**N,N-Dimethylacetamide (DMA)**

**N,N-DIMETHYLACETAMIDE**

Monitored by analysis of N-methylacetamide in urine

**BMGV**: 100 mmol derived N-methylacetamide /mol creatinine

**Hazardous Substances:**

N,N-Dimethylacetamide(DMA)

CAS number: 127-19-5

**Workplace Exposure Limits:**

8-hour TWA: 10 ppm, 36mg/m3

15-minute STEL: 20 ppm, 72 mg/m3

Skin notation

***Who is this guidance for?***

This guidance is primarily aimed at employers or individuals with delegated responsibility for managing workplace exposure to substances. Whilst it is not exhaustive, the information presented is intended to demonstrate how biomonitoring can help with this duty. Some simple advice is presented to help non-specialist users to get the most out of biomonitoring covering (1) when to take a sample to ensure reliable and comparable results over time; (2) putting the result into context with respect to background (environmental) levels or what can reasonably be achieved with good exposure control; and (3) some basic technical data that can help to evaluate an analytical service provider. For further information you should consult your chosen analytical service provider who should be happy to discuss your specific requirements and find solutions.

***Biological Monitoring Guidance Value (BMGV)***

100 mmol derived N-methylacetamide (NMA) /mol creatinine

Conversion: 1mmol/mol = 0.646mg/g

***Other Guidance Values***

The ACGIH BEI for NMA is 30 mg/g (approx. 47 mmol/mol creatinine)

The DFG BAT for NMA is 25 mg/L (approx. 29 mmol/mol creatinine), based on a 5 ppm TWA exposure.

The HSE BMGV, the United States Biological Exposure Index (BEI) and the German Biological Tolerance Value (BAT) are all health-based guidance values, where long-term exposure at or below this level will not reasonably create a risk of injury, disease or ill-health.

***Sample Collection***

Urine samples should be collected at the end of shift into polystyrene universal containers (30mL). If exposures are repeated over consecutive days, collect samples towards the end of the week (or shift pattern).

***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 samples chilled – ideally frozen if suitable facilities are available. Packaging must comply with relevant postal regulations for biological samples (UN3373).

**Suggested Method and Analytical Evaluation**

Analytical technique: Gas chromatography with mass spectrometry detection.

Direct injection of urine metabolite into heated inlet to analyse NMA (conjugated metabolites undergo hydrolysis during analysis).

Detection limit: 6 µmol/L (3 x background, approx. 10 mmol/mol creatinine)

Limit of Quantitation: 10 µmol/L (5 x detection limit, approx. 10 mmol/mol creatinine)

Calibration range: Typically 0-1300 µmol/L

Precision:

- within-day <10% RSD at 200 µmol/L

- day to day <10% RSD at 200 µmol/L

Sample stability: 2 days at ambient temperature, >3 months frozen

Analytical Interferences: None known

Quality assurance: GEQAS (www.g-equas.de).

***When to take a sample***

Elimination half-life is a measure of the rate of removal of a substance that has entered the body, through the skin, orally or by inhalation. It helps to identify when it is best to take a sample following potential exposure and indicates the potential ‘exposure window’ that will be reflected by the results.

For DMA, the elimination of the corresponding NMA metabolites into urine has an approximate half-life of between 9 and 18 hours for skin exposure, and 5-9 hrs for inhalation exposure. Urine samples should be collected at the end of shift.

Biomonitoring results will reflect mostly that day’s exposure, with some influence from the previous 48-hours. If exposure is predominantly through skin contact, the peak of exposure will be delayed and higher levels may be found in pre-shift samples the following day. If individuals are potentially exposed over consecutive days, taking a sample towards the end of the working week can be considered.

Determining the optimal time to take samples for biomonitoring DMA exposure requires consideration of when and how product is being used and the likely routes of exposure. As far as possible, a consistent sampling strategy should be used for long-term exposure monitoring. Recording contextual information (such as work tasks during 2-3 days prior to providing a urine sample and any protective equipment used) can be helpful for interpreting the results.

**Other Information**

***Confounding factors***

None known

***Unexposed level***

None detected

**Creatinine correction is advised**

***Interpretation***

Urinary N-methylacetamide results reflect systematic exposure to N,N-dimethylacetamide, 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. An elevated result should be re-tested as soon as possible to help establish whether it represents ongoing workplace exposure or a ‘one-off’ event. If necessary, 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/pubns/books/eh40.htm>

Biological Monitoring: A tool for helping to assess workplace exposure (August 2021). Published by British Occupational Hygiene Society (www.bohs.org). [BOHS-Biological-Monitoring-A-tool-for-helping-to-assess-workplace-exposure-rebranded.pdf](https://www.bohs.org/app/uploads/2021/08/BOHS-Biological-Monitoring-A-tool-for-helping-to-assess-workplace-exposure-rebranded.pdf)

For further advice, please contact us:

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**Biological Monitoring at HSE**

<https://www.hsl.gov.uk/online-ordering/analytical-services-and-assays/biological-monitoring>