

Biological Monitoring Guidance Values

Guidance sheet for:

Butan-2-one

BMGV: 70 μmol butan-2-one/L urine

Hazardous Substance

Butan-2-one

CAS number: 78-93-3

Alternative names:

Methyl ethyl ketone (MEK)

Workplace Exposure Limits:

8-hour TWA: 200ppm, 600mg/m³

15-minute STEL: 300ppm, 899mg/m³

Skin notation



Biological Monitoring Guidance Values

Butan-2-one (MEK) in urine

Biological Monitoring Guidance Value (BMGV)

Guidance value: 70 μmol butan-2-one/L urine

Conversion: 1 $\mu\text{mol/L}$ = 72.1 $\mu\text{g/L}$

Other Guidance Values

The ACGIH BEI is 2mg/L (28 $\mu\text{mol/L}$) and the DFG BAT is 2mg/L (28 $\mu\text{mol/L}$).

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

Urine samples (0.25 - 1 mL) are diluted with H_2O (0.75 mL) in glass headspace vials, capped with PTFE-faced butyl rubber septa and incubated at 65°C for 10 minutes before injection into a gas chromatography column. The oven temperature is held at 60°C for 1 min then increased at $8^{\circ}\text{C}/\text{min}$ to 80°C then $25^{\circ}\text{C}/\text{min}$ to 200°C where it is held for 1 minute before cooling to reset. Detection is by flame ionisation or mass spectrometry in electron impact mode (using ions m/z 43 and 72).

Analytical Evaluation

Detection limit:

1 $\mu\text{mol/L}$ (3 x background)

Calibration range:

Typically 0-140 $\mu\text{mol/L}$

Precision:

- within day <2% RSD at 27 $\mu\text{mol/L}$

- day to day <10% RSD at 27 $\mu\text{mol/L}$

Sample stability:

4 days at ambient temperature, >2 months at -20°C

Analytical Interferences: None known



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Other Information

Elimination half-time:

For butan-2-one acid in [blood](#), approximately 0.5 and 1.4 hours (biphasic).

Confounding factors:

none known

Unexposed level:

<2 µmol/L

Creatinine correction is not advised

Alternative Methods

HPLC: Gori, G., et al. "High performance liquid chromatographic determination of methyl ethyl ketone in urine as its 3-methyl-2-benzothiazolinone hydrazone derivative." *Chromatographia* 40.5-6 (1995): 336-340.

GC: Yoshikawa, M., et al. "Biological monitoring of occupational exposure to methyl ethyl ketone in Japanese workers." *Archives of environmental contamination and toxicology* 29.1 (1995): 135-139.

Quality Assurance

Internal QC:

Must be established

External QA:

G-EQUAS (www.g-equas.de).

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Interpretation

Urinary butan-2-one acid results reflect systematic exposure to butan-2-one 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.



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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

Brooke I, Cocker J, Delic JI, Payne M, Jones K, Gregg NC, Dyne D. Dermal uptake of solvents from the vapour phase: an experimental study in humans. *Ann Occup Hyg.* 1998 Nov;42(8):531-40.

For further advice, please contact us:

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