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Airborne disinfection by-products in indoor swimming pools and spas

Disinfection by-products in the atmosphere of indoor swimming pools

Disinfection chemicals are needed in swimming pools to control formation and spreading of pathogenic microorganisms between swimmers. Disinfection by-products (DBP) are formed when disinfectants such as chlorine or sodium hypochlorite have been introduced in to the water which contains organic or inorganic impurities. All the DBPs are considered to cause irritation symptoms in respiratory tract and eyes. In present study, indoor air quality of 32 Finnish swimming pool and spa areas were monitored. VOC-samples (including DBPs) were collected using Tenax TA and Chromosorb 106 adsorbent tubes and SKC AirChek 3000 pumps. VOC-samples were analyzed using TD-GC-MS device (Markes TD-100, Agilent 7890A, Agilent 5975C). Trichloroamines were collected to $\text{Na}_2\text{CO}_3 + \text{As}_2\text{O}_3$ impregnated filters. Analysis was made according to EN ISO 10304-1 standard. Trihalomethanes and trichloroamines were the most commonly found DBPs. Chloroform was the main trihalomethane and its concentrations varied from 6 to 270 $\mu\text{g}/\text{m}^3$ (mean 61 $\mu\text{g}/\text{m}^3$). Concentration of trichloroamines varied from 15 to 330 $\mu\text{g}/\text{m}^3$ (mean 117 $\mu\text{g}/\text{m}^3$). In addition, around 50 other disinfection by-products were found and their concentrations were typically below 5 $\mu\text{g}/\text{m}^3$. Although, the concentration of DBPs were relatively low, previous studies suggest that mixtures of DBPs might have synergistic effect on the irritation of mucous membranes.

<https://europepmc.org/abstract/med/9531722>, Irritating effects of disinfection by-products in swimming pools (PMID:9531722)