

Biological Monitoring Guidance Values

Guidance sheet for:

2,2'-Dichloro-4,4' Methylene dianiline
(MbOCA) in Urine

BMGV 15 $\mu\text{mol/mol}$

Hazardous Substance

2,2'-Dichloro-4,4' methylene dianiline

CAS No 101-14-4

Alternative name: *Methylene bis*
(2-chloroaniline) (MbOCA)

Workplace Exposure Limit:

0.005 mg m^{-3} (skin notation)



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Biological Monitoring Guidance Value:

Guidance Value - 15 μmol 'total'
MbOCA/mol creatinine in urine

Sample Collection

Urine samples should be collected at the end of shift into polystyrene universal containers (30ml)

Sample Transport to Laboratory

Send samples to the laboratory by first class post (or equivalent) to arrive within 48h of collection. If any delay is anticipated, store at -20°C . Packaging must comply with Post Office Regulations.

Description of Suggested Method

Urine samples are spiked with 3,3' dichlorobenzidine (internal standard), heated at 100°C for 30 minutes to hydrolyse labile conjugates and cooled. MbOCA is extracted from the urine by either solid-phase extraction columns (C18) & eluted with water/acetonitrile (10/90) or solvent extraction with diethyl ether under alkaline conditions (0.33M NaOH). Solvent extracts are redissolved in HPLC mobile phase phosphate buffer (50mM pH7): acetonitrile:methanol (12:10:1). HPLC analysis uses a 3μ ODS 100mm x 4mm column, a mobile phase flow rate of 1ml/min and an electrochemical detector.

Analytical Evaluation

Precision

- within day <3% RSD at 250 nmol/l
- day to day <7% RSD at 250 nmol/l

Detection Limit

- 3x background - 25 nmol/l

Calibration Range

- typically 0-500 nmol/l

Sample Stability

- 2 days at ambient, >3 months at -20°C

Analytical Interferences

- None known



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Alternative Method

Ducos et al (1985) Int Arch Occup Environ Health, 55, (2) 159-167 or Okayama et al (1988) Clin Chem, 34, (10) 2122-2125. (These methods omit the required hydrolysis step and thus measure only 'free' MbOCA).

Other Information

Elimination half-time

For MbOCA in urine approximately 24 hours

Confounding Factors None known

Unexposed Levels None detected

Creatinine Correction Advised

Quality Assurance

Internal QC - must be established External

QA - available from Health & Safety Laboratory

Toxicity of MbOCA

MbOCAs is a suspect human carcinogen

Interpretation

Urinary MbOCA results reflect systematic exposure to MbOCA that may have entered the body by inhalation or more likely, 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.

Conversion: $1 \mu\text{mol/mol} = 2.361 \mu\text{g/g}$

Other Guidance Values

None.

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>

References

Cocker J, Nutley B P, Wilson H K, (1996)
Methylene bis(2-chloroaniline) (MbOCA):
Towards a biological monitoring guidance value.
Biomarkers, 1, 185-189.