Biological Monitoring Guidance Values

Guidance sheet for:
2-Butoxyethanol
Monitored by analysis of 2-butoxyacetic acid in urine

BMGV: 240mmol 2-butoxyacetic acid/mol creatinine

Hazardous Substance
2-Butoxyethanol
CAS number: 111-76-2

Alternative names:
Ethylene glycol monobutyl ether (EGBE)

Workplace Exposure Limits:
8-hour TWA: 25ppm, 123mg/m³
15-minute STEL: 50ppm, 246mg/m³
Skin notation
Biological Monitoring

Guidance Value (BMGV)

Guidance value: 240mmol 2-butoxyacetic acid/mol creatinine
Conversion: 1mmol/mol = 1.167mg/g

Other Guidance Values

The ACGIH BEI is 200mg/g (approx. 170mmol/mol creatinine) and the DFG BAT is 200mg/L (approx. 125mmol/mol creatinine).

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 48 hours of collection. If any delay is anticipated, store at -20°C. Packaging must comply with Post Office regulations.

Description of Suggested Method

The metabolite 2-butoxyacetic acid is analysed as an indicator of exposure to 2-butoxyethanol. The urine is spiked with butoxy-d9-acetic acid (m/z = 140) as an internal standard, acid hydrolysed, derivatised with dry acetone and pentafluorobenzyl bromide and analysed by capillary GCMS. The GCMS is operated in the negative ion chemical ionisation mode with selected ion monitoring, using m/z 131 for 2-butoxyacetic acid.

Analytical Evaluation

Detection limit: 10µmol/L (3 x background)
Calibration range: Typically 0-1000 µmol/L
Precision:
- within day <12% RSD at 600µmol/L
- day to day <17% RSD at 600µmol/L
Sample stability:
2 days at ambient temperature, >3 months at -20°C
Analytical Interferences: None known

http://www.hsl.gov.uk/online-ordering/analytical-services-and-assays/biological-monitoring
Biological Monitoring
Guidance Values

2-Butoxyethanol in urine

Other Information

Elimination half-time:
For 2-butoxyacetic acid in urine, approximately 6-7 hours.

Confounding factors:
Consumption of ethanol will delay excretion

Unexposed level:
<10µmol/L

Creatinine correction is advised

Alternative Methods


Quality Assurance

Internal QC:
Must be established

External QA:
G-EQUAS (www.g-equas.de). Email: G-EQUAS@ipasum.med.uni-erlangen.de. Telephone: +49-9131-8522312.

Interpretation

Urinary 2-butoxyacetic acid results reflect systematic exposure to 2-butoxyethanol 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.

http://www.hsl.gov.uk/online-ordering/analytical-services-and-assays/biological-monitoring
Biological Monitoring
Guidance Values

2-Butoxyethanol in urine

Links

EH40 List of Approved Workplace Exposure Limits
http://www.hse.gov.uk/pubns/books/eh40.htm

Biological Monitoring at HSL
http://www.hsl.gov.uk/online-ordering/analytical-services-and-assays/biological-monitoring

References


For further advice, please contact us:

Sample Registration, Health and Safety Laboratory, Harpur Hill, Buxton. SK17 9JN.
registration.sample@hsl.gsi.gov.uk
01298 218099