Biological Monitoring
Guidance Values

Guidance sheet for:
Method for Methyl Hippuric Acid
(a metabolite of Xylene)
BMGV 650mmol methyl hippuric acid/ mmol creatinine

Hazardous Substance
Xylene

Workplace Exposure Limit
50 ppm
CAS No 1330-20-7
Biological Monitoring Guidance Value:

Guidance Value - 650 mmol methyl hippuric acid/mol creatinine
Conversion: 1 mmol/mol = 1.71 mg/g

Sample Collection

Time: Urine samples collected at the end of the shift
Equipment: Polystyrene universal container (30ml).

Sample Transport to Laboratory

At ambient temperature, samples should arrive within 48h of collection. If delay anticipated, store at -20°C. Samples sent through postal system must comply with Post Office regulations.

Description of Suggested Method

There are numerous methods for the determination of methyl hippuric acid in urine either based on gas chromatography 1-2 after derivatisation or HPLC with UV detection 3-4.

Quality Assurance

Internal QC - must be established
G-EQUAS (www.g-equas.de)

Analytical Evaluation

Precision
- within day <5% RSD
- day to day <10% RSD

Detection Limit
- 3 x background noise - 100 μmol/l (20mg/l)

Calibration Range
- typically 0-5000 μmol/l

Sample Stability
- > 7 days at ambient,
- > 3 months at -20OC

Analytical Interferences
- None known

Interpretation

Urinary Methyl Hippuric Acid results reflect systematic exposure to Xylene that may have entered the body by inhalation or through the skin. If biological monitoring results are greater than the guidance value it does not necessarily mean that ill health will occur, but it does mean that exposure is not being adequately controlled. Under these circumstances employers will need to look at current work practices to see how they can be improved to reduce exposure.
Alternative Method

Elimination half-time
For methyl hippuric acid in urine, approximately 1.5 hours and 20 hours.

Confounding Factors
Xylene is metabolised by Cyp 2E1, alcohol dehydrogenase and aldehyde dehydrogenase to methyl benzoic acid and then conjugated with glycine to form methyl hippuric acid. Any co-administration of substance which also use these pathways will potentially interfere with xylene metabolism. The most likely interferences are alcohol and aspirin. Alcohol taken during xylene exposure will tend to increase blood and breath xylene levels. Aspirin, at therapeutic doses can reduce the methyl hippuric acid in end of exposure urine samples by 50%. As a consequence, any co-administration of alcohol, aspirin or similar substances should be noted when collecting samples.

Unexposed levels Methyl hippuric acid values in people not occupationally exposed are generally less than 1 mmol/mol-1 (< 2 mg/g-1).

Creatinine Correction - Advised

References


Links

EH40 List of Approved Workplace Exposure Limits  http://www.hse.gov.uk/coshh/table1.pdf

Biological Monitoring at HSL
http://www.hsl.gov.uk/online-ordering/analytical-services.aspx