



**German Chemical Society
Gesellschaft Deutscher Chemiker**

GDCh-Advisory Committee
on Existing Chemicals of
Environmental Relevance (BUA)

BUA Reports 68 - 70

Adipic acid

BUA Report 68 (April 1991)

Terephthalic acid

BUA Report 69 (June 1991)

Acetic anhydride

BUA Report 70 (June 1991)



S. Hirzel

Wissenschaftliche Verlagsgesellschaft 1994

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Beratergremium für
Umweltrelevante Altstoffe (BUA)



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Foreword

The German Chemicals Act (Chemikaliengesetz - ChemG) of 1980 stipulates that certain existing chemicals must be reported to the competent authority, if they exhibit properties which indicate that they may be hazardous, either alone or in combination with other substances.

In the summer of 1982, an Advisory Committee on Existing Chemicals of Environmental Relevance (BUA) was set up by the German Chemical Society (Gesellschaft Deutscher Chemiker - GDCh). It brings together representatives from the scientific community, the chemical industry and the governmental authorities. This Advisory Committee is responsible for elaborating appropriate solutions for substances of relevance for health and the environment on the basis of voluntary measures. It selects and examines existing chemicals from the aforementioned angles. The testing and evaluation are based on scientific criteria alone.

It was, therefore, necessary to develop priority setting procedures. In a first phase reports were only prepared for priority chemicals. Within the framework of a first priority setting procedure, chemicals were compiled from several priority lists and 135 chemicals were selected for detailed substance reports.

In a second priority setting procedure the survey of the German Chemical Industry Association (VCI) on all substances with a production volume of more than 10 tons per year was used as a starting list. Since this survey covered 4,600 chemicals, BUA decided to process the corresponding list in several stages. The first stage included approx. 1,050 substances with a production volume of more than 1,000 tons per year.

Detailed reports are drawn up on chemicals suspected of having a hazard potential and abridged reports on those presenting only a minor hazard potential, according to the current state of knowledge.

The detailed BUA reports take in both the published literature and data from industry. If data for the evaluation of the chemicals are not available, additional studies are recommended and the results are published as updates to the reports. The reports serve as a basis for the instigation of administrative measures, when there are indications of risks to health or the environment.

Tübingen, May 1993

Ernst Bayer
Chairman of the Advisory Committee
on Existing Chemicals
of Environmental Relevance

Adipic acid

BUA Report 68
(April 1991)

edited by the GDCh-Advisory
Committee on Existing Chemicals
of Environmental Relevance

Contents

Adipic acid

1.	Chemical Identity	1
2.	Manufacture, Use, Emissions into the Environment	2
3.	Occurrence in the Environment	4
4.	Behaviour in the Environment	4
5.	Ecotoxicology	5
6.	Toxicity to Mammals	5
7.	Summa	7
8.	References	9
Annex	Substance Data Set of Bayer AG	1 - 33

BUA Report on Adipic acid

7. Summary

Emissions of adipic acid into the atmosphere from its production amount to an estimated 1.5 t/a at the BAYER AG and to about 18 t/a at BASF. At BAYER about 500 kg/a are lost in cleaning and splash water, while at BASF about 20 t/a are fed into the wastewater treatment facility. In addition, from the production of adipic acid an estimated 85,000 tonnes of nitrous oxide are formed (by the reduction of nitric acid) and emitted into the atmosphere.

Emissions resulting from the processing and use of adipic acid cannot be quantified, but those resulting from processing, at least, should be low.

Concentrations of adipic acid which have been detected in the atmosphere are in the pico- or microgramme range. Adipic acid is readily biodegradable.

Towards fish the toxicity of the free acid is different to that of the neutralized acid, with a 96-h LC₅₀ of 97 mg/l for *Pimephales promelas* compared with a 48-h LC₀ of > 1,000 mg/l for *Leuciscus idus*.

Adipic acid is readily absorbed by the organism and rapidly excreted. Its acute toxicity is low. Animal studies have failed to give any indication of adipic acid having a carcinogenic, mutagenic or teratogenic effect.

Adipic acid has been placed in group III (substances which according to available data represent a low hazard potential for the general population and for the environment). The present evaluation confirms this classification and shows that wide spread exposure of man and environment is possible. The ecotoxicological and toxicological data provide no indication of adipic acid presenting a possible hazard.

Terephthalic acid

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Committee on Existing Chemicals
of Environmental Relevance

Contents

Terephthalic acid

1.	Chemical Identity	1
2.	Manufacture, Use, Emissions into the Environment	1
3.	Occurrence in the Environment	4
4.	Behaviour in the Environment	4
5.	Ecotoxicology	5
6.	Toxicity to Mammals	5
7.	Summary	7
8.	References	8
Annex	Substance Data Set of Hoechst AG	1 - 31

BUA Report on Terephthalic acid

7. Summary

In the Federal Republic of Germany, TPA is used for the production of polyethylene terephthalate (PET). In 1990 the amount required was covered to one third by production in Federal Republic of Germany and to two thirds by imports. No information is available on emission from production and processing of TPA in what used to be the German Democratic Republic. Most of the TPA is processed at two plants in Bavaria. Emissions of TPA dust from transfer and filling operations at these two plants amount to less than 50 kg per annum. Off-gases from processing of TPA are collected and incinerated. Waste water is either rid of its organic contents by incineration or, following degassing, is fed into a municipal sewage treatment plant. Through migration from packaging materials made of PET, TPA can enter into foodstuffs (measured migration rates of up to 67 µg/dm²). In Japan, atmospheric TPA concentrations of up to 23 ng/m³ have been detected and accounted for by the photochemical oxidation of aromatic hydrocarbons which have been emitted into the atmosphere. No information is available for the Federal Republic of Germany on the occurrence of TPA in the environment.

In respect to the ecotoxicology of TPA, at concentrations of up to 19 mg/l (its solubility in water) and at nominal concentrations above that (500 mg/l) no lethal effect was found towards fish in 96-hour tests of acute toxicity. TPA is readily biodegradable. On account of its log P_{OW} only a low potential for bioaccumulation is expected.

In respect to the toxicology of TPA, the relevant range of effects for an evaluation has been sufficiently clarified. Effects only occur at exposure levels which, compared with those resulting from the migration of TPA from PET, are very high.

Terephthalic acid has been placed in group III (substances which according to available data represent a low hazard potential for the general population and for the environment). The present evaluation confirms this classification. On account of its pattern of use, wide spread exposure of man and the environment is possible. The ecotoxicological and toxicological data provide no indication of TPA representing a possible hazard.

Acetic anhydride

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Committee on Existing Chemicals
of Environmental Relevance

Contents

Acetic anhydride

1.	Chemical Identity	1
2.	Manufacture, Use, Emissions into the Environment	1
3.	Occurrence in the Environment	4
4.	Behaviour in the Environment	4
5.	Ecotoxicology	5
6.	Toxicity to Mammals	6
7.	Summary	7
8.	References	8
Annex	Substance Data Set of Hoechst AG	1 - 16

BUA Report on Acetic anhydride

7. Summary

As far as can be ascertained, acetic anhydride is used solely as an intermediate in the manufacture of acetyl cellulose, dyes, pharmaceuticals and the bleach activator, tetraacetyl ethylenediamine.

Total emissions into the atmosphere from all plants producing and processing acetic anhydride in the Federal Republic of Germany (united) can be roughly estimated at below 9 t/a. Information on emissions from production and processing in former East Germany is not available.

In the atmosphere and hydrosphere, acetic anhydride is rapidly hydrolysed to acetic acid, which is subject only to slow photo-oxidative degradation. However, it is assumed that acetic acid, on account of its high solubility, will be rapidly rained out of the atmosphere. Acetic acid is readily biodegradable. The lowest concentration showing a toxic effect (on a blue green alga) was found to be 18 mg/l.

On account of its strong corrosive effects, there is little chance of humans being subjected to strong and persistent acetic anhydride exposure. On contact with wet tissue, acetic anhydride hydrolyses to acetic acid, which is a constituent of endogenous metabolism.

Acetic anhydride has been placed in group III (substances which according to available data present a low hazard potential for the general population and for the environment). The present evaluation confirms this classification and shows that although wide-spread exposure to acetic anhydride is theoretically possible, in practice, on account of its rapid hydrolysis, it is of little significance for man or the environment. Unaltered acetic anhydride is usually only encountered at the workplace. Notwithstanding its known corrosive properties, the ecotoxicological and toxicological data provide no indication of acetic anhydride presenting a particular hazard.