instituto Politécnico de Lisboa;, Lisbon, Portugal, [2]NOVA National School of Public Health, Public Health Research Centre, Universidade Nova de Lisboa;, Lisbon, Portugal, [3]Comprehensive Health Research Center (CHRC);, Lisbon, Portugal, [4]) NOVA National School of Public Health, Public Health Research Centre, Universidade Nova de Lisboa;, Lisbon, Portugal, [5]H&TRC – Health &Technology Research Center, ESTeSL – Escola Superior de Tecnologia e Saúde, Instituto Politécnico de Lisboa, Lisbon, Portugal, [6]Kazimierz Wielki University, Faculty of Natural Sciences, Institute of Experimental Biology, Department of Physiology and Toxicology, Chodkiewicza 30, 85–064, Bydgoszcz, Poland, [7])H&TRC – Health &Technology Research Center, ESTeSL – Escola Superior de Tecnologia e Saúde, Instituto Politécnico de Lisboa, Lisbon, Portugal, [8]Research Institute for Medicines (iMed.ULisboa), Faculty of Pharmacy, University of Lisbon, Lisbon, Portugal, Lisbon, Portugal

This study intends to present an overview from the assessments of fungal contamination and mycotoxins performed in three different occupational environments (Firefighters headquarters - FFH; Waste collection trucks – WCT and; Cemeteries - CM). Active sampling (impaction and impingement methods) and several passive sampling methods (swabs, settled dust, settled dust filters, electrostatic dust cloths – EDC, cleaning materials,...) were employed. Azole resistance screening, the molecular detection of Aspergillus sections, as well as mycotoxin analysis were also conducted. In FFH microbial contamination didn't comply with Portuguese IAQ legal requirements in most of the FFH, the widespread of Aspergillus section Fumigati in all the FFH was observed, as well as a trend of multidrug resistance with focus on Fumigati isolates. Several mycotoxins (fumonisin B2, nivalenol, mycophenolic acid and sterigmatocystin) were detected. Concerning WCT Aspergillus sp. (4.18 %) was one of the most prevalent species. Aspergillus section Fumigati was detected in 5 samples. Mycotoxins were detected in filters (N=1) and in settled dust samples (N=16). The mycotoxin detected in the filter was fumonisin B1 and the most detected in settled dust was mycophenolic acid. In what concerns CM, Aspergillus sp. presented the highest counts in DG18 (18.38%) and it wasn't observed in azole-supplemented SDA media. Mycophenolic acid was detected in one settled dust sample.Overall, our study reveals that a comprehensive sampling approach and combined analytic methods is an important

asset in microbial exposure assessments. Furthermore, in all the three occupational environments mycotoxins were detected unveiling this occupational health threat.

Abstract citation ID: wxac087.026

88 Occupational Exposure to Metals Among Battery Recyclers in France: Biomonitoring and External Dose Measurements

Ogier Hanser, Mathieu Melczer, Aurélie Martin Remy, Sophie Ndaw French National Research and Safety Institute (INRS), Vandoeuvre-lès-Nancy, France

In battery-recycling facilities, exposure to trace elements may occur through inhalation of contaminated dust or vapor emanating from the treatment processes. Thus, biomonitoring coupled with air measurements, appeared to be a relevant approach to assess exposure of battery recyclers. While lead exposure has been quite well covered in the literature, in contrast, data on exposure to other elements contained in batteries are lacking. The aim of this study was to characterize the exposure of French battery recyclers to multiple elements using biomonitoring and airborne measurements. Eighty-six workers participated in the study. Pre-shift and post-shift urine samples and personal airborne samples were collected during the working week. Inductively coupled plasma mass spectrometry was used to analyze 7 trace elements in both type of sample: Cd, Co, Cr, Li, Mn, Ni, Pb. Results showed battery recyclers to be mostly exposed to Cd, Co, Li, Mn and Ni. Urinary sample analysis indicated exposure to Cd and Co, with levels measured at up to 27.6 and 3.34 µg/g of creatinine, respectively. Cd, Co, Li, Mn, and Ni were detected at high levels in air samples, especially near the treatment facilities, with airborne cadmium levels of up to 79.4 µg/m3. Administrative and sorting workers were exposed at lower levels than maintenance, treatment, and dismantling workers. The data presented provide valuable information on exposure to trace elements for battery recyclers. They also highlight the need to improve both collective and individual protective measures, which were not sufficient in the participating companies.

Abstract citation ID: wxac087.027

91 Isocyanates Aerosols Sampling for Occupational Exposures Assessment

Marianne Guillemot, Christel Ravera, Sandrine Melin, Xavier Simon, Eddy Langlois INRS, France

Isocyanate compounds are potent sensitizers, in particular through the development of skin dermatitis and allergies. They are one of the main causes of occupational asthma. None no-adverse-effect level has been establishes for isocyanates, therefore, it is important to measure isocyanates level at workplaces. Most of the time, isocyanates are present in workplaces atmosphere both in gas and particle phase, which makes their quantitative sampling difficult. Actual sampling methods do not fit with individual sampling over 8 hours. The aim of this work was first to characterize the particles size distribution in workplaces, depending on the isocyanate and the process used. Then, we studied the effectiveness of CIP 10-I as a sampling device for four isocyanates, compared to impinger and impregnated filter. Particles size distribution was determined thank to different cascade impactors such as Andersen, DLPI+ and MiniMOUDI-8. The Mass Median Aerodynamic Diameter (MMAD) of 4,4'-MDI (4,4'-diphenylmethane diisocyanate) particles in polyurethane foam projection process was found to be higher than 4 µm. In paint spray process, HDI (hexamethylene diisocyanate) particles MMAD was between 1 and 2 µm. The aerosol generation system was designed to obtain particles sizes closed to those observed in workplaces. The CIP 10-I collection foam was impregnated with the same derivative agent as filters. HDI, 2,4-TDI and 2,6-TDI (Toluene diisocyanate) aerosols were generating at concentrations between 10 and 250 µg/m3 in dry air. Whatever the concentration, CIP 10-I collection efficiency is higher than that of filters. Further investigation are currently performed to investigate CIP 10-I performance for MDI sampling.

Abstract citation ID: wxac087.028

95 Local Scale Exposure and Fate of Engineered Nanomaterials

Mikko Poikkimäki[1,2], Joris T.K. Quik[3], Arto Säämänen[1], Miikka Dal Maso[2] [1]Finnish Institute of Occupational Health, Tampere, Finland, [2]Tampere University, Tampere, Finland, [3]National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands

Nanotechnology is a growing megatrend in industrial production and innovations. Many applications utilize engineered nanomaterials (ENMs) that are potentially released into the atmospheric environment, e.g., via direct stack emissions from production facilities, and may have adverse effects on human health and the environment. Previous modeling approaches have focused on large regional compartments, into which the released ENMs are evenly mixed. However, due to the localization of the ENM release and removal processes, potentially higher airborne concentrations and deposition fluxes are obtained around the production facilities. Therefore, we compare the ENM concentrations from a dispersion model to those from the uniformly mixed compartment approach. For realistic release scenarios, we based the modeling on the