Detection of methyl ethyl ketone in urine using headspace solid phase microextraction and gas chromatography

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Abstract

Headspace solid-phase microextraction coupled with gas chromatography/flame ionization detection was developed to measure urinary methyl ethyl ketone (MEK). A fused silica fiber coated with 75 μm carboxen/polydimethylsiloxane was used to extract urinary MEK. The optimal extraction conditions were obtained when temperature was 50°C, extraction time was 15 minutes, and ammonium sulfate concentration was 0.5 g/mL. The optimal desorption temperature and time were 200°C and 5 minutes, respectively. The concentration range of calibration curves was 27 to 8000 ng/mL of MEK. The within-day and between-day pooled coefficients of variation (9 concentrations, triplicate samples) were 5.4% and 8.8%, respectively. The limit of detection and limit of quantitation were 4.2 ng/mL and 21.6 ng/mL, respectively. The recovery (± standard deviation) of MEK was 100.2% ± 8.6% (n = 3). MEK in urine was stable for at least 1 month when stored at - 20°C. This method proved to be applicable for the analysis of urinary MEK of exposed workers in a plastic material printing plant. We concluded that this new method is sensitive, inexpensive, simple, and reliable for measuring the occupational exposure of MEK.