IFA
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Focus on IFA's work

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Flammability of respiratory filters

Problem

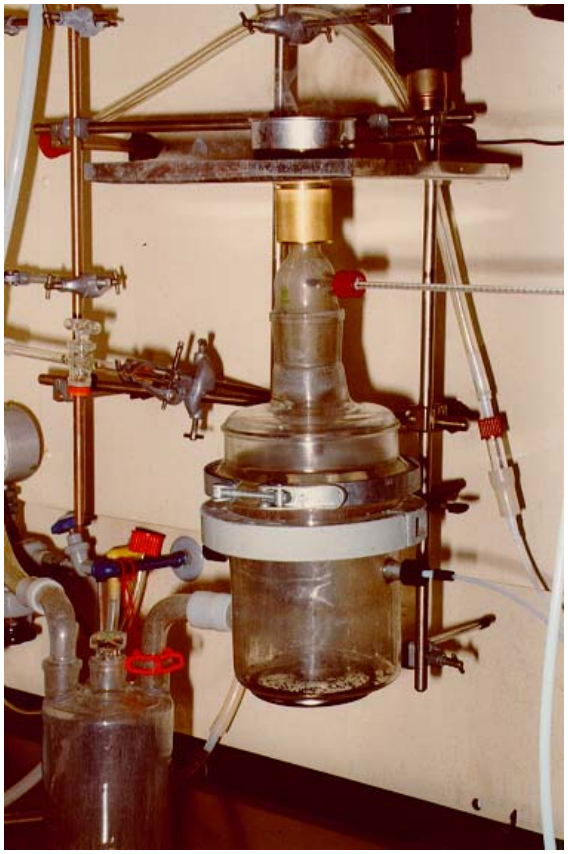
The ignition of activated charcoal gas filters by flames or metal droplets from welding may present a potentially lethal risk for wearers of gas-filtering respiratory protective devices owing to the production of high concentrations of carbon monoxide and carbon dioxide in the breathing air. A fatal accident prompted a closer examination of the flammability behaviour of respiratory filters.

Activities

In a two-phase study, gas and combination filters were tested regarding their susceptibility to ignition by thermal ignition sources commonly encountered in the field. The flammability behaviour was also studied under powered and non-powered breathing conditions. Important information was gained as a result which has been considered in the rules governing the use of respiratory protective devices, DGUV Regel 112-190 (formerly BGR 190).

Results and Application

Of particularly decisive significance for the flammability of respiratory filters are the nature and duration of the source of ignition, the design features of the filter (type), the impregnation of the activated carbon, and the breathing mode. None of the filters tested, for example, could be set alight by incandescent cigarette ash or by sparks from an angle grinder. Conversely, none of the filters was able to withstand sustained application of a cutting torch flame.



Apparatus for study of the flammability behaviour of respiratory filters

It should be noted in particular that in the event of a filter fire, the rise in breathing air temperature lags the increase in carbon monoxide (CO) and carbon dioxide (CO_2) concentrations. The user of the device does not therefore receive a sufficiently timely warning in the form of the temperature rise.

Conclusions:

- Under identical conditions, gas filters can be ignited more readily than combination filters.
- Filters used in conjunction with blowers can be ignited more readily than those used with non-powered-air respiration.
- Combination filters can be ignited by metal droplets from welding only with a continual air-flow; by contrast, gas filters can also be ignited with discontinuous breathing.

Area of Application

Metalworking and processing enterprises (e.g. welding and flame-cutting workplaces, demolition businesses, foundries)

Additional Information

- Entzündbarkeit (Entflammbarkeit) und Brand-verhalten von Atemschutzfiltern www.dguv.de/webcode/d95378 (in German)

Expert Assistance

IFA, Division 3: Hazardous substances: handling – protective measures

Expert Committee personal protective equipment of the DGUV, Hohenpeißenberg

Literature Requests

IFA, Central Division

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