

MEASUREMENT OF GLUTARALDEHYDE IN OCCUPATIONAL INDOOR AIR BY PASSIVE SAMPLER

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Glutaraldehyde has been in widespread use in hospitals to sterilize instruments which are not suitable for heat sterilization. Routine exposure to glutaraldehyde is, however, known to cause adverse health effects such as breathing difficulties and skin irritations, especially for workers in endoscopy, dentistry and other medical departments within hospitals. Authors have developed an analytical method of gaseous glutaraldehyde in air at ppb level using a passive diffusion sampler based on the Fick's first law. The sampler consists of serially connected porous polyethylene tube uniformly packed with 2,4-dinitrophenylhydrazine (DNPH) coated silica gel as a reactive adsorbent. The sampling duration of this device was designed for 8 hours to apply to field measurements in workplace. After sampling, DNPH derivatives were eluted by acetonitrile and subsequently determined by high-performance liquid chromatography (HPLC). An uptake rate of the sampler was determined by chamber experiments and resulted in 9.7 ($\mu\text{g/ppm/h}$) for glutaraldehyde. Effects of temperature and humidity on the rate were not apparent. The uptake rates were then validated in the field measurements comparing with a previous active sampling method. The diffusion sampler was successfully used for determination of 8–16 ppb of glutaraldehyde and gave similar results to active sampling in indoor air of a dental clinic located in Kanagawa, Japan. Limit of quantitation of the diffusion sampler was defined as 10 times standard deviation of HPLC baseline noise and resulted in 4.3 ppb for 8-hour exposure in air.