Biological Monitoring Guidance Values

Guidance sheet for:
Method for Nitroglycerin (GTN) and 1,2 and 1,3 glycerol dinitrate (GDN) in Urine
BMGV 15 μmol nitroglycols/mmol creatinine

Hazardous Substance
Nitroglycerin or Glycerol Trinitrate
CAS 55 63 0

The Health and Safety Laboratory is an Agency of the Health and Safety Executive
Biological Monitoring Guidance Values

Nitroglycerin (GTN) and 1,2 and 1,3 glycerol dinitrate (GDN) in Urine

Biological Monitoring Guidance Value:

Benchmark Value: 15 μmol nitroglycols/mol creatinine
Conversion: 1 μmol/mol = 2.007μg/g

Sample Collection

Time: End of the task being monitored
Equipment: Polystyrene universal container (30ml).

Sample Transport to Laboratory

At ambient temperature, 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

Urine samples are hydrolysed by addition of pH5 buffered glucuronidase and heating at 370C overnight and cooled. Spike all samples with 100 μl of 4-nitrobenzyl alcohol (internal standard) and 20mM silver nitrate solution. The analytes are extracted with isopropyl ether, which is then evaporated to dryness. Analytes are resuspended in toluene prior to analysis. Polypropylene or silanised glass apparatus should be used Internal QC - must be established throughout. GC-MS analysis uses a 30m BP1 fused silica capillary column (or equivalent) (i.d. 0.33 mm, 1μm thick film). Negative CI Mass Spectrometric detection for m/z = 62 for NGs, 153 for I.S.

Analytical Evaluation

Precision
- within day <10% RSD at 16 nmol/l
- day to day <12% RSD at 16 nmol/l

Detection Limit
- 3 x background noise - 0.3 nmol/l

Calibration Range
- typically 0-250 nmol/l

Sample Stability
- >2 days at ambient
- >2 months at -20°C

Analytical Interferences
- None known

Quality Assurance

Internal QC - must be established

Other Information

Unexposed levels - none
Confounding Factors
Nitroglycerin is used in pharmaceuticals prescribed to treat angina. It should be noted if workers take nitroglycerin therapeutically as this will affect their urine levels.
Creatinine Correction - advised
Interpretation

Urinary MIBK results reflect systematic exposure to MIBK 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.

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


P. Akrill, R. Guiver and J. Cocker. Biological monitoring of nitroglycerin exposure by urine analysis Toxicology Letters, 2002 134:271-276 (These references do not use a hydrolysis step – this will need to be added to measure total NGs)