

GDCh-Advisory Committee
on Existing Chemicals (BUA)

2-Chloroacetamide

BUA Report 225

(September 2000)



S. Hirzel

Wissenschaftliche Verlagsgesellschaft 2001

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MinR Prof. Dr. U. Schlottmann, Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, Bonn

GDCh Office:

Dr. H. Behret, GDCh, Frankfurt am Main

2-Chloroacetamide

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on Existing Chemicals

GDCh-Beratergremium
für Altstoffe (BUA)



S. Hirzel

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Dr. H. Behret
Gesellschaft Deutscher Chemiker
Postfach 90 04 40
D-60444 Frankfurt am Main
E-Mail: boa@gdch.de
Homepage: <http://www.gdch.de>

Responsible at the BMU:
MinR Prof. Dr. U. Schlottmann
BMU
Postfach 12 06 29
D-53048 Bonn
E-Mail: schlottmann.ulrich@bmu.de

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Preface

The Advisory Committee on Existing Chemicals of Environmental Relevance, BUA for short, was established in May 1982 to help the German federal government cope with the large task of dealing with existing chemicals. In an agreement between federal government, scientific community, and the chemical industry, it was associated with the German Chemical Society (GDCh, Gesellschaft Deutscher Chemiker) to ensure objective work, carried out in accordance with scientific principles.

At the end of 1997, the Committee was renamed 'GDCh Advisory Committee on Existing Chemicals' (abbreviation 'BUA' as before) and the statutes were revised to include EU level aspects of occupational safety for the handling of existing chemicals from then on. The collaboration with the Employment Accident Insurance Fund of the Chemical Industry (BG-Chemie), with its knowledge on workplace exposure and the toxicologic properties of chemicals, is a valuable addition to the BUA's know-how.

The cooperation between authorities, industry, and the scientific community, upon which the BUA is based, has proven worthwhile. No other national or international body has dealt with the ecological and health-related effects of so many existing chemicals as the BUA. On the national level, the BUA has produced comprehensive reports on about 300 substances and carried out preliminary evaluation and classification (priority-setting) for approximately 200 more, as of 1997. Publication of the process leading to priority-setting, in addition to the BUA Reports, lends transparency to the Committee's work.

Since the EU presently considers only those substances with a production volume of more than 1000 tonnes/year, the BUA began an additional national project in 1997, which also selects and assesses existing chemicals with a lower production volume in the range of 100 - 1000 tonnes/ year. The chemical industry presents about 50 databases for substances each year, for which the BUA sets the priority. Comprehensive reports are published on chemicals suspected of having a hazardous potential. If the data available for substance assessment are insufficient, the gaps in knowledge are documented and, if necessary, investigations recommended.

Moreover, BUA is increasingly addressing scientific questions and problems such as "endocrine disruptors", selection criteria for "persistent organic pollutants" (POPs), "risk assessment and evaluation models for soils and sediments", "evaluation criteria for the marine sector" and "safety factors within the framework of toxicological risk assessment". The aim of BUA is to develop assessment concepts, determine data gaps, point out the need for further research and, last but not least, also to reduce information deficits in the general population.

Munich, November 1999

Helmut Greim
BUA Chairman

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Summary

Ecological Aspect

The only manufacturer of 2-chloroacetamide in Europe is Clariant GmbH. Less than 1000 t of 2-chloroacetamide were produced in 1998. All of the 2-chloroacetamide produced by Clariant GmbH is put on the market.

2-Chloroacetamide is used as a biocide, in particular, in glues, coatings and paints. Furthermore, it is used as a preservative in household cleaners and care agents. Of less importance is the application of 2-chloroacetamide as a component for the synthesis of pharmaceutical products as is supposedly also its use in cutting oils as well as in the leather, paper, textile and plastics industry.

No emissions into the atmosphere occur during the production of 2-chloroacetamide.

In the bagging area, dust concentrations of typically $< 10 \text{ mg/m}^3$ were measured.

Based on the AOX calculation, the maximum possible emission into the hydrosphere amounts to 200 kg/year.

There are no data available on the emissions into the atmosphere and hydrosphere with use and processing.

Unquantifiable emissions into the hydrosphere occur through the use of the cooling lubricant N-methylolchloroacetamide which, in water, hydrolyzes to 2-chloroacetamide.

Because 2-chloroacetamide is used in consumer-related products (see above), humans may become exposed to it.

There are no indications on the occurrence of 2-chloroacetamide in the environment.

In the Zahn-Wellens Test (OECD 302 B), 2-chloroacetamide was proven to be potentially biodegradable. In a degradation test (analogous to the OECD Confirmatory Test), 2-chloroacetamide was evaluated to be biochemically non-degradable with unadapted microorganisms but to be biochemically degradable with adapted microorganisms.

Methylosinus trichosporium OB-3b can degrade 2-chloroacetamide to CO₂ via the step of hydroxyacetamide.

The transformation of 2-chloroacetamide to chloroacetic acid and bicarbonate or ammonium was detected in studies with soils, sediment and activated sludge. Nevertheless, the hydrolysis supposedly is not due to microbial processes but rather is attributed to the catalytic influence of soil components.

Under laboratory conditions, hydrolysis is not particularly important. It is not known whether 2-chloroacetamide in the aquatic compartment is hydrolyzed under environmental conditions.

Chloroacetamide is classified to be poorly volatile from aqueous solution.

A direct photodegradation is not expected. A half-life of 7.1 days can be calculated for the photochemical oxidative degradation in air.

Bio- and geoaccumulation are not expected.

Determined in the fermentation tube test, the toxicity limit for bacteria is 200 mg/l. The minimum inhibitory concentration for various microorganisms is \geq 500 mg/l.

The toxicity of 2-chloroacetamide to algae was not studied yet.

A 96h LC₅₀ value of 8.9 mg/l was established in an aquatic test on *Enchytraeus albidus*, performed analogously to OECD Testing Guideline 202. A 48h EC₅₀ value of 14 mg/l was determined in an acute immobilization test on *Daphnia magna* (OECD

202, Part I). A 24h LC₁₀₀ value of 56 mg/l was found for the toxicity of 2-chloroacetamide to *Australorbis glabratus*.

The determination of the acute toxicity (based on DIN 38412, Part 15) with *Leuciscus idus* produced LC₅₀ values of 22.7 mg/l (24h), 21.1 mg/l (48h) and 19.8 mg/l (96h).

For *Eisenia foetida*, 48h LC₅₀ values of 1.5 to 2.4 µg/cm² were determined in the filter paper contact test. In soil tests with *Eisenia foetida* und test times ranging up to 28 days, in general, LC₅₀ values of >10 to 75 mg/kg were found. The lowest effective value (28d LC₅₀ = 4 mg/kg) was established for *Enchytraeus albidus*.

During an 8-week exposure of *Eisenia foetida* to 2-chloroacetamide concentrations of <1,000 mg/kg, no effects were found on the growth, weight and reproduction of the animals. In another study, however, initial effects on growth and reproduction were observed at concentrations of 25 mg/kg.

A 2-chloroacetamide concentration of about 9 mg/l had no inhibitory effect on the glutathione-S-transferase activity of *Triatoma infestans*.

During the 5-day test period, 2-chloroacetamide concentrations of 22 mg/kg inhibited the germination of *Lactuca sativa* by 30 % as well as the root growth of *Avena sativa* and *Lactuca sativa* by 80 % and 60 %, respectively.

With the application of 5 kg 2-chloroacetamide/ha, *Zea mays*, *Sinapis alba*, *Avena sativa*, *Lolium multiflorum* und *Galium aparine* exhibited shoot fresh weights of 108, 105, 88, 98 and 71 %, compared to the controls. The application of 10 kg 2-chloroacetamide/ha yielded shoot fresh weights of these species of respectively 104, 30, 78, 98 and 68%, compared to the controls.

Toxicological Aspect:

see Appendix:

Toxicological Evaluation No. 8 "Chloroacetamide"

Employment Accident Insurance Fund of the Chemical Industry

[Berufsgenossenschaft der chemischen Industrie], Heidelberg (06/2000)

Data Gaps

Ecology

Due to missing data, the emission and exposure situation from the use of 2-chloroacetamide as a biocide and preservative cannot be evaluated.

A conclusive evaluation of the ecotoxicity of 2-chloroacetamide is impossible to make, because the stability in soils is not clarified, the proof of ready biodegradability is missing, and data on the toxicity to algae are unavailable. In the mean time the company Clariant GmbH has ordered an algae growth inhibition test (OECD 201).

Toxicology

There are no studies available on the endpoints toxicokinetics, metabolism and carcinogenicity. Furthermore, studies are missing on the acute dermal toxicity of 2-chloroacetamide and on the inhalative toxicity of chloroacetamide dust.

The testing of the acute dermal toxicity is not considered to be necessary, since data exist from a subacute, 30-day study on rabbits. In these studies, systemic effects occurred from 100 mg/kg b.w. onwards, and 400 mg/kg b.w. was lethal in 3 out of 5 animals (following a single to 3-time treatment).

There are no studies available on the inhalation of chloroacetamide dust in order to evaluate the effects after acute and repeated exposure to mucous membranes and the respiratory tract. This information is necessary due to the known skin- and eye-irritating effect. Such information cannot be obtained from the existing studies on the effects after dermal and oral application. According to the only producer in Germany, the production of 2-chloroacetamide takes place in a closed system. In the area of packaging, the contact with 2-chloroacetamide is avoided through protective measures (wearing of gas masks and protective clothing). An exposure of the consumer, for example, through the use of household cleaners containing 2-chloroacetamide is feasible. However, this ought to be low, since 2-chloroacetamide

is employed only in low concentrations as a preservative (in general, < 1 %). Studies on the inhalative toxicity of 2-chloroacetamide dust are not a priority upon adhering to the aforementioned work protection measures and taking into consideration the expected low consumer exposure.

Although no carcinogenicity studies are available, conducting a corresponding study is not seen as necessary, since the genotoxicity studies do not infer such a potential.

