

Does foam application reduce aerosol formation?

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Foam spraying is often used as an alternative to droplet spraying for the treatment of surfaces with biocides because it offers some advantages over spraying e.g. a better visual control of the application, an increased contact time and a mechanical cleaning during removal. It is generally assumed that aerosol exposure is considerably smaller for foam sprays compared to conventional droplet mists. This especially refers to the application of biocides in the occupational section, e.g. the disinfection in the food industry.

The use of biocides in the European Union is in the scope of the so called Biocidal Product Regulation (BPR, Regulation (EU) No 528/2012) which introduces a harmonized procedure for the for evaluation and authorization of biocidal active substances and biocidal products. One aim of the BPR is to ensure a high level of protection for human health and the environment. To this end a well defined exposure scenario which characterizes the professional exposure during the product use is an essential part of the human risk assessment..

While there is a well-developed quantitative understanding on the physical and technical parameters determining the exposure risk when using droplet sprays, the characterization of potential aerosol exposure for the application of foams has received little attention so far.

In this study the current state of knowledge on the use of foam sprays for biocide application was surveyed from the literature. In addition some exploratory aerosol measurements were carried out for typical biocide products to compare aerosol release from foam and droplet spraying.

More than 55 biocidal substances, such as QAV or peracidic products as well as pyrethrins and coumarins comprising products for disinfection, insecticides and rodenticides, are used in foams. The foaming technologies can be classified as mechanical foam generation using low and high pressure and blowing agent foam generation.

Since no information on aerosol formation during foam spraying was found in the literature, exploratory aerosol measurements were performed in a laboratory set-up.

A reduction of a factor of three was determined for aerosol release in the three health-related size fractions (respirable, thoracic, inhalable), when the biocidal product was sprayed as a foam compared to droplet spraying. Generation of semi-solid, highly-viscous foams using physical blowing agents lowered aerosol formation more than hundred fold. The experiments show that aerosol exposure cannot generally be ruled out when using foams but increasing foam viscosity seems to reduce aerosol release.

Thus, further investigations should specify to what extent foam could be explained by physical chemical data of biocidal products by using specific application techniques.

These factors not only determine the primary aerosol inhalation exposure but also the risk for exposure and mobility in the environment. This is especially important in the regulatory context of biocidal product authorization under the BPR because valid data are required to determine the exposure risk for foam applications and to meet the requirement of health protection. Correlations allowing for a prediction of aerosol release from process and product parameters have to be established in future more comprehensive experiments.