

Occupational exposures associated with petroleum-derived products containing trace levels of benzene

Williams, P.R.D., J.M. Panko, K. Unice, J.L. Brown, and D.J. Paustenbach

Benzene may be present as a trace impurity or residual component of mixed petroleum products due to refining processes. In this article, the authors review the historical benzene content of various petroleum-derived products and characterize the airborne concentrations of benzene associated with the typical handling or use of these products in the United States, based on indoor exposure modeling and industrial hygiene air monitoring data collected since the late 1970s. Analysis showed that products that normally contained less than 0.1% v/v benzene, such as paints and paint solvents, printing solvents and inks, cutting and honing oils, adhesives, mineral spirits and degreasers, and jet fuel typically have yielded time-weighted average (TWA) airborne concentrations of benzene in the breathing zone and surrounding air ranging on average from <0.01 to 0.3 ppm. Except for a limited number of studies where the benzene content of the product was not confirmed to be <0.1% v/v, airborne benzene concentrations were also less than current occupational exposure limits (e.g., threshold limit value of 0.5 ppm and permissible exposure limit of 1.0 ppm) based on exceedance fraction calculations. Exposure modeling using Monte Carlo techniques also predicted 8-hr TWA near field airborne benzene concentrations ranging from 0.002 to 0.4 ppm under three hypothetical solvent use scenarios involving mineral spirits. The overall weight-of-evidence indicates that the vast majority of products manufactured in the United States after about 1978 contained <0.1% v/v benzene, and 8-hr TWA airborne concentrations of benzene in the workplace during the use of these products would not have been expected to exceed 0.5 ppm under most product use scenarios.

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