IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

MEGA evaluations for the preparation of REACH exposure scenarios for sodium hydroxide

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 (MGU[1], 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 sodium hydroxide exposure at the workplace, a defined volume of air is sucked by a suitable pump through a quartz fibre filter. The particulate hydroxides contained in the air are retained on the filter. For analysis, the filter is extracted with dilute sulfuric acid solution. Qualitative and quantitative analysis are performed by ion chromatography with conductivity detector. For quantitative evaluation, the method of the external standard is used. The quantification limit is 0.04 mg/m³ with a sample air volume of 420 L. Source: Hydroxides (ref. no. 7638). In: IFA-Arbeitsmappe Messung von Gefahrstoffen. 42. Lfg. V/2009. 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). The MEGA^{Pro} software developed by the IFA 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 2008

Sodium hydroxide

Information on the sampling systems can be found in the IFA work folder (IFA-Arbeitsmappe, in German).
Limit value 2 mg/m³ (international limit value in AU, DK, HU, E, CH)

General description	Number of measured values (%)
Total	1375
Type of sampling: Stationary	986 (72 %)
Type of sampling: Personal	389 (28 %)
Sampling time ≥ 2 h and exposure time ≥ 8 h	1131 (82 %)
Number of data < quantification limit (Values < quantification limit were adopted in calculations with half their values)	1107 (81 %)
Number of data > limit value	3 (0.2 %)
Examples: Exposure conditions	
Without mechanical ventilation With mechanical ventilation No details	340 911
Without local exhaust ventilation With local exhaust ventilation No details	431 826
General description of measurements of sodium hydroxide in: 94 branches of industry and 191 work areas	

2.2 Criteria for inclusion of measured data in the evaluation

- Measured data relating to exposure
- Sampling time ≥ 1 hour
- Exposure time ≥ 8 hours
- Data sets comprising fewer than ten measured data were disregarded.

2.3 Evaluation strategy

The evaluation is performed according to industry groups (Chapter 4) and work area groups (Chapter 5).

If individual values fall below the measurement method's analytical quantification limit, half the value is adopted in the evaluation.

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.

* If any single values fell below the measurement method's analytical quantification limit, half of each value was adopted in the evaluation.

4 Statistic evaluations for industry groups

Sodium hydroxide, sampling time ≥ 2 h and exposure time ≥ 8 h
Industry groups, general

Branch of industry	Number of measured data	Number of firms	Frequency < number of values %	≤ limit value % $	Concentrations in mg/m³	
					50 per-centile *	90 per-centile *
Chemistry, plastics, rubber	21	13	14 67	100	! a. q.	0.24
Rolling mills, moulding	24	11	15 63	100	! a. q.	0.14
Foundries	26	12	11 42	100	0.05	0.32
Electroplating	769	318	622 81	99.9	! a. q.	0.08
Processing and treatment of metals	99	55	84 85	100	! a. q.	+ 0.05
Steel and light metal construction; manufacture of machinery and vehicles; apparatus engineering; manufacture of taps and valves	26	18	21 81	100	! a. q.	0.14

5 Statistical evaluations for work area groups

Sodium hydroxide, sampling time ≥ 2 h and exposure time ≥ 8 h
Work area groups: General

Work area	Number of measured data	Number of firms	Frequency < number of values %	≤ limit value % $	Concentrations in mg/m³	
					50 per-centile *	90 per-centile *
Surface coating, immersing, flooding etc.	23	15	20 87	100	! a. q.	0.08
Cleaning	41	29	36 88	100	! a. q.	0.056
Electroplating; staining	49	32	23 47	98	+ 0.04	0.254
Electroplating; degreasing, pickling	163	87	141 87	100	! a. q.	+ 0.05
Electroplating; galvanizing	89	45	66 74	100	! a. q.	0.14
Electroplating; anodisation	52	29	40 77	100	! a. q.	0.08
Electroplating; waste water treatment	22	17	19 86	100	! a. q.	0.044

6 Statistical evaluations for the assignment of work area and industry groups

No statistical evaluation has been performed.

7 Overview lists

No lists have been compiled.