

MEGA evaluations for the preparation of REACH exposure scenarios for acetonitrile

1 Introduction

The measured data for workplace exposure evaluated in the following have been gathered and documented in accordance with the principles of the measurement system of the German social accident insurance institutions for exposure assessment (MGU¹, formerly BGMG). The quality of the MGU is upheld by a quality management system that in essence satisfies the requirements of DIN EN ISO 9001. The test laboratories are operated in accordance with DIN EN ISO 17025 “General requirements for the competence of testing and calibration laboratories”.

To measure acetonitrile exposure at the workplace, a defined volume of air is sucked by a suitable pump through a silica gel tube. The hazardous substance contained in the air is adsorbed by an activated carbon tube type B. Qualitative and quantitative analysis are performed by gas chromatography with a flame ionisation detector (FID). The quantification limit is 1 mg/m³ for a test air volume of 40 L. Source: Substances and test methods in the MGU (ref. no. [6009](#)). In: IFA-Arbeitsmappe Messung von Gefahrstoffen. 38. Lfg. IV/2007. Ed.: Deutsche Gesetzliche Unfallversicherung (DGUV), Berlin. Erich Schmidt, Berlin 2011 – loose-leaf edition.

All the surveyed data in the MGU are brought together in the MEGA exposure database (measured data on exposure to hazardous substances at the workplace). If individual values fall below the measurement method's analytical quantification limit, half the value is adopted in the evaluation. The MEGA^{Pro} software developed by the IFA (formerly BGIA) makes it possible to statistically analyse the data of the MEGA exposure database on the basis of various selection criteria and evaluation strategies.

¹ Gabriel, S.; Koppisch, D.; Range, D.: The MGU – a monitoring system for the collection and documentation of valid workplace exposure data. Gefahrstoffe – Reinhalt. Luft 70 (2010) No. 1/2, pp. 43-49
<http://www.dguv.de/ifa>, Webcode [m200066](#)

2 Data situation and evaluation strategy

2.1 Overview of the measured values collected in the MGU, data period 2000 to 2010

Acetonitrile with a workplace limit of 34 mg/m³

Information on the sampling systems can be found in the IFA work folder (IFA-Arbeitsmappe, in German).

General description	Number of measured values (%)
Total	153
Type of sampling: Stationary	93 (60.8%)
Type of sampling: Personal	60 (39.2%)
Sampling time ≥ 1 h and exposure time ≥ 6 h (comparable to shift measurements)	132 (86.3%)
Sampling time < 1 h <u>or</u> exposure time < 6 h	21 (13.7%)
Number of data < quantification limit (Values < quantification limit were adopted in statistics with half their values)	44 (28.8%)
Number of data > limit value	12 (7.8%)
Number of data ≥ quantification limit and ≤ limit value	97 (63.4%)
Examples: Exposure conditions	
Without mechanical ventilation	32
With mechanical ventilation	108
No details	11
Without local exhaust ventilation	40
With local exhaust ventilation	79
No details	30

General description of
acetonitrile measurements in
20 branches of industry and 34 work areas

2.2 Criteria for inclusion of measured data in the evaluation

- Measured data relating to exposure
- Sampling time \geq 1 hour
- Exposure time \geq 6 hours
- Data sets comprising fewer than ten measured data were disregarded.

2.3 Evaluation strategy

The evaluation was performed on the basis of industry groups (Appendix 1) and work area groups (Appendix 2) and broken down further according to type of sampling (stationary or personal).

3 Abbreviations and indices

The following abbreviations and indices are used in the evaluation tables:

+ The distribution value is below the largest analytical quantification limit in the data set.

\$ With reference to the given limit value, the percentage of values below the limit value is given.

! The number of measured values below the analytical quantification limit (a. q.) is greater than the number of measured values represented by this cumulative frequency value. No concentration is therefore given for this cumulative frequency value.

* Measured values below the analytical quantification limit of the measuring method concerned are adopted in the evaluation with half the analytical quantification limit value.

Appendix 1

Statistic evaluations for industry groups

Acetonitrile, sampling time ≥ 1 h and exposure time ≥ 6 h

Industry groups, general

D.No. = Data set number/ Designation Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	Number of Allis*	Largest quanti- fication limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 608 Acetonitrile Total	132	58	36 27.3	14	2	93.2	+ 1.6	23.8	38.4
D.No. 617 Acetonitrile Chemical industry; Manufacture/processing of coating materials, glue, mastics; Cosmetic products, manufacture	27	11	2 7.4	1	0.1	85.2	6	37.8	52.4
D.No. 618 Acetonitrile Pharmaceutical products, manufacture; Biochemical industry	51	15	2 3.9	1	1	92.2	2.95	23.6	48.95
D.No. 620 Acetonitrile Research and testing institutes and laboratories; Medical and federal state testing authorities	31	16	9 29	6	1	96.8	+ 1	10.8	16.95

* All = social accident insurance institution

Industry groups: Stationary measurements

D.No. = Data set number/ Designation Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quantification limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 percentile *	90 percentile *	95 percentile *
D.No. 621 Acetonitrile Total	84	46	26 31	11	2	96.4	+ 1.2	12.6	24.6
D.No. 622 Acetonitrile Chemical industry; Manufacture/processing of coating materials, glue, mastics; Cosmetic products, manufacture	9	8	2 22.2	1	0.1	100			
D.No. 623 Acetonitrile Pharmaceutical products, manufacture; Biochemical industry	38	13	0	1		94.7	2.4	17.6	28.7
D.No. 625 Acetonitrile Research and testing institutes and laboratories; Medical and federal state testing authorities	18	12	5 27.8	5	1	94.4	+ 1	14.2	25.2

* All = social accident insurance institution

Industry groups: Personal measurements

D.No. = Data set number/ Designation Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quantifi- cation limit in mg/m ³	Concentrations in mg/m ³			
						≤ limit value % \$	50 per- centile *	90 per- centile *	95 per- centile *
D.No. 626 Acetonitrile Total	48	25	10 20.8	7	1	87.5	3.7	37.2	64
D.No. 627 Acetonitrile Chemical industry; Manufacture/processing of coating materials, glue, mastics; Cosmetic products, manufacture	18	7	0	1		77.8	18	45.2	67.6
D.No. 628 Acetonitrile Pharmaceutical products, manufacture; Biochemical industry	13	6	2 15.4	1	1	84.6	4.9	54.8	70.1
D.No. 630 Acetonitrile Research and testing institutes and laboratories; Medical and federal state testing authorities	13	8	4 30.8	3	1	100	1.15	9	9.7

* All = social accident insurance institution

Industry groups: Measurements with local exhaust ventilation

D.No. = Data set number/ Designation Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quantifi- cation limit in mg/m ³	Concentrations in mg/m ³			
						≤ limit value % \$	50 per- centile *	90 per- centile *	95 per- centile *
D.No. 636 Acetonitrile Total	74	31	23 31.1	9	1	94.6	1.1	20.4	32.9
D.No. 637 Acetonitrile Chemical industry; Manufacture/processing of coating materials, glue, mastics; Cosmetic products, manufacture	11	4	0	1		90.9	3.95	28.3	34.85
D.No. 638 Acetonitrile Pharmaceutical products, manufacture; Biochemical industry	29	8	2 6.9	1	1	93.1	1.6	15	47.1
D.No. 640 Acetonitrile Research and testing institutes and laboratories; Medical and federal state testing authorities	20	9	7 35	4	1	95	+ 0.7	4	23

* All = social accident insurance institution

Industry groups: Measurements without local exhaust ventilation

D.No. = Data set number/ Designation Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quanti- fication limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 631 Acetonitrile Total	31	18	6 19.4	4	2	90.3	5.75	27.7	53.1
D.No. 632 Acetonitrile Chemical industry; Manufacture/processing of coating materials, glue, mastics; Cosmetic products, manufacture	7	5	1 14.3	1	0.1	71.4			
D.No. 633 Acetonitrile Pharmaceutical products, manufacture; Biochemical industry	12	5	0	1		91.7	8	26.4	46.4
D.No. 635 Acetonitrile Research and testing institutes and laboratories; Medical and federal state testing authorities	7	4	0	2		100			

* All = social accident insurance institution

Appendix 2

Statistic evaluations for work area groups

Acetonitrile, sampling time ≥ 1 h and exposure time ≥ 6 h

Work area groups: General

D.No. = Data set number/ Designation Work area	Number of measured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quanti- fication limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 641 Acetonitrile Production, general; Production, separation processes, room; Production, separation processes, general	25	4	2 8	1	1	92	2.6	22	55.5
D.No. 642 Acetonitrile Laboratory, room Laboratory, at facilities	75	35	10 13.3	6	1	92	2.7	28.5	38.25

* All = social accident insurance institution

Work area groups: Stationary measurements

D.No. = Data set number/ Designation Work area	Number of meas- ured data	Number of firms	Frequency < number of values %	Number of Alls*	Largest quanti- fication limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 643 Acetonitrile Production, general; Production, separation processes, room; Production, separation processes, general	17	3	0	1		94.1	1.9	17.9	26.9
D.No. 644 Acetonitrile Laboratory, room; Laboratory, at facilities	44	27	6 13.6	5	1	95.5	1.6	18.6	27.4

* All = social accident insurance institution

Work area groups: Personal measurements

D.No. = Data set number/ Designation Work area	Number of measured data	Number of firms	Frequency < number of values %	Number of Allis*	Largest quantifi- cation limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 645 Acetonitrile Production, general; Production, separation processes, room; Production, separation processes, general	8	3	2 25	1	1	87.5			
D.No. 646 Acetonitrile Laboratory, room; Laboratory, at facilities	31	16	4 12.9	3	1	87.1	3.75	35.5	65.2

* All = social accident insurance institution

Work area groups: Measurements without local exhaust ventilation

D.No. = Data set number/ Designation Work area	Number of measured data	Number of firms	Frequency < number of values %	Number of Allis*	Largest quantifi- cation limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 per- centile *	90 per- centile *	95 per- centile *
D.No. 647 Acetonitrile Production, general; Production, separation processes, room; Production, separation processes, general	5	2	0	1		100			
D.No. 648 Acetonitrile Laboratory, room Laboratory, at facilities	18	11	1 5.6	2	0.1	83.3	8	43.6	82

* All = social accident insurance institution

Work area groups: Measurements with local exhaust ventilation

D.No. = Data set number/ Designation Work area	Number of measured data	Number of firms	Frequency < number of values %	Number of Allis*	Largest quantifi- cation limit in mg/m ³	≤ limit value % \$	Concentrations in mg/m ³		
							50 percen- tile *	90 percen- tile *	95 percen- tile *
D.No. 649 Acetonitrile Production, general; Production, separation processes, room; Production, separation processes, general	17	3	2 11.8	1	1	88.2	1.4	36.6	66.3
D.No. 650 Acetonitrile Laboratory, room; Laboratory, at facilities	39	17	7 17.9	4	1	97.4	1.15	10.3	23.3

* All = social accident insurance institution