

Biological Exposure Indicators for Low Exposure to Toluene

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Abstract

Sixteen male workers were exposed to toluene at sub-occupational exposure limits and examined for the time-weighted average of exposure by diffusive personal sampling. The urine, blood and exhaled air collected during the first and last four hours were analyzed for biological exposure indicators. There was a significant correlation between toluene concentrations in the air on the one hand and the concentrations of toluene in the blood, urine and exhaled air and urinary hippuric acid and o-cresol corrected with creatinine. The levels of five indicators corresponding to threshold limit values of 50 ppm and time-weighted average of toluene (TLV-TWA) were determined. The biological indicators were used to determine discriminative concentrations of toluene (DC_5) which were considered to discriminate exposure from non-exposure within a five percent margin of error. The proper biological indicators were selected from the levels of DC_5 , agent specificity, and convenience for sampling and storage procedures.

In the present study, the average concentrations of toluene vapors in the breathing zone of workers during the first and last four hours were 14.7 and 25.0 ppm, respectively. Under these conditions the correlation coefficients between the concentrations of toluene during the whole eight hours and levels of major biological exposure indicators collected during the whole eight hours were higher than the correlation coefficients between concentrations of toluene during the whole eight hours and levels of biological exposure indicators collected during just the last four hours. The shorter biological half life of toluene and the timing of taking specimens for biological monitoring are discussed.
