**Chlorobenzene**

***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.

**Chlorobenzene**

Monitored by analysis of 4-chlorocatechol in urine

**BMGV**: 5 mmol 4-chlorocatechol /mol creatinine

**Hazardous Substance:**

Chlorobenzene

CAS number: 108-90-7

**Workplace Exposure Limits:**

8-hour TWA: 1 ppm, 4.7 mg/m3

15-minute STEL: 3 ppm, 14 mg/m3

Skin notation

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

5 mmol 4-chlorocatechol /mol creatinine

Conversion: 1 mmol/mol = 1.278 mg/g

***Other Guidance Values***

The ACGIH BEI is 100mg/g (approx. 78 mmol/mol creatinine) and the DFG BAT is 150mg/g

(approx. 137 mmol/mol creatinine). Guidance values set by different organisations will vary, based on factors including available data and scientific knowledge at the time and interpretation of the toxicology data.

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

***Description of Suggested Method***

4-Chlorocatechol in urine is determined by HPLC with UV detection.

**Analytical Evaluation**

Detection limit: 0.1 mg/L (approx. 0.08mmol 4-chlorocatechol/mol creatinine)

Calibration range: Typically 0.5-50 mg/L

Precision:

- within day 2.3% RSD

- day to day 4.9% RSD

Sample stability: >6 months at 20°C

Analytical Interferences: None known

***Elimination Half-Life***

Elimination half-life is a measure of the rate of removal of a substance that has been taken into the body. 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 a result.

Excretion of 4-chlorocatechol in urine has a half-life of approximately 3-6 hours. An end-of-shift urine sample will mostly reflect that shift’s exposure to chlorobenzene. Uptake via skin absorption is delayed relative to inhalation, so higher levels are often found the following morning if skin contact is the predominant route of exposure.

**Other Information**

***Confounding factors***

None known

***Unexposed level***

<0.5mg/L (approx. 0.4 mmol 4-chlorocatechol/mol creatinine)

**Creatinine correction is advised**

***Interpretation***

Urinary 4-chlorocatechol results reflect systematic exposure to chlorobenzene 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.

***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>