Standardising inhalable aerosol sampling

The newly developed CALTOOL is a reference instrument that allows the assessment of the performance of personal aerosol samplers in real workplaces.

Current methods for testing personal samplers for inhalable aerosols in workplaces take place at laboratory settings, where non-real conditions, including uniform airflow, exist. Yet, in real workplaces, local generation of aerosols by workers and exhaust ventilation systems are found to cause non-uniform airflows. Therefore, testing needs to be conducted in actual workplace environments and hence, a reference instrument for calibration of candidate samplers is highly needed.

To answer this need, the CALTOOL was designed in order to offer reliable assessment of the performance of personal aerosol samplers in real workplaces. The instrument includes a breathing manikin with an on-board pumping support unit. Air passing through a circular mouth entry on a cylindrical head is sampled at a steady flow-rate. The contained aerosol is gathered in filter holder positioned at the removable cylindrical head. The head is mounted on an elliptical torso on which personal samplers under test are supported.

The method allows direct comparison of the aerosol concentration value collected by the personal sampler against the one obtained from the CALTOOL. This leads to an assessment of the performance of the personal sampler under test. More specifically, the tool evaluates the potential of a given personal sampler to provide measurements of inhalable aerosol fraction in real situations. It features ease of use and offers a broad spectrum of particle size distributions under various processes.

The calibration tool was initially tested and provided the same results by selecting either continuous breathing through the mouth or sinusoidal breathing. Additionally, it was found that under both calm and moving air conditions, CALTOOL offered a satisfactory sampling efficiency close to the expected target. The tool was further evaluated under a wide range of workplace settings in three EU member states and displayed good performance indoors and outdoors. This promising instrument is expected to gain a great acceptance for widespread use in the future.

Related information

| Report Summary | Design of calibration tool for the assessment of the performance of personal samplers in real workplaces |

Subjects

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