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Focus on IFA's work

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Benzene measurements in a range of working areas

Problem

Benzene is a human carcinogen. The TRGS 910 technical rules for hazardous substances specify an acceptable concentration of 0.2 mg/m³ for benzene. This value is expected to be lowered further to 0.02 mg/m³ in 2018. This constitutes a significant reduction with respect to the existing EU OEL of 3.25 mg/³. A need consequently arose for a new and substantially more sensitive measurement method to be developed in the German Social Accident Insurance Institutions' MGU measurement system for exosure assessment. The new method is also to enable the lower range of the acceptable concentration to be monitored reliably.

Activities

The new analytical thermal desorption method was tested for its suitability by measurements performed at selected workplaces in the field. All tests showed the new method to be suitable for reliable monitoring of the acceptable concentration, even following further reduction of the value as anticipated in 2018. Additionally, the existing method provides good coverage of the tolerable concentration of 1.9 mg/m³. A combination of the two methods is a good means of evaluating the benzene exposure at the workplace.

The field measurements were conducted primarily at filling stations and in horticulture and gardening. At filling stations, three working areas are distinguished: the outdoor area around the filling pumps, the till and sales areas, and workshops.

Benzene measurement at a filling station

Since workshop areas at filling stations differ little from other workshops, they were not considered here.

In the horticulture and gardening sector, the use of petrol-engined garden equipment such as powered hedge trimmers, leaf blowers, lawnmowers and chainsaws was examined in particular. The use of special benzene-free fuel is however mandatory for such equipment; consequently, no benzene exposure need be anticipated.

Results and Application

A total of 22 measurements were performed at 13 filling stations. Benzene was not detected in any sample by means of the existing measurement method on activated charcoal. The new

method detected exposure values in the lower µg/m^3 range. The values measured in the outdoor areas were at the same level as those in the sales areas. The detected concentrations were approximately in the region of ambient measurements. At 0.088 mg/m^3, one result was substantially higher than the other results. It was obtained at the filling pump during the filling process. Nevertheless, all other values measured were substantially below the acceptable concentration. It can be assumed that the acceptable concentration will still be observed at filling stations if it is reduced in 2018 as planned.

Low concentrations were detected by the majority of measurements performed on garden equipment. Over 90% of the measured values (26 measurements in five companies) lay below the concentration of 0.072 mg/m^3. Substantially higher values were however measured sporadically. Maximum values of 0.2 and 0.172 mg/m^3 – effectively the same for the two methods – were measured on a leaf blower. Normal petrol was deliberately used for this study, in order to demonstrate the difference between it and the special benzene-free fuel. It must be observed more closely in particular from 2018 onwards that the specified benzene-free special fuel is used for garden equipment.

The measurement campaign is to be continued in the years to come with a different focus: workshops of all types are to be studied, and possibly larger filling facilities, since they are expected to exhibit benzene exposure.

Area of Application

Test bodies, accident insurance institutions, labour inspectorates of the regional governments

Additional Information

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Expert Assistance

IFA, Division 2: Chemical and biological hazards

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Edited by: Yvonne Giesen
Institut fuer Arbeitsschutz der Deutschen
Gesetzlichen Unfallversicherung (IFA)
Alte Heerstrasse 111, 53757 Sankt Augustin, Germany
Phone: +49 2241 231-02/Fax: -2234
E-mail: ifa@dguv.de, Internet: www.dguv.de/ifa