

## Focus on IFA's work

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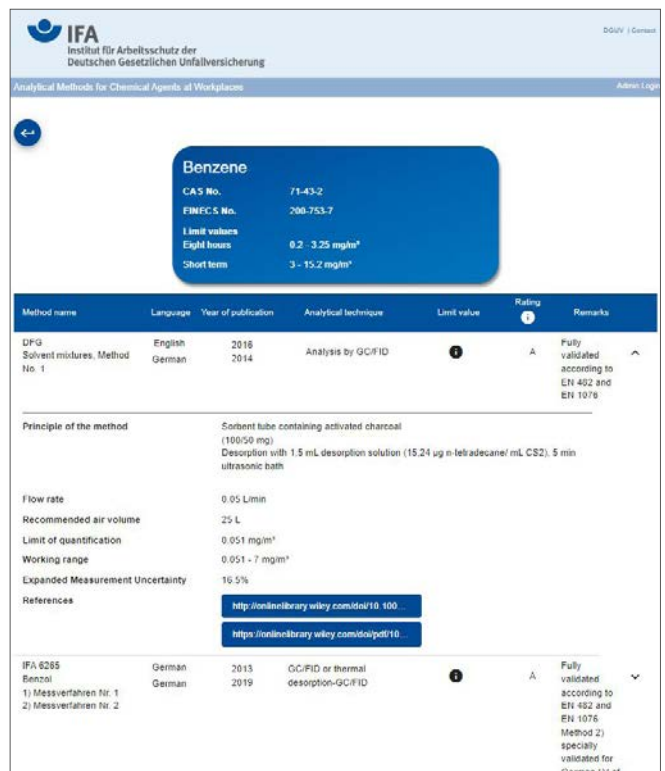
# Reprogramming of the GESTIS database – Analytical Methods for Chemical Agents at Workplaces (GESTIS-AMCAW)

### Problem

Workers in all sectors of trade and industry handle a wide variety of chemical substances, mixtures of substances and preparations. Suitable validated methods are required to analyse the concentrations of hazardous substances in the workplace atmosphere, and to ensure the compliance with the applicable limit values. For this reason, the European Directive on the protection of the health and safety of workers from the risks related to chemical agents at work (98/24/EC) requires standardised procedures for measuring and evaluation of concentrations of hazardous substances in the workplace atmosphere.

Searching for suitable analytical methods has been difficult in the past, as different institutions and organisations list a variety of method descriptions. In 2005, the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA) was responsible for developing the first database of suitable validated analytical methods from several international institutions and organisations. The database, GESTIS – Analytical Methods for Chemical Agents at Workplaces (GESTIS-AMCAW), is available in English only.

Over the years, however, some of the older methods ceased to be accepted good practice, and some had been only partially validated. Therefore, the content of the database needed to be revised. Since the technical approach of the database appeared outdated as well, the IFA took the revision of the content of GESTIS-AMCAW in 2020 as an opportunity to also redevelop the IT structure of the database.



The screenshot shows the GESTIS-AMCAW database interface. At the top, there is a search bar and a navigation menu. The main content area displays the entry for Benzene, including its CAS No. (71-43-2), EINECS No. (200-753-7), and limit values (Eight hours: 0.2 - 3.25 mg/m³, Short term: 3 - 15.2 mg/m³). Below this, there is a table of methods and a detailed view of a specific method.

| Method name                        | Language          | Year of publication | Analytical technique | Limit value | Rating | Remarks   |
|------------------------------------|-------------------|---------------------|----------------------|-------------|--------|---|
| DFG Solvent mixtures, Method No. 1 | English<br>German | 2016<br>2014        | Analysis by GC/FID   |             | A      | Fully validated according to EN 452 and EN 1078 |

**Principle of the method**  
Sorbent tube containing activated charcoal (100/50 mg)  
Desorption with 1.5 mL desorption solution (15.24 µg n-tetradecane/mL CS<sub>2</sub>), 5 min ultrasonic bath

**Flow rate**  
0.05 L/min

**Recommended air volume**  
25 L

**Limit of quantification**  
0.051 mg/m<sup>3</sup>

**Working range**  
0.051 - 7 mg/m<sup>3</sup>

**Expanded Measurement Uncertainty**  
16.5%

**References**  
<http://online.library.wiley.com/doi/10.1002>  
<https://online.library.wiley.com/doi/pdf/10.1002>

| IFA  | Language | Year of publication | Analytical technique                | Limit value | Rating | Remarks   |
|--|----------|---------------------|-------------------------------------|-------------|--------|---|
| IFA 6285 Benzol                                  | German   | 2013                | GC/FID or thermal desorption-GC/FID |             | A      | Fully validated according to EN 452 and EN 1078 |
| 1) Messverfahren Nr. 1<br>2) Messverfahren Nr. 2 | German   | 2019                |                                     |             |        | Method 2) specially validated for German LV of  |

Extract of the method description in GESTIS-AMCAW using benzene as an example

### Activities

The purpose of the database remains unchanged: to provide a quick overview of suitable analytical methods for as many common hazardous substances as possible.

To achieve this, lists of methods were created for each substance, containing the most important method parameters. AMCAW currently consists of over 500 different analytical methods for 126 hazardous substances. These analytical methods were evaluated for suitability and quality against European standards and divided into three categories. Redevelopment of the database in a new, state-of-the-art programming language was completed in mid-2023, and AMCAW went online as a responsive web application. Its modernisation is reflected not only in the user-friendly interface, but also in simplified management of data in the backend. Interfaces have already been created for future links between the AMCAW database and other GESTIS products (such as the international limit values in GESTIS-ILV).

## Results and use

The reprogrammed GESTIS-AMCAW database provides a clear summary in English of suitable analytical methods for determining the concentration of hazardous substances in the workplace atmosphere, together with important parameters of the methods. The parameters include the principle of the method, the sampling conditions and preparation of the samples, the analytical method, limits of detection and quantitation, the method's working range, and the associated expanded measurement uncertainties. In addition, each analytical method is ranked. For example, only methods ranked "A" satisfy the general requirements of EN 482 and the specific requirements of CEN/TR 17055 and/or the EN 13205 series. Further information on the individual analytical methods can be found via links to the original sources.

The database is being extended with the addition of successive relevant hazardous substances. Response to changes and error messages is now also significantly faster, as the new database structure allows the data to be updated in real time.

## User group

International occupational safety and health institutions, accredited and in-house test bodies, research institutes

## Technical enquiries

- IFA, Department "Chemical and Biological Hazards"

## Literature enquiries

- IFA, Department "Interdisciplinary Services"

## Further information

- AMCAW database on the IFA's website:  
<https://www.dguv.de/ifa/gestis/gestis-analysenverfahren-fuer-chemische-stoffe/index-2.jsp>
- Access to the database:  
<https://amcaw.ifa.dguv.de/>

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