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A new tool to compare respirable dust sampling techniques in the workplace atmosphere: The Workplace Atmosphere Multisampler- WAM

Steven Verpaele¹, Jonathan Jouret¹ and Céline Eypert-Blaison²

¹Adhesia, Belgium

²Institut National de Recherche et de Sécurité (INRS), France

Studying the effects that create differences between contemporary dust samplers (e.g. design, flow rate and sampling efficiency) is usually done by means of personal measurements or by comparing samplers in a standard atmosphere, thus ignoring workplace variability and congruent sampling. Previous comparison studies used unequal sampling methods (e.g. hanging samplers next to one another), and consequentially produced biased results. The development of the WAM, Workplace Atmosphere Multisampler, makes it possible to determine the reproducibility of sampling data and to compare several samplers (up to 12) in 1 run.

In this study, sampling was performed in 3 distinct industries (foundry industry, enamel industry and brickworks industry) using 3 different respirable dust samplers. In this study, the Dorr Oliver 10 mm cyclone, Casella SIMPEDS plastic cyclone and the CIP10-R sampler was used to validate this device. Single runs with identical samplers only, were used to validate the WAM for providing homogeneous dust aerosols to the samplers. Mixed runs, with different samplers in one run, were performed to confirm these results.

The gravimetric analyses for the SIMPEDS cyclone show reproducible results. All 6 runs show a relative standard deviation below 10% (flow rate and analysis error included in these figures). The analyses of the Dorr Oliver cyclone produced varying results, between 19.2 and 79.7% RSD, which may be an important indicator of the non-reproducibility of the results obtained out of the gravimetric analysis of this sampler. The results for the CIP10-R almost always show deviations below 10%. These data prove the capability of the WAM to equally expose the samplers to respirable dust. This enables the comparison of dust samplers in the very unique atmospheres of divergent workplaces.