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TOXICOLOGICAL EVALUATIONS

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Programme
for the Prevention of Health Hazards Caused
by Industrial Substances

Toxicological Evaluations

- General Introduction and Overview -



BG Chemie
Berufsgenossenschaft der
chemischen Industrie

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TOXICOLOGICAL EVALUATIONS

General Introduction and Overview

As per closing date 18 September 1981, an inventory survey counted approximately 100 000 marketed chemicals in Europe. This considerable number of substances is compiled in the European Inventory of Existing Commercial Chemical Substances (EINECS), listed by name. However, only a small number of them are of technical significance. According to a survey conducted by the Verband der chemischen Industrie (VCI; German Chemical Industry Association) among its most important member companies, only about 4 600 substances are produced in quantities greater than 10 tonnes per annum. Most of the remaining substances are presumably laboratory chemicals or products manufactured or delivered in response to individual orders.

New chemicals – i.e. substances first marketed after 18 September 1981 – are required by the German Chemikaliengesetz (Chemicals Act) to undergo evaluation under certain conditions. For existing chemicals, however, this was previously necessary only in individual cases following the passing of a relevant ordinance under German law. A new situation has arisen since the enactment of the EU Existing Substances Regulation in 1992. In accordance therewith, assessment of selected priority existing substances is now mandatory throughout Europe.

The Berufsgenossenschaft der chemischen Industrie (BG Chemie; Institution for Statutory Accident Insurance and Prevention in the Chemical Industry) was already concerned with the testing of industrial substances for health-hazardous properties long before the German Chemicals Act and the EU Existing Substances Regulation came into force.

In 1977, the management of the BG Chemie decided to give particular priority to the prevention of damage to health through industrial products.

For this purpose it set up the

Programme for the Prevention of Health Hazards Caused by Industrial Substances.

This long-term programme aimed to improve safety in the handling and use of chemicals in industrial plants.

In addition to other activities, the BG Chemie began at the time to investigate chemicals, with an emphasis on establishing a **List of substances** with so far only suspected potential hazards to health, particularly long-term effects. Depending on the outcome of the investigations, it was then possible to introduce additional safety measures promptly into the factories.

The work of the BG Chemie in this field was incorporated into the German Federal Government's scheme for systematic registration and evaluation of existing chemicals in accordance with the Chemicals Act.

The BG Chemie is making its contribution available to all interested parties by publishing the **TOXIKOLOGISCHE BEWERTUNGEN / TOXICOLOGICAL EVALUATIONS**.

The TOXIKOLOGISCHE BEWERTUNGEN / TOXICOLOGICAL EVALUATIONS and their predecessor versions provided the basis for all decisions on the further procedure in respect of the testing of the chemicals and any necessary workplace safety measures. They were prepared in the context of the work described in detail below. In addition to the loose-leaf collection of individual full-length TOXIKOLOGISCHE BEWERTUNGEN in German ("long versions"), short versions were published in German in the form of booklets to assist occupational safety in handling these chemicals in the workplace. In keeping with modern technology and the needs of the target communities, online publication on the Internet was commenced in April 2004.

Relevant existing industrial chemicals have been compiled in a list for the purpose of accurate and systematic detailed evaluation (Annex 4). The prerequisites for inclusion in the List were as follows:

1. The substances in question were to be those used in industry in the manufacture of primary, intermediate, final or auxiliary products.
2. The volume of production and the method of handling the substances were also relevant considerations.
3. Special priority was given to industrial substances that were destined for the consumer sector.
4. There was to be evidence of a potential risk to health. This could include, for example, experience gathered by occupational physicians or in the workplace, unconfirmed indications in the literature or a similarity of the chemical structure to other substances that had been proven to be hazardous (e.g. alkylating agents, aromatic amines).
5. Substances for which maximum allowable workplace concentrations had already been set and substances classified as Category 1 or 2 carcinogens were, in principle, not included in the BG Chemie List of substances. Substances included in the “yellow pages” of the list of MAK values (maximum allowable workplace concentrations) were only investigated by the BG Chemie after prior consultation with the German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (“MAK Commission”).
6. In order to avoid duplication of work, the BG Chemie would also not study substances known to be the subject of investigations already being carried out by other national or international committees if the investigations pursued objectives similar to those of the “Programme for the Prevention of Health Hazards Caused by Industrial Substances” run by the BG Chemie.

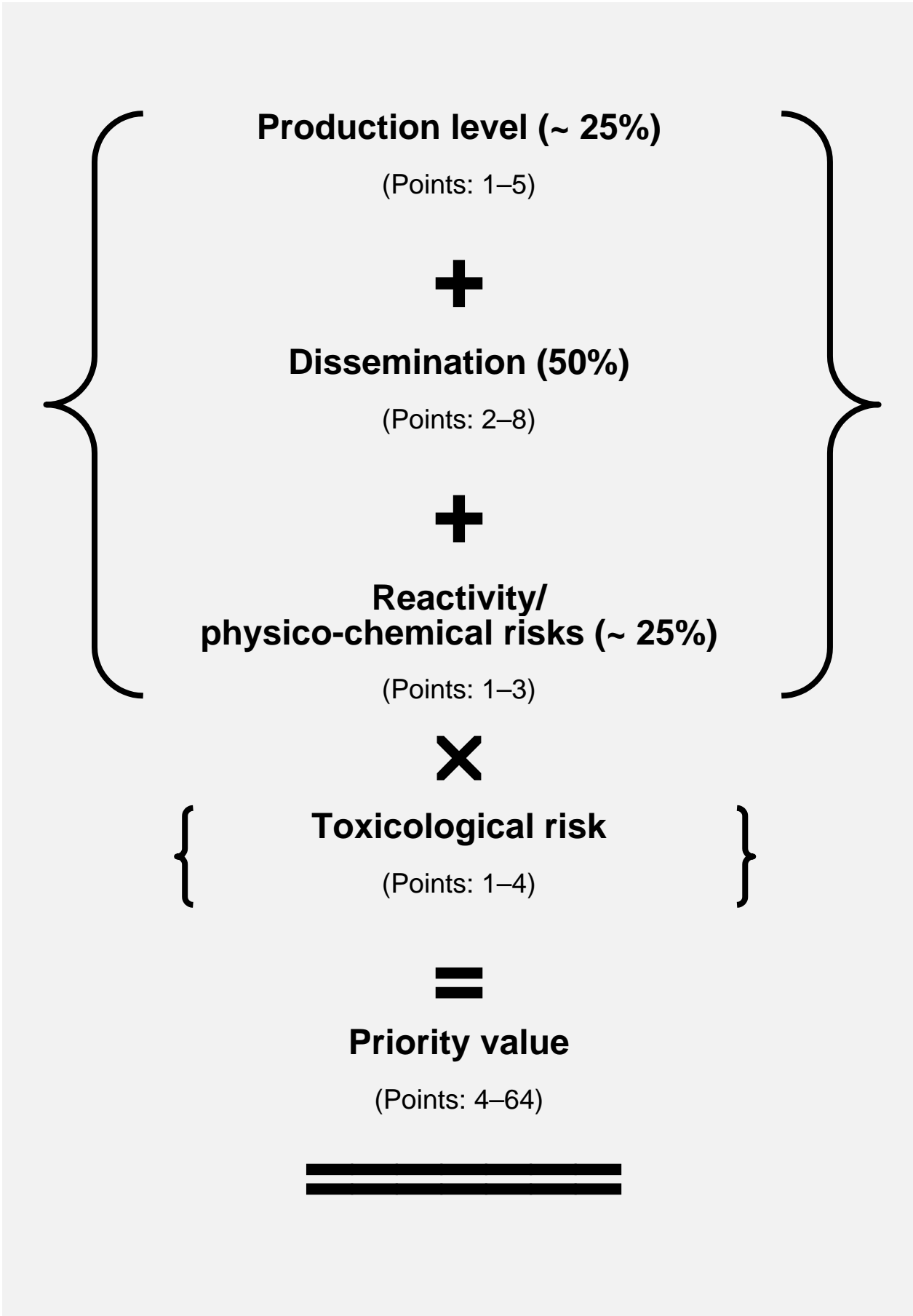
Because of the large number of chemicals to be assessed prior to further investigation, a priority-setting system was developed for practical use. The system used essentially two elements to estimate potential risk – exposure and intrinsic hazard.

The exact determination of exposure is a task requiring a great deal of time and effort. Therefore, surrogate parameters were used in this context. They consisted of the subparameters *production level* and *dissemination*, which can be considered as representing, *inter alia*, the work practices and number of persons exposed. The third subparameter – *reactivity/physico-chemical risks* – was introduced following the Bhopal accident. In that incident, a water leak into a storage tank led to a reaction which produced heat with subsequent vaporisation of methyl isocyanate. Chemicals that produce large amounts of heat when they react with themselves, e.g. on polymerisation or through reactions with readily available substances such as water and air, were therefore also assigned a higher priority. As the aim of the Programme was to determine toxicological properties, the last subparameter – the *toxicological risk* – was initially speculative (suspected toxicological potential).

The various parameters and subparameters were assigned numerical values (scores). The scores of the first three subparameters, which defined exposure, were added and then multiplied by the score of the suspected toxicological potential to yield the priority value (see scheme below).

This priority value expressed the urgency with which the substance was to be investigated without indicating the risk of handling the substance in the workplace, since at the outset of the investigation little was known of the fundamental parameter – the intrinsic hazard of the substance – which had yet to be determined.

In addition to the substances that were proposed by the BG Chemie member companies and technical supervision section, the *Bundesanstalt für Arbeitsschutz und Arbeitsmedizin* (BAuA; German Federal Institute for Occupational Safety and Health) systematically reviewed substances for their relevance to the workplace and proposed certain substances for inclusion in the List of substances to be evaluated. As a result of these activities, various substances were included in the List.



The work of the BG Chemie within its “Programme for the Prevention of Health Hazards Caused by Industrial Substances” was directed to chemicals that pose potential health hazards to employees with such workplace exposure. Several of the substances, however, were of environmental relevance and therefore in some cases investigated in parallel by the *Beratergremium für umweltrelevante Altstoffe* (BUA; Advisory Committee on Existing Chemicals of Environmental Relevance, now named *Beratergremium für Altstoffe* (Advisory Committee on Existing Chemicals)). To avoid duplication of work, the BG Chemie and BUA agreed in each case as to who would prepare the section on “toxicity in warm-blooded animals”, which is of relevance to occupational safety and health as well as environmental protection. Additionally, agreements were made with the *Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe* (“MAK Commission”; German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area), the European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC) and the Organisation for Economic Co-operation and Development (OECD) in order to avoid duplication. In cases where a substance was investigated by BUA or ECETOC, the BG Chemie adopted the evaluation as a short version referencing the institution having prepared the detailed overall evaluation. Conversely, BUA and the MAK Commission incorporated many of the TOXIKOLOGISCHE BEWERTUNGEN prepared by the BG Chemie into their overall evaluations.

In addition, there was frequent exchange of data with national and international institutions, organisations and companies. This made it possible, for example, to include in the TOXIKOLOGISCHE BEWERTUNGEN / TOXICOLOGICAL EVALUATIONS previously unpublished data from experimental studies conducted in Germany and other countries. Conversely, the results from the experimental studies initiated by the BG Chemie can help to avoid duplication of work in the existing substances programmes conducted by the EU, the US EPA, the NTP and the OECD. The BG Chemie did not initiate any toxicological studies for chemicals on its List of substances if they were already under assessment according to the priority lists established within the framework of the EU Existing Substances Regulation.

In assessing individual chemicals from the List of substances, the BG Chemie was assisted by a scientific Advisory Committee consisting of experienced toxicologists, occupational physicians and chemists. Representatives

of the *Bundesinstitut für Risikobewertung* (German Federal Institute for Risk Assessment) and the *Bundesanstalt für Arbeitsschutz und Arbeitsmedizin* (German Federal Institute for Occupational Safety and Health), for instance, also participated. Some members of the Advisory Committee (see Annex 1) were at the same time members of the MAK Commission, BUA or the *Beraterkreis "Toxikologie" des Ausschusses für Gefahrstoffe (AGS)* (Toxicology Advisory Council to the German Hazardous Substances Committee (AGS)).

The decision-making body for all activities within the "Programme" was the Principles and Substances Programme Committee of the Board of the BG Chemie (see Annex 2).

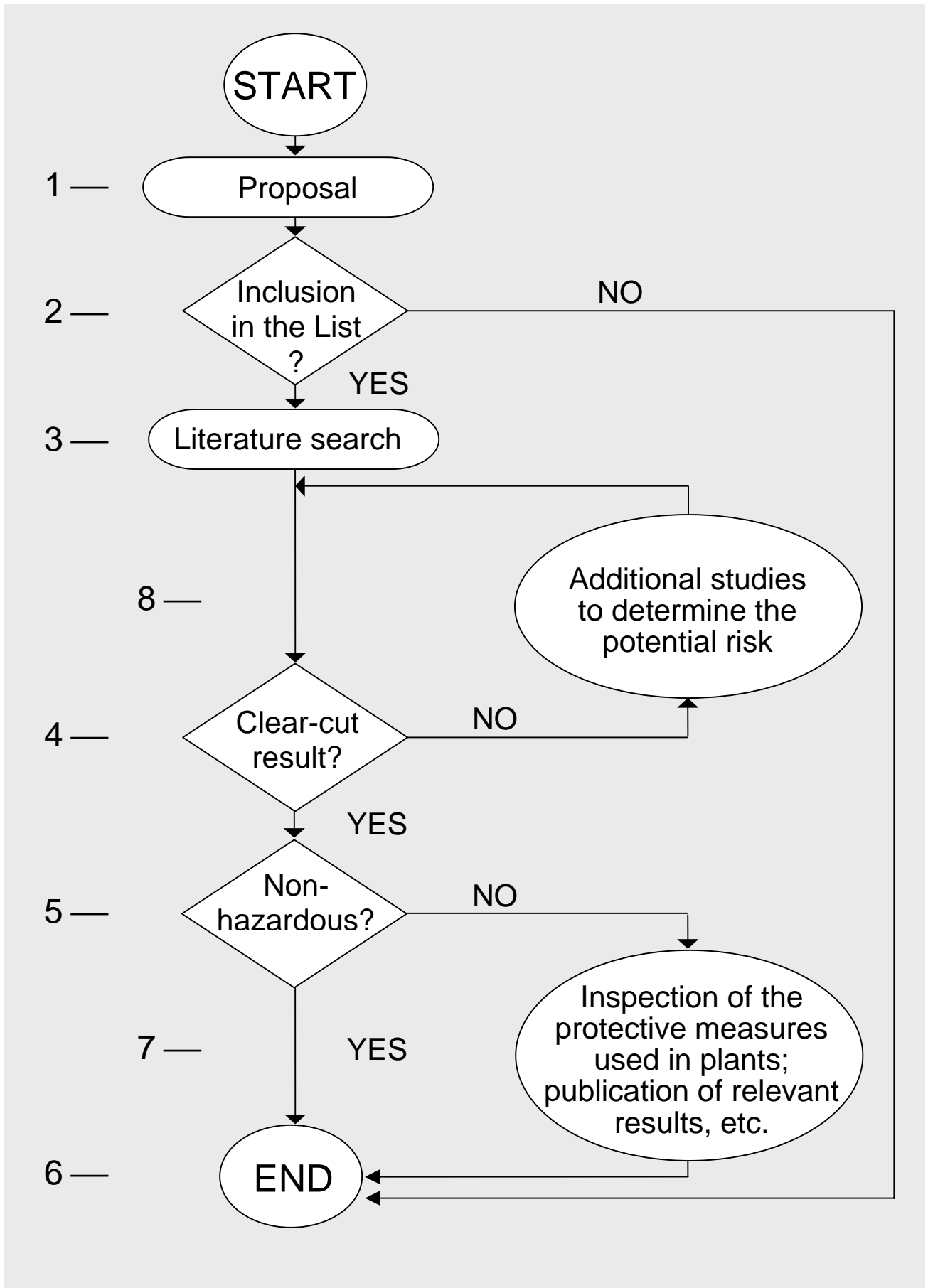
After a substance was included in the List, a painstaking investigation had to be undertaken to decide whether that particular substance posed a health hazard to employees.

The full procedure was as follows:

- Proposal for inclusion in the BG Chemie List of substances (1).
- Decision on inclusion in the List of substances (2).
- After inclusion in the List of substances, a toxicology institute or the Secretariat of the Advisory Committee conducted a literature search* and summarised in a preliminary evaluation the scientific publications and/or unpublished findings from studies on acute and chronic toxicity, reproductive toxicity, mutagenicity and carcinogenicity (3).

* Literature searches were conducted in the following databases that were accessible through DIMDI (*Deutsches Institut für medizinische Dokumentation und Information*, Cologne): HSDB (Hazardous Substances Data Bank), RTECS (Registry of Toxic Effects of Chemical Substances), ECDIN (Environmental Chemicals Data and Information Network) and CCRIS (Chemical Carcinogenesis Research Information Service) as factual databases and TOXALL as a bibliographic database. In TOXALL, the CAS numbers were linked with the search strategies (preprocessed search, pps) offered by the host (DIMDI). These search strategies covered the subject fields "Toxicology", "Occupational Toxicology", "Sensitisation" and "Adverse Effects".

- On the basis of the literature search and preliminary evaluation, a decision was made as to whether a conclusive evaluation of the chemical in question was possible (4).
- If this indicated that the substance was “non-hazardous” (5), investigation of the substance was concluded and a **TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION** published (6).
- If the substance under scrutiny had properties hazardous to health, the BG Chemie checked the safety precautions in the companies where the chemical was used and, if necessary, ensured that adequate improvements were made. At the same time, the results were published and made available to interested and affected parties, for example to the Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (7).
- If conclusive evaluation of the substance was not possible (4), further studies were necessary to determine the potential risk (8).
- Once these studies had been completed, a decision had to be taken as to whether the available documentation was then sufficient for a final evaluation (4).
- If the result was conclusive (4), no further studies were necessary. If on the other hand the chemical was not “non-hazardous”, appropriate measures were taken (7).
- However, if the results were inconclusive (4), further studies were necessary to determine the potential risk (8). In that event, the procedures to be followed were decided on case-by-case basis.
- In each case, following completion of the literature search and review and any additional studies that may have been conducted, a – possibly preliminary – **TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION** was published.



The following tasks were accomplished (see also Annex 4):

- Over 4 000 substances were subjected to preliminary investigations to ascertain whether they met the above-mentioned prerequisites for inclusion in the List. This was accomplished using the above criteria.
- The question of acceptance of 514 of the substances was discussed intensively by the Advisory Committee, in some cases repeatedly.
- 325 substances (284 BG Chemie numbers and the project “Aromatic Amines”) were investigated (Annex 4).
- Literature searches were conducted and preliminary evaluation completed for 257 substances.
- For a number of substances the literature searches produced no conclusive result. Hence, a decision was made to pursue the question further by conducting investigations to ascertain the potential risk, especially in respect of teratogenic, embryotoxic, neurotoxic, genotoxic and carcinogenic effects. For 127 substances, studies – in some cases several studies (437 altogether, including range-finding studies) – were planned, commissioned and conducted. Of these studies, 40 were funded by the chemical industry (Annex 4), including a long-term carcinogenicity study of one substance.
- As a result of the investigations, the following 18 chemicals on the BG Chemie List were recognised for the first time as potentially having carcinogenic effects:

| | | |
|---|---------|------------|
| N-Methyl-bis(2-chloroethyl)amine | CAS No. | 51-75-2 |
| Vinylidene fluoride | CAS No. | 75-38-7 |
| Dichloroacetyl chloride | CAS No. | 79-36-7 |
| Dichloroacetic acid | CAS No. | 79-43-6 |
| Diethylcarbamyl chloride | CAS No. | 88-10-8 |
| 5-Chloro-2-aminotoluene | CAS No. | 95-69-2 |
| Benzotrichloride | CAS No. | 98-07-7 |
| 4-Nitro-2-aminotoluene | CAS No. | 99-55-8 |
| p-Nitrosophenol | CAS No. | 104-91-6 |
| Vinyl propionate | CAS No. | 105-38-4 |
| 1,2-Butylene oxide | CAS No. | 106-88-7 |
| Tris(2-chloroethyl) phosphate | CAS No. | 115-96-8 |
| Hydrazobenzene | CAS No. | 122-66-7 |
| 3,3'-Dimethyl-4,4'-diaminodiphenylmethane | CAS No. | 838-88-0 |
| 2-Chloroacrylonitrile | CAS No. | 920-37-6 |
| o-Chlorobenzotrichloride | CAS No. | 2136-89-2 |
| Sodium dichloroacetate | CAS No. | 2156-56-1 |
| Hydroxylamine sulfate | CAS No. | 10039-54-0 |

In each individual case, technical supervisory officers of the BG Chemie investigated the handling of these substances on the plant premises and, wherever necessary, introduced improvements to the occupational safety measures. At the same time, the MAK Commission, the *Beraterkreis "Toxikologie" des Ausschusses für Gefahrstoffe (AGS)* (Toxicology Advisory Council to the German Hazardous Substances Committee (AGS)) at the *Bundesministerium für Wirtschaft und Arbeit* (BMWA; German Federal Ministry of Economics and Labour) and the *Verband der chemischen Industrie* (VCI; German Chemical Industry Association) were informed of the results in order that regulatory consequences could be initiated.

Data on other endpoints allowing, for example, the derivation of a maximum allowable workplace concentration or the classification of the mutagenic, embryotoxic or teratogenic, fertility-damaging or sensitising properties of a substance were communicated to the MAK Commission and the *Beraterkreis "Toxikologie"* (Toxicology Advisory Council) either with the request to initiate appropriate regulatory action or, proactively, with a concrete proposal for a limit value or a category for classification. The experimental studies and TOXIKOLOGISCHE BEWERTUNGEN provided by the BG Chemie have served as the basis for numerous maximum allowable workplace concentrations and classifications. Workplace safety for employees has thus also benefited in this way from the work carried out within the BG Chemie's "Programme for the Prevention of Health Hazards Caused by Industrial Substances".

In order to make our toxicological data available to all interested parties, and in particular to the scientific community, the BG Chemie began in 1986 to publish the TOXIKOLOGISCHE BEWERTUNGEN in German. In all, such evaluations are now available in a short format ("short version") for 244 substances and a detailed full-length format ("long version") for 224 substances. However, TOXIKOLOGISCHE BEWERTUNGEN had previously been published in a first, second or third edition for a total of 157, 64 and 3 substances, respectively. Up until November 2000, the short versions were published in the form of 6 booklets and the long versions as separate contributions to a loose-leaf publication. In order to cater to the growing international interest in the TOXIKOLOGISCHE BEWERTUNGEN, it was undertaken to publish the evaluations in English under the title **TOXICOLOGICAL EVALUATIONS**. A book series by the same title containing

203 TOXICOLOGICAL EVALUATIONS – 28 of these in a second edition – was published in 15 volumes by Springer Verlag. TOXICOLOGICAL EVALUATIONS are available in English for a total of 211 substances. The 37 long and 50 short-version evaluations published in 2000 as separate issues and booklets belonging supplements 15 and 16, together with 33 new long and short-version TOXIKOLOGISCHE BEWERTUNGEN and 58 TOXICOLOGICAL EVALUATIONS are successively being published on the internet, in keeping with modern technology and the needs of the target community. Online publication commenced in April 2004 and is scheduled to be completed by approximately the end of 2004.

Annex 4 provides a complete list, by CAS number, of the reviewed substances, the experimental studies that were conducted and the TOXIKOLOGISCHE BEWERTUNGEN and TOXICOLOGICAL EVALUATIONS which have been published.

The TOXIKOLOGISCHE BEWERTUNGEN were prepared on the basis of the work carried out by scientists or toxicology research institutes (see Annex 3) and members of the Secretariat of the Advisory Committee (see Annex 1) and underwent approval by the scientific Advisory Committee (see Annex 1). The editorial process was managed by the Secretariat of the Advisory Committee.

The evaluations are based on documentation found in the scientific literature, experimental studies commissioned by the BG Chemie, experience gathered by the specialised research institutes and their staff in the preparation of the TOXIKOLOGISCHE BEWERTUNGEN and the experience of the members of the Advisory Committee (Annex 1) and its Secretariat. The members of the Committee are in agreement with the available TOXIKOLOGISCHE BEWERTUNGEN / TOXICOLOGICAL EVALUATIONS. The BG Chemie's Principles and Substances Programme Committee has also accepted these evaluations.

With its "Programme for the Prevention of Health Hazards Caused by Industrial Substances" the BG Chemie has made a contribution to the prevention of occupational diseases and occupational risks to health which goes beyond conventional workplace safety and health practices used so far. The intention behind the experimental studies and the TOXIKOLOGISCHE BEWERTUNGEN / TOXICOLOGICAL EVALUATIONS was to identi-

fy as early as possible the risks to employees of handling hazardous substances and, where necessary, to examine and improve the situation at the workplace in advance of any introduction of regulatory consequences by other authorities.

On account of the EU White Book activities, the responsibility for the safety of the chemicals is transferred to the producers and importers. The BG Chemie therefore successfully concluded its “Programme for the Prevention of Health Hazards Caused by Industrial Substances” in June 2002 after 25 years. In future the BG Chemie will conduct toxicological studies only when there is reason to suspect that employees in Germany may be at risk despite the EU activities.

The BG Chemie is grateful to all persons named in this report, without whose active co-operation the research could not have been effectively pursued. We also wish to thank the many people who can not be named individually here and who have contributed their own time and energy to the success of these endeavours.

Heidelberg, April 2004

Annex 1

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Annex 2

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Vize-Chairman of the Board of the BG Chemie

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Annex 3

In addition to the members of the Advisory Committee and the Secretariat, the following persons were involved in supporting the publication of the TOXICOLOGICAL EVALUATIONS:

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Dr. G. Martens
Secretariat of the Advisory Committee until 1998

L. Taylor (Translations until 1998)
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Dr. H. Zeller †
Secretariat of the Advisory Committee until 1993

Annex 4

List of substances compiled by the BG Chemie Overview of the status of publications and studies (in order of CAS number)

A legend explaining the abbreviations used in the overview of the status of publications and studies can be found on pp. 45ff. at the end of the table.

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|----------------------------------|--------|----------------------------------|--------------|-------|-------|--------------|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 51-75-2 | N-Methyl-bis(2-chloroethyl)amine | 22 | MAK | | | | |
| 60-35-5 | Acetamide | 167 | MAK | | | | |
| 62-56-6 | Thiourea | 251 | | 5 | 06/95 | 12 | PROJ-3 |
| 67-56-1 | Methanol | 277 | MAK | | | | |
| 68-11-1 | Thioglycolic acid | 281 a | MAK | | | | |
| 74-31-7 | N,N'-Diphenyl-p-phenylenediamine | 214 | | 3 | 10/92 | 7 | |
| 74-87-3 | Chloromethane | 129 | BUA, MAK | 1 | | | |
| 75-02-5 | Vinyl fluoride | 34 | | 1 | 09/89 | 2 | A-3 MNT-3 |
| 75-25-2 | Bromoform | 82 | | 1 | 09/89 | 3 | |
| 75-38-7 | Vinylidene fluoride | 35 | | 1 | | | |
| 75-54-7 | Methyldichlorosilane | 196 | | 2 | | | |
| 75-77-4 | Trimethylmonochlorosilane | 171 | MAK | | | | |
| 75-78-5 | Dichlorodimethylsilane | 269 | | 4 | 10/94 | 9 | |
| 75-79-6 | Trichloromethylsilane | 270 | | 4 | 10/94 | 9 | |
| 75-86-5 | Acetone cyanohydrin | 271 | DECOS | | | | |
| 77-73-6 | Dicyclopentadiene | 84 | | 4 | 10/94 | 10 | |
| 78-32-0 | p-Tricresyl phosphate | 184 | IPCS | | | | |
| 78-79-5 | Isoprene | 105 | | 06/00 | 06/00 | 2 (+) | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------------|--------|----------------------------------|--------------|-----------|--------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 78-83-1 | 2-Methylpropanol-1 | 96 | | 01/97 (+) | 01/97 (+) | 15 (+) | MNT-3 D14-wat-rat-3 D90-wat-rat-3 TERA-ihl-rat-3 TERA-ihl-rbt-3 |
| 78-85-3 | Methacrolein | 108 | | 5 | 12/95 | 14 | IRS-3 CTC-3 D14-ihl-rat-3 D90-ihl-rat-3 TERA-ihl-rat-3 |
| 78-94-4 | Methylvinylketone | 161 | MAK | | | | |
| 79-01-6 | Trichloroethene | 133 | BUA, MAK | 3 | | | |
| 79-04-9 | Chloroacetyl chloride | 209 | | 5 | 06/95 | 12 | |
| 79-07-2 | Chloroacetamide | 8 | | 06/00 | 06/00 | 06/00 | |
| 79-10-7 | Acrylic acid | 157 | | 1 | 05/90 | 2 | |
| 79-11-8 | Chloroacetic acid | 23 | | 3 | 10/92 | 6 | |
| 79-20-9 | Acetic acid methyl ester | 278 | | 5 | 02/95 | 10 | |
| 79-22-1 | Chloroformic acid methyl ester | 36 | | 1 (+) | 03/88 (+) | (+) | A-3 AP-3 CTC-3 D05-ihl-rat-3 D28-ihl-rat-3 D90-ihl-rat-3 |
| 79-36-7 | Dichloroacetyl chloride | 188 a | | (+) | (+) | (+) | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--|--------|----------------------------------|--------------|-------|-------|-----------------------------------|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 79-39-0 | Methacrylamide | 238 | ICCA | | | | MNT-ip-mouse-3 D14NT-ihl-rat-3 |
| 79-41-4 | Methacrylic acid | 213 | ECETOC, MAK | | | | |
| 79-43-6 | Dichloroacetic acid | 188 b | | (+) | (+) | (+) | |
| 80-10-4 | Dichlorodiphenylsilane | 199 | | 2 | | | |
| 80-17-1 | Benzenesulphonic acid hydrazide | 220 | | 2 | 02/92 | 6 | |
| 81-20-9 | 2-Nitro-1,3-dimethylbenzene | 91 | | 4 | 04/94 | 9 | A-3 CTC-3 D28-diet-rat-3 |
| 81-84-5 | 1,8-Naphthalic anhydride | 256 | | 06/00 | 06/00 | 06/00 | SENS-3 |
| 82-45-1 | 1-Aminoanthraquinone | 257 | | (+) | (+) | (+) | |
| 83-41-0 | 3-Nitro-1,2-dimethylbenzene | 93 | | 4 | 04/94 | 9 | A-3 CTC-3 D28-diet-rat-3 |
| 84-65-1 | Anthraquinone | 101 | | 4 | 10/94 | 11 | |
| 86-57-7 | 1-Nitronaphthalene | 131 | MAK | | | | |
| 87-02-5 | 7-Amino-4-hydroxy-2-naphthalenesulfonic acid | 226 | | 06/00 | 06/00 | 06/00 | |
| 87-56-9 | Mucochloric acid | 258 | | 01/97 | 01/97 | 14 | |
| 88-10-8 | Diethylcarbaryl chloride | 67 | | 1 | 09/89 | 3 | |
| 88-16-4 | o-Chlorobenzotrifluoride | 88 | | 1 | 05/90 | 3 | A-3 CTC-3 |
| 88-72-2 | o-Nitrotoluene | 153 | BUA, MAK | | | | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--|--------|----------------------------------|--------------|-------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 88-73-3 | o-Chloronitrobenzene | 73 | | 11/00 | 11/00 | 11/00 | CTC-3 HPRT-3 D05-diet-mouse-3 D28-diet-mouse-3 |
| 88-74-4 | o-Nitroaniline | 122 | BUA | 1 | | | |
| 88-85-7 | 2-(1-Methylpropyl)-4,6-dinitrophenol | 239 | | 01/97 | 01/97 | (+) | |
| 89-58-7 | 2-Nitro-1,4-dimethylbenzene | 94 | | 4 | 04/94 | 9 | |
| 89-62-3 | 2-Nitro-4-methylaniline | 118 | | 06/00 | 06/00 | 06/00 | HPRT-3 D28-diet-rat-3* |
| 89-63-4 | 4-Chloro-2-nitroaniline | 85 | | 1 | 02/89 | 1 | |
| 89-83-8 | Thymol | 259 | | 06/00 | 06/00 | (+) | MNT-orl-mouse-3 |
| 89-87-2 | 4-Nitro-1,3-dimethylbenzene | 90 | | 4 | 04/94 | 9 | A-3 HPRT-3 CTC-3 CTV-3 D28-diet-rat-3 |
| 90-04-0 | o-Anisidine | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 90-30-2 | N-Phenyl-1-naphthylamine | 215 | BUA | 4 | | | |
| 90-51-7 | 6-Amino-4-hydroxy-2-naphthalenesulfonic acid | 227 | | 06/00 | 06/00 | 06/00 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 91-15-6 | o-Phthalodinitrile | 28 | | 5 | 06/95 | 11 | HPRT-3 MNT-3 D14NT-diet-rat-3 D90NT-diet-rat-3 |
| 91-22-5 | Quinoline | 228 | BUA | | | | |
| 91-29-2 | 4-Nitro-4'-aminodiphenylamine-2-sulfonic acid | 120 | | 06/00 | 06/00 | 06/00 | SENS-3 CTC-3 D14-diet-rat-3 D28-diet-rat-3 |
| 92-52-4 | Biphenyl | 18 | | 1 | | | |
| 95-49-8 | o-Chlorotoluene | 146 | BUA, MAK | | | | |
| 95-51-2 | o-Chloroaniline | 144 | BUA, MAK | | | | |
| 95-52-3 | 2-Fluorotoluene | 127 | | 3 | 08/93 | 8 | IRS-3 IRE-3 A-3 MNT-3 D01-ihl-rat-3 |
| 95-53-4 | o-Toluidine | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 95-68-1 | 2,4-Xylidine | 64 | | 3 | 08/93 | 8 | IRS-3 IRE-3 CTC-3 CTCF-3 D01-ihl-rat-3 D28-ihl-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------------|-----------|----------------------------------|--------------|-------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 95-69-2 | 5-Chloro-2-aminotoluene | 10 PAA | | 1 | | | A-3 UDSC-3 UDSC-3 MNT-3 MNT-3 |
| 95-72-7 | Chloro-p-xylene | 150 | | 11/00 | 11/00 | 11/00 | |
| 95-73-8 | 2,4-Dichlorotoluene | 149 a | | 5 | 02/95 | 12 | |
| 95-75-0 | 3,4-Dichlorotoluene | 149 b | | 5 | 02/95 | 12 | |
| 95-76-1 | 3,4-Dichloroaniline | 13 | | 5 | | | A-3 A-3 UDSC-3 MNT-3 |
| 95-79-4 | 4-Chloro-2-aminotoluene | 130 | BUA, MAK | | | | |
| 95-80-7 | 2,4-Toluylenediamine | 31 PAA | | | | | A-3 UDSC-3 MNT-3 |
| 95-82-9 | 2,5-Dichloroaniline | 243 | BUA | 5 | | | |
| 95-95-4 | 2,4,5-Trichlorphenol | 52 | | 1 | 11/86 | | |
| 96-29-7 | 2-Butanone oxime | 210 | MAK | | | | |
| 96-34-4 | Chloroacetic acid methyl ester | 76 | | 4 | 04/94 | 9 | D01-ihl-rat-3 D28-ihl-rat-3 |
| 96-45-7 | Ethylenethiourea | 1 | | 5 | 06/95 | 12 | HPRT-3 UDSV-3 D28-ihl-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-----------|-------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 96-48-0 | γ -Butyrolactone | 7 | | 11/00 | 11/00 | 1 (+) | D01-ihl-rat-3 TERA-ihl-rbt-3 |
| 97-00-7 | 1-Chloro-2,4-dinitrobenzene | 43 | | 2 | 02/92 | 5 | CTC-3 UDSC-3 |
| 97-36-9 | N-(2,4-Dimethylphenyl)-3-oxobutanoic acid amide | 244 | | 3 | 08/93 | 8 | HB-3* |
| 97-39-2 | 1,3-Di-o-tolylguanidine | 221 | | 01/97 | 01/97 | 15 | |
| 97-52-9 | 2-Methoxy-4-nitroaniline | 124 | | 5 | 12/95 | 14 | SENS-3 D01-der-rat-3 |
| 97-56-3 | o-Aminoazotoluene | 2 | | 1 | | | |
| 97-74-5 | Tetramethyl thiuram monosulfide | 186 | | 4 | 10/94 | 10 | |
| 98-07-7 | Benzotrichloride | 5 | | 1 | 05/90 | 4 | |
| 98-08-8 | Benzotrifluoride | 75 | | 3 | 10/92 | 7 | A-3 |
| 98-13-5 | Trichlorophenylsilane | 267 | | 4 | 10/94 | 9 | |
| 98-15-7 | m-Chlorobenzotrifluoride | 89 | | 01/97 | 01/97 | 15 | A-3 CTC-3 SENS-3* D01NT-ihl-rat-3* |
| 98-54-4 | p-t-Butylphenol | 6 | | 1 | | | |
| 98-56-6 | p-Chlorobenzotrifluoride | 272 | | 5 | 06/95 | 13 | |
| 98-73-7 | p-t-Butylbenzoic acid | 54 | | 3 (+) | 08/93 (+) | 8 (+) | CTV-rat-3 D05-ihl-rat-3 D28NT-ihl-rat-3 FERT-diet-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---------------------------------|--------|----------------------------------|--------------|-------|----|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 98-87-3 | Benzalchloride | 58 | | 1 | 05/90 | 4 | D01-ihl-rat-3 D14-ihl-rat-3 D32-ihl-rat-3 |
| 98-88-4 | Benzoylchloride | 55 | | 1 | 05/90 | 4 | AP-3 MNT-3 |
| 98-95-3 | Nitrobenzene | 151 | BUA, MAK | | | | |
| 99-08-1 | m-Nitrotoluene | 152 | BUA, MAK | | | | |
| 99-09-2 | m-Nitroaniline | 123 | | 1 | 05/90 | 2 | |
| 99-51-4 | 4-Nitro-1,2-dimethylbenzene | 92 | | 4 | 04/94 | 9 | A-3 CTC-3 D28-diet-rat-3 |
| 99-52-5 | 5-Nitro-2-aminotoluene | 26 | | 1 | 05/90 | 2 | A-3 UDSC-3 MNT-3 |
| 99-55-8 | 4-Nitro-2-aminotoluene | 25 | MAK | | | | UDSC-3 MNT-3 |
| 99-59-2 | 2-Methoxy-5-nitroaniline | 80 | | 5 | 12/95 | 14 | CTC-3 UDSC-3 |
| 99-98-9 | N,N-Dimethyl-p-phenylenediamine | 187 | | 5 | 12/95 | 14 | |
| 99-99-0 | p-Nitrotoluene | 154 | BUA, MAK | | | | |
| 100-02-7 | 4-Nitrophenol | 81 | | 3 | 10/92 | 6 | |
| 100-21-0 | Terephthalic acid | 51 | | 1 | 05/90 | 3 | |
| 100-41-4 | Ethyl benzene | 280 | MAK | | | | |
| 100-44-7 | Benzyl chloride | 48 | | 01/97 | 01/97 | 13 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------------------|--------|----------------------------------|--------------|-----------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 100-47-0 | Benzonitrile | 260 | | 06/00 | 06/00 | (+) | |
| 101-54-2 | p-Aminodiphenylamine | 197 | | 2 | 05/91 | 5 | |
| 101-67-7 | Dioctyldiphenylamine | 40 | | 1 | 05/90 | 5 | |
| 101-83-7 | Dicyclohexylamine | 212 | | 11/00 | 11/00 | 11/00 | |
| 101-96-2 | N,N'-Di-sec-butyl-p-phenylenediamine | 20 | | 5 | 06/95 | 12 | CTC-3 HPRT-3 D05-gav-rat-3 D28-gav-rat-3 |
| 102-01-2 | N-Phenyl-3-oxobutanoic acid amide | 245 | | 5 | 02/95 | 12 | HB-3* |
| 102-06-7 | 1,3-Diphenylguanidine | 216 | BUA | 4 | | | |
| 102-50-1 | 2-Amino-5-methoxytoluene | 79 | | 1 | 02/89 | 1 | |
| 102-71-6 | Triethanolamine | 57 | | 1 (+) | 05/90 (+) | 4 (+) | SENS-3 D05NT-ihl-rat-3 D28NT-ihl-rat-3 |
| 103-11-7 | 2-Ethylhexyl acrylate | 225 | BUA | 3 | | | |
| 103-71-9 | Phenylisocyanate | 198 | | 01/97 | 01/97 | 15 | |
| 103-83-3 | Dimethylbenzylamine | 68 | | 01/97 | 01/97 | 15 | IRS-3 IRSF-3 AP-3 MNT-3 D28-gav-rat-3 D28F-gav-rat-3 |
| 104-12-1 | 4-Chlorophenyl isocyanate | 78 | | 01/97 | 01/97 | 15 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-----------|--------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 104-76-7 | 2-Ethylhexanol | 114 | | 5 | 12/95 | 14 | D14-ihl-rat-3 D90-ihl-rat-3 |
| 104-91-6 | p-Nitrosophenol | 27 a | | 5 | 06/95 | 12 | UDSC-3 CBD-3 MNT-3 D01MHB-gav-cat-3 D28-gav-rat-3 META-3 |
| 105-38-4 | Vinyl propionate | 261 | | 11/00 | 11/00 | 11/00 | SENS-3* |
| 105-39-5 | Chloroacetic acid ethyl ester | 190 | | 2 | 02/92 | 5 | |
| 105-58-8 | Carbonic acid diethyl ester | 183 | | 3 | 10/92 | 7 | |
| 105-67-9 | 2,4-Xylenol | 137 | | 5 (+) | 12/95 (+) | 14 (+) | SENS-3 MNT-3 D05-gav-rat-3 D28-gav-rat-3 |
| 106-20-7 | Di-2-ethylhexylamine | 166 | | 06/00 | 06/00 | 06/00 | D01-ihl-rat-3 ALAR-ihl-mouse-3* |
| 106-43-4 | p-Chlorotoluene | 147 | BUA, MAK | | | | |
| 106-47-8 | p-Chloroaniline | 9 | | 4 | 10/94 | 10 | MNT-3 |
| 106-49-0 | p-Toluidine | 132 | MAK | | | | |
| 106-58-1 | 1,4-Dimethylpiperazine | 283 | MAK | | | | |
| 106-75-2 | Diethylene glycol bis-chloroformic acid ester | 241 | | 3 | 08/93 | 8 | |
| 106-88-7 | 1,2-Butylene oxide | 49 | | 1 | 11/86 | | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------|--------|----------------------------------|--------------|-------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 107-05-1 | Allyl chloride | 189 | MAK | | | | |
| 107-19-7 | Propargyl alcohol | 116 | | 06/00 | 06/00 | 06/00 | MNT-3 D14-ihl-rat-3 D90-ihl-rat-3 |
| 107-21-1 | Ethyleneglycol | 173 | BUA, MAK | 3 | | | |
| 107-22-2 | Glyoxal | 177 | | 01/97 | 01/97 | 12 | UDSV-3 |
| 107-25-5 | Vinylmethylether | 63 | | 2 | 02/92 | 5 | MNT-3 D28-ihl-rat-3 D28F-ihl-rat-3 |
| 107-31-3 | Formic acid methyl ester | 279 | | | | | |
| 108-22-5 | Isopropenyl acetate | 262 | | (+) | (+) | (+) | MNT-orl-mouse-3 D01-ihl-rat-3* D05-ihl-rat-3 D28-ihl-rat-2 |
| 108-41-8 | m-Chlorotoluene | 145 | BUA, MAK | | | | |
| 108-42-9 | 3-Chloroaniline | 44 | | 1 | 11/86 | | A-3 A-3 MNT-3 |
| 108-44-1 | m-Toluidine | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 108-45-2 | m-Phenylenediamine | PAA | | | | | A-3 UDSC-3 MNT-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|-------------------------------------|--------|----------------------------------|--------------|-----------|--------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 108-68-9 | 3,5-Xylenol | 139 | | 5 (+) | 12/95 (+) | 14 (+) | SENS-3 MNT-3 D05-gav-rat-3 D28-gav-rat-3 |
| 108-77-0 | Cyanuric acid chloride | 141 | BUA | 4 | | | |
| 108-80-5 | Cyanuric acid | 103 | | 3 | 10/92 | 7 | |
| 108-88-3 | Toluene | 97 | | | | | TERA-ihl-rbt-3 TERAF-ihl-rbt-3 |
| 109-02-4 | N-Methylmorpholine | 284 | MAK | | | | |
| 109-59-1 | Isopropyl ethylene glycolether | 56 | | 1 | 09/89 | 3 | D28-ihl-rat-3 D28F-ihl-rat-3 TERA-ihl-rbt-3 TERA-ihl-rat-3 |
| 109-61-5 | Chloroformic acid propyl ester | 159 | | (+) | (+) | (+) | AP-3 |
| 109-92-2 | Vinyl ethyl ether | 263 | | 11/00 | 11/00 | 11/00 | |
| 109-99-9 | Tetrahydrofurane | 109 | MAK | | | | |
| 110-01-0 | Tetrahydrothiophene | 29 | | 3 | 10/92 | 7 | AP-3 CTC-3 D28-ihl-rat-3 |
| 110-57-6 | 1,4-Dichlorobutene-2 (trans-isomer) | 14 | | 1 | 11/86 | | |
| 110-63-4 | 1,4-Butanediol | 99 | | 3 | 10/92 | 7 | D01-ihl-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|-------------------------------|--------|----------------------------------|--------------|-----------|--------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 110-65-6 | 2-Butyne-1,4-diol | 117 | | 5 (+) | 02/95 (+) | 10 (+) | CTC-3 SENS-3 D01-ihl-rat-3 D05-ihl-rat-3 D28NT-ihl-rat-3 D01-der-rat-3 D05NT-orl-rat-3 TERA-gav-rat-3 |
| 110-88-3 | Trioxane | 185 | | 3 (+) | 10/92 (+) | 7 (+) | |
| 110-89-4 | Piperidine | 72 | | 11/00 | 11/00 | (+) | MNT-3 D05NT-ihl-rat-3 D28NT-ihl-rat-3 TERA-ihl-rat-3 |
| 110-97-4 | Diisopropanolamine | 178 | | 2 | 05/91 | 4 | |
| 111-40-0 | Diethylenetriamine | 182 | | 3 | 10/92 | 7 | |
| 111-42-2 | Diethanolamine | 158 | | 1 (+) | 05/90 (+) | 2 (+) | SENS-3 D14NT-ihl-rat-3 D90NT-ihl-rat-3 TERA-ihl-rat-3 |
| 111-46-6 | Diethylene glycol | 11 | | 5 | 12/95 | 15 | D28-diet-rat-3 TERA-gav-rbt-3 |
| 111-69-3 | 1,4-Dicyanobutane | 100 | | 1 | 02/89 | 1 | |
| 111-77-3 | Diethylene glycol methylether | 60 | | 3 | 08/93 | 8 | |
| 111-90-0 | Ethyl diglycol | 61 | | 5 | 12/95 | 15 | D01-ihl-rat-3 D05-ihl-rat-3 D28-ihl-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-----------|-------|--------------------------------|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 112-24-3 | Triethylenetetramine | 181 | | 2 | 05/91 | 4 | |
| 115-11-7 | 2-Methylpropene | 104 | | 01/97 | 01/97 | 2 (+) | CBD-ihl-3 META-3 |
| 115-19-5 | 2-Methyl-3-butyn-2-ol | 205 | | 06/00 | 06/00 | 06/00 | |
| 115-96-8 | Tris(2-chloroethyl) phosphate | 33 | | 5 | 12/95 | | A-3 MNT-3 MNT-ip-mouse-3 |
| 118-48-9 | Isatoic acid anhydride | 224 | | 2 | 02/92 | 6 | MNT-3 |
| 118-82-1 | 4,4'-Methylene-bis(2,6-di-tert-butylphenol) | 39 | | 1 | 05/90 | 5 | |
| 118-91-2 | o-Chlorobenzoic acid | 211 | MAK | | | | |
| 118-92-3 | 2-Aminobenzoic acid | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 120-35-4 | 3-Amino-4-methoxybenzanilide | 119 | | (+) | (+) | (+) | MNT-orl-mouse-3* |
| 120-61-6 | Terephthalic acid dimethyl ester | 50 | | 1 (+) | 02/89 (+) | 1 (+) | CTV-3 TERA-gav-rat-3 |
| 120-83-2 | 2,4-Dichlorophenol | 53 | | 1 | 11/86 | | |
| 121-45-9 | Trimethyl phosphite | 172 | MAK | | | | |
| 121-57-3 | 4-Aminobenzenesulfonic acid | 252 | | 3 | 10/92 | 7 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|----------------------|--------|----------------------------------|--------------|-----------|--------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 121-73-3 | m-Chloronitrobenzene | 74 | | 11/00 | 11/00 | (+) | IRS-3 SENS-3 HPRT-3 CTC-3 CTV-3 D01-der-rat-3 D28-gav-rat-3 |
| 122-52-1 | Triethylphosphite | 192 | | 5 | 06/95 | 13 | SENS-3* MNT-3* D28-gav-rat-3* |
| 122-60-1 | Phenylglycidylether | 65 | | 1 | 05/90 | 3 | |
| 122-66-7 | Hydrazobenzene | 19 | | 4 | 10/94 | 10 | |
| 122-80-5 | 4-Aminoacetanilide | 268 | | (+) | (+) | (+) | |
| 123-05-7 | 2-Ethylhexanal | 113 | | 1 (+) | 09/89 (+) | 2 (+) | MNT-orl-mouse-3 ALAR-ihl-mouse-3 D01-ihl-rat-3 D28PP-ihl-rat-3 D28PPF-ihl-rat-3 TERA-orl-rat-3 |
| 123-30-8 | p-Aminophenol | 27 b | | 5 | 12/95 | 15 | |
| 123-38-6 | Propionaldehyde | 207 | | 2 | 05/91 | 6 | |
| 123-51-3 | 3-Methylbutanol-1 | 95 | | 01/97 (+) | 01/97 (+) | 15 (+) | MNT-3 D14-wat-rat-3 D90-wat-rat-3 TERA-ihl-rat-3 TERA-ihl-rbt-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------|--------|----------------------------------|--------------|-----------|-------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 123-54-6 | Acetylacetone | 264 | ICCA | | | | |
| 123-77-3 | Diazene dicarboxamide | 217 | | 3 | 08/93 | 8 | |
| 123-91-1 | Dioxane | 111 | BUA, MAK | 3 | | | |
| 125-12-2 | Isobornyl acetate | 191 | | 4 | 04/94 | 9 | |
| 126-71-6 | Triisobutyl phosphate | 112 | | 11/00 | 11/00 | 11/00 | A-3 IRS-rbt-3 SENS-3 SENS-3* D01-ihl-rat-3 TERA-gav-rat-3 |
| 126-73-8 | Tributyl phosphate | 170 | | 11/00 | 11/00 | 8 (+) | |
| 127-19-5 | Dimethylacetamide | 98 | | | | | TERA-ihl-rbt-3 |
| 128-95-0 | 1,4-Diaminoanthraquinone | 165 | | 2 | 05/91 | 4 | |
| 130-15-4 | 1,4-Naphthoquinone | 45 | | 5 | 12/95 | 14 | CTC-3 CTV-3 HPRT-3 D01-ihl-rat-3* ALAR-ihl-mouse-3* |
| 134-32-7 | α -Naphthylamine | 180 | | 5 | 06/95 | 13 | |
| 135-19-3 | β -Naphthol | 135 | | 5 | 12/95 | 14 | SENS-3* |
| 137-26-8 | Thiram | 59 | | 1 (+) | 05/90 (+) | 3 (+) | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---------------------------------|--------|----------------------------------|--------------|-------|-------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 138-24-9 | Trimethylphenylammoniumchloride | 46 | | 1 | 02/89 | 1 | A-3 HPRT-3 MNT-3 D01-ihl-rat-3 D01CHE-caps-dog-3 |
| 141-97-9 | Acetoacetic acid ethyl ester | 246 | | 06/00 | 06/00 | 06/00 | |
| 142-82-5 | n-Heptane | 134 | MAK | | | | PROJ-3 |
| 149-30-4 | 2-Mercaptobenzothiazole | 70 | | 11/00 | 11/00 | 4 (+) | |
| 149-57-5 | 2-Ethylhexanoic acid | 275 | | 06/00 | 06/00 | (+) | |
| 280-57-9 | Triethylenediamine | 69 | | 5 | 06/95 | 13 | AP-3 MNT-3 IRE-3 SENS-3 SENSF-3 D28-ihl-rat-3 |
| 288-32-4 | Imidazole | 203 | | (+) | (+) | (+) | A-3* MNT-3* |
| 367-51-1 | Sodium thioglycolate | 281 c | MAK | | | | |
| 460-00-4 | 4-Bromofluorobenzene | 128 | | 3 | 08/93 | 8 | A-3 CTC-3 IRS-3 IRE-3 SENS-3 D01-gav-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--------------------------------|--------|----------------------------------|--------------|-----------|--------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 462-06-6 | Fluorbenzol | 126 | | 5 | 06/95 | 13 | IRS-3 MNT-3 D05-ihl-rat-3* D28-ihl-rat-3* |
| 538-75-0 | Dicyclohexylcarbodiimide | 16 | | 1 | 11/86 | | A-3 CTC-3 |
| 541-41-3 | Chloroformic acid ethyl ester | 77 | | 1 (+) | 02/89 (+) | 1 (+) | AP-3 |
| 563-04-2 | m-Tricresyl phosphate | 184 | IPCS | | | | |
| 563-47-3 | β -Methallyl chloride | 176 | MAK | | | | |
| 576-26-1 | 2,6-Xylenol | 138 | | 5 (+) | 12/95 (+) | 14 (+) | SENS-3 MNT-3 D05-gav-rat-3 D28-gav-rat-3 |
| 583-39-1 | 2-Mercaptobenzimidazole | 218 | | 11/00 | 11/00 | 11/00 | |
| 592-34-7 | Chloroformic acid butyl ester | 160 | | (+) | (+) | (+) | AP-3 CTC-3 D05-ihl-rat-3 D28-ihl-rat-3 |
| 592-35-8 | Carbamic acid butyl ester | 273 | | 11/00 | 11/00 | (+) | |
| 598-78-7 | α -Chloropropionic acid | 201 | | 5 | 06/95 | 13 | |
| 616-21-7 | 1,2-Dichlorobutane | 202 | | | | | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---------------------------------|--------|----------------------------------|--------------|-----------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 624-48-6 | Maleic acid dimethylester | 21 | | 1 | 09/89 | 2 | A-3 MNT-3 IRS-3 SENS-3 D01-der-rat-3 D28-der-rat-3 |
| 624-65-7 | Propargyl chloride | 115 | | 4 | 04/94 | 9 | A-3 MNT-3* ALAR-ihl-mouse-3 |
| 625-36-5 | 3-Chloropropanoic acid chloride | 162 | | 06/00 | 06/00 | 06/00 | A-3 CTC-3* ALAR-ihl-mouse-3 |
| 625-45-6 | Methoxyacetic acid | 110 | | 1 (+) | 09/89 (+) | 3 (+) | D05-ihl-rat-3 D28-FERT-ihl-rat-3 |
| 638-38-0 | Manganese (II) acetate | 140 a | MAK | | | | |
| 700-13-0 | 2,3,5-Trimethylhydroquinone | 240 | | 2 (+) | 02/92 (+) | 5 (+) | D14-gav-rat-3 D28-gav-rat-3 |
| 760-23-6 | 3,4-Dichlorobutene-1 | 253 | | 5 | 02/95 | 12 | |
| 762-04-9 | Diethylphosphite | 193 | | 5 | 06/95 | 13 | MNT-3* SENS-3* D28-gav-rat-3* |
| 764-41-0 | 1,4-Dichlorobutene-2 | 14 | | 1 | 11/86 | | |
| 814-71-1 | Calcium thioglycolate | 281 e | MAK | | | | |
| 836-30-6 | 4-Nitrodiphenylamine | 274 | | 4 | 10/94 | 10 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-----------|-------|-----------------------------------|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 838-88-0 | 3,3'-Dimethyl-4,4'-diaminodiphenylmethane | 30 | | 1 | 11/86 | | |
| 868-85-9 | Dimethylhydrogen phosphite | 168 | MAK | | | | |
| 920-37-6 | 2-Chloroacrylonitrile | 38 | | 06/00 | 06/00 | 06/00 | A-3 |
| 923-02-4 | N-Methylolmethacrylamide | 206 | | 3 | 08/93 | 7 | |
| 935-92-2 | Trimethylquinone | 208 | | 1 (+) | 05/90 (+) | 2 (+) | CTV-gav-3* |
| 1241-94-7 | Diphenyl-2-ethylhexyl phosphate | 194 | | 5 | 06/95 | 13 | TERA-orl-rbt-3* D90-orl-rat-3* |
| 1313-13-9 | Manganese dioxide | 102 | | 1 | 02/89 | 1 | |
| 1313-82-2 | Sodium sulfide (anhydrous) | 106 a | MAK | | | | |
| 1314-60-9 | Antimony (V) oxide | 236 b | | 4 | 10/94 | 11 | |
| 1317-61-9 | Iron oxide (Magnetite) | 255 | MAK | | | | |
| 1328-53-6 | Copper phthalocyanine, chlorinated | 229 | | 5 | 06/95 | 12 | |
| 1330-78-5 | Tricresyl phosphate (mixed isomers) | 184 | IPCS | | | | |
| 1476-11-5 | 1,4-Dichlorobutene-2 (cis-isomer) | 14 | | 1 | 11/86 | | |
| 1663-39-4 | tert-Butylacrylate | 200 | MAK | | | | |
| 1738-25-6 | Dimethylaminopropionitrile | 37 | | 4 | 10/94 | 11 | D14-ihl-rat-3 |
| 1747-60-0 | 2-Amino-6-methoxybenzothiazole | 125 | | 5 | 06/95 | 13 | SENS-3 D01-der-rat-3 |
| 1758-68-5 | 1,2-Diaminoanthraquinone | 164 | | 5 | 12/95 | 14 | |
| 1761-71-3 | 4,4'-Diaminodicyclohexylmethane | 15 | | 1 | 11/86 | | A-3 MNT-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|-----------------------------------|--------|----------------------------------|--------------|-----------|--------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 1817-47-6 | p-Nitrocumene | 156 | | 5 | 12/95 | 14 | HPRT-3* MNT-3* SENS-3* D28-diet-rat-3* |
| 1854-26-8 | Dimethyloldihydroxyethylene urea | 230 | | 5 (+) | 06/95 (+) | 12 (+) | A-3* MNT-orl-mouse-3 TERA-gav-rat-3 TERAF-gav-rat-3 |
| 2044-88-4 | 2,4-Dinitromethylaniline | 47 | | 5 | 12/95 | 14 | A-3 CTC-3 IRS-3 IRE-3 D01MHB-cat-3 D01-gav-rat-3 D28-gav-rat-3* |
| 2136-89-2 | o-Chlorobenzotrichloride | 86 | | 4 | 04/94 | 9 | HPRT-3 MNT-3 D01-der-rat-3 SENS-3 |
| 2156-56-1 | Sodium dichloroacetate | 188 b | | (+) | (+) | (+) | |
| 2238-07-5 | Diglycidylether | 66 | | 1 | 09/89 | 3 | |
| 2243-62-1 | 1,5-Naphthalenediamine | 24 | | 1 | 05/90 | 2 | CTC-3 HPRT-3 CBD-3 |
| 2431-50-7 | 2,3,4-Trichlorobutene-1 | 32 | | 1 | 11/86 | | |
| 2524-03-0 | Dimethoxy thiophosphonyl chloride | 265 | | 5 | 06/95 | 13 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|---|--------|----------------------------------|--------------|-----------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 2582-30-1 | Aminoguanidine bicarbonate | 3 | | 01/97 | 01/97 | 15 | AP-3 MNT-3 UDSV-rat-3* D28-gav-rat-3 |
| 2624-17-1 | Monosodium cyanurate | 103 | | 3 | 10/92 | 7 | |
| 2807-30-9 | Ethylene glycol mono propyl ether | 174 | ECETOC, MAK | | | | |
| 3033-62-3 | Bis(2-dimethylaminoethyl)ether | 282 | MAK | | | | |
| 3033-77-0 | Glycidyl trimethyl ammonium chloride | 231 | MAK | | | | |
| 3039-83-6 | Ethene sulfonic acid, sodium salt | 247 | | 4 | 10/94 | 11 | |
| 3302-10-1 | 3,5,5-Trimethylhexanoic acid | 276 | | 06/00 (+) | 06/00 (+) | (+) | |
| 3302-12-3 | 2,2,4,4-Tetramethylpentanoic acid | 276 | | 06/00 (+) | 06/00 (+) | (+) | |
| 3327-22-8 | (3-Chloro-2-hydroxypropyl)trimethyl ammonium chloride | 237 | | 11/00 | 11/00 | 11/00 | |
| 3468-63-1 | 1-(2,4-Dinitrophenylazo)-2-naphthol | 223 | | 11/00 | 11/00 | (+) | |
| 3638-04-8 | 2,4-Dichloro-6-methoxy-1,3,5-triazine | 169 | | 1 | | | |
| 4454-05-1 | 2-Methoxy-2,3-dihydropyran | 266 | | 4 | 04/94 | 9 | HPRT-3 |
| 4635-59-0 | 4-Chlorobutanoic acid chloride | 163 | | 06/00 | 06/00 | 06/00 | CTC-3* ALAR-ihl-mouse-3 D01-ihl-rat-3 D05-ihl-rat-3 D28-ihl-rat-3 |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|--|--------|----------------------------------|--------------|-----------|--------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 4979-32-2 | N,N-Dicyclohexyl-2-benzothiazole sulfenamide | 242 | | 4 | 10/94 | 11 | |
| 5216-25-1 | p-Chlorobenzotrichloride | 87 | | 4 | 04/94 | 9 | |
| 5421-46-5 | Ammonium thioglycolate | 281 b | MAK | | | | |
| 5470-11-1 | Hydroxylamine hydrochloride | 62 | | 11/00 (+) | 11/00 (+) | 6 (+) | |
| 6104-30-9 | Isobutylidenediurea | 204 | | 3 | 08/93 | 8 | MNT-orl-mouse-3 TERA-gav-rbt-3 |
| 6358-64-1 | 2,5-Dimethoxy-4-chloroaniline | 121 | | 4 (+) | 10/94 (+) | 11 (+) | SENS-3* D14-diet-rat-3 D28-gav-rat-3 |
| 6369-59-1 | 2,5-Toluenediamine sulfate | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 6526-72-3 | o-Nitrocumene | 155 | | | | | |
| 7440-55-3 | Gallium | 42 | | | | | |
| 7446-70-0 | Aluminum chloride | 234 d | MAK | | | | |
| 7647-18-9 | Antimony (V) chloride | 236 a | | 4 | 10/94 | 11 | |
| 7659-86-1 | Thioglycolic acid 2-ethylhexyl ester | 83 | | 3 | 08/93 | 8 | A-3 CTC-3 D07-diet-rat-3 D07F-gav-rat-3 D28PP-diet-rat-3 |
| 7681-52-9 | Sodium hypochlorite | 175 | | 2 | 05/91 | 4 | |
| 7722-84-1 | Hydrogen peroxide | 254 | ECETOC | 4 | | | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|------------------------------------|--------|----------------------------------|--------------|-----------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 7727-54-0 | Ammonium peroxydisulfate | 4 | | 4 | 10/94 | 10 | |
| 7758-19-2 | Sodium chlorite | 250 | | (+) | (+) | (+) | CTC-3 |
| 7773-01-5 | Manganese (II) chloride | 140 b | MAK | | | | |
| 7783-06-4 | Hydrogen sulfide | 106 c | MAK | | | | |
| 7784-18-1 | Aluminum fluoride | 234 b | MAK | | | | |
| 7785-87-7 | Manganese (II) sulfate | 140 d | MAK | | | | |
| 7789-09-5 | Ammoniumbichromate | 143 | MAK | | | | |
| 7790-94-5 | Chlorosulfonic acid | 248 | | 5 | 12/95 | 14 | |
| 7791-25-5 | Sulfuryl chloride | 179 | | 06/00 | 06/00 | 06/00 | A-3* |
| 7803-49-8 | Hydroxylamine | 62 | | 11/00 (+) | 11/00 (+) | 6 (+) | |
| 10025-91-9 | Antimony (III) chloride | 235 | | 4 | 10/94 | 11 | |
| 10039-54-0 | Hydroxylamine sulfate | 62 | | 11/00 (+) | 11/00 (+) | 6 (+) | MNT-3 TERA-gav-rat-3 CLT-wat-rat-2* |
| 10043-01-3 | Aluminum sulfate | 234 a | MAK | | | | |
| 10377-66-9 | Manganese (II) nitrate | 140 c | MAK | | | | |
| 10588-01-9 | Sodium bichromate | 142 | MAK | | | | |
| 12042-91-0 | Dialuminum chloride pentahydroxide | 234 d | MAK | | | | |
| 13360-57-1 | Dimethylaminosulfochloride | 17 | | 1 | 11/86 | | |
| 13465-08-2 | Hydroxylamine nitrate | 62 | | 11/00 (+) | 11/00 (+) | 6 (+) | |
| 13473-90-0 | Aluminum nitrate | 234 c | MAK | | | | |
| 13755-29-8 | Sodium tetrafluoroborate | 136 | | 11/00 | 11/00 | 11/00 | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|------------------------------------|--------|----------------------------------|--------------|-----------|-------|---|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 13826-83-0 | Ammonium tetrafluoroborate | 136 | | 11/00 | 11/00 | 11/00 | |
| 14075-53-7 | Potassium tetrafluoroborate | 136 | | 11/00 | 11/00 | 11/00 | IRE-3* D05-gav-rat-3 D28-gav-rat-3 D28F-orl-rat-3 |
| 14324-55-1 | Zinc diethyl dithiocarbamate | 233 | | | | | |
| 14634-93-6 | Zinc ethylphenyl dithiocarbamate | 219 | | 5 | 06/95 | 13 | MNT-3 |
| 14861-17-7 | p-(2,4-Dichlorophenoxy)aniline | 232 | | 3 | 08/93 | 8 | |
| 15096-52-3 | Cryolite | 107 | | 2 (+) | 02/92 (+) | 5 (+) | D01-ihl-rat-3 D14-ihl-rat-3 D14F-ihl-rat-3 D90-ihl-rat-3 CTV-ihl-rat-3 CTV-ihl-rat-3 |
| 15481-70-6 | 2,6-Toluenediamine dihydrochloride | PAA | | | | | A-3 UDSC-2 MNT-3 |
| 16721-80-5 | Sodium bisulfide | 106 b | MAK | | | | CTC-3 CTCF-3 |
| 16872-11-0 | Tetrafluoroboric acid | 136 | | 11/00 | 11/00 | 11/00 | |
| 16987-02-3 | Sodium 2-chloropropionate | 201 | | 5 | 06/95 | 13 | |
| 19429-30-2 | Di-t-butyl tin chloride | 12 | | 1 | 11/86 | | A-3 MNT-3 |
| 20941-65-5 | Tellurium diethyldithiocarbamate | 222 | | 3 | 08/93 | 8 | |
| 21645-51-2 | Aluminum hydroxide | 234 e | MAK | | | | |

| Overview of the status of publications and studies (in order of CAS number) | | | | | | | |
|---|-------------------------------------|--------|----------------------------------|--------------|-----------|-------|--|
| CAS No. | Name of substance | BG No. | Evaluation (if not by BG Chemie) | Publications | | | Studies |
| | | | | K | L | E | |
| 24925-59-5 | Dinonyldiphenylamine | 41 | | | | | |
| 26444-49-5 | Diphenyl cresyl phosphate | 195 | | 06/00 | 06/00 | 5 (+) | MNT-3 D28-gav-rat-3 TERA-gav-rat-3 |
| 26896-18-4 | Isononanoic acid | 276 | | 06/00 (+) | 06/00 (+) | (+) | D05-orl-rat-3 D28-orl-rat-2 |
| 29797-40-8 | Dichlorotoluene (mixed isomers) | 148 | | 5 | 02/95 | | |
| 30618-84-9 | Glyceryl thioglycolate | 281 d | MAK | | | | |
| 31027-31-3 | 4-Isopropyl phenyl isocyanate | 249 | | 3 | 08/93 | 7 | |
| 61702-44-1 | 2-Chloro-p-phenylenediamine sulfate | PAA | | | | | A-3 UDSC-3 MNT-3 |
| 68442-68-2 | Styrenated diphenylamine | 71 | | 5 | 12/95 | 14 | MNT-3 D28-gav-rat-3 |

| Legend to publication codes | |
|------------------------------------|---|
| K | Short version ("Kurzfassung" in German) of TOXIKOLOGISCHE BEWERTUNGEN (booklet number or, in the case of publication on the Internet, original date of printed publication) |
| L | Long version ("Langfassung" in German) of TOXIKOLOGISCHE BEWERTUNGEN (date of publication) |
| E | TOXICOLOGICAL EVALUATIONS published in English (volume number or, in the case of publication on the Internet, date of original German publication) |
| (+) | Up-date or first-time publication soon to be made available on the Internet |
| Legend to the studies | |
| Type of study | |
| A | Ames test |
| AP | Ames test with preincubation |
| ALAR | Alarie test (sensory irritation) |
| CBD | Covalent binding to DNA (adduct formation) |
| CLT | Combined long-term carcinogenicity study |
| CTC | Cytogenetic test in vitro (cultures) |
| CTV | Cytogenetic test in vivo |
| D01 | Acute toxicity study (LD ₅₀ , LC ₅₀) |
| Dnn | Toxicity study with repeated administration (nn = 05 to 90 days) |
| DnnCHE | Cholinesterase inhibition |
| DnnMHB | Methaemoglobin formation |
| DnnNT | Neurotoxicity study (+ Irwin screen) |
| DnnPP | Peroxisome proliferation |
| F | Follow-up study |
| FERT | Fertility study |
| HB | Haemoglobin adduct formation |
| HPRT | Hypoxanthine phosphoribosyl transferase test |
| IRE | Eye irritation study |
| IRS | Skin irritation study |
| META | Metabolism/kinetic study |
| MNT | Micronucleus test |
| PROJ | Project |
| SENS | Sensitisation study |
| TERA | Embryotoxicity/teratogenicity study |
| UDSC | Unscheduled DNA synthesis in vitro |
| UDSV | Unscheduled DNA synthesis ex vivo in vitro |
| Species | |
| cat | Cat |
| dog | Dog |
| gpig | Guinea pig |
| hams | Hamster |
| mouse | Mouse |
| rat | Rat |
| rbt | Rabbit |
| sgh | Syrian gold hamster |

| Legend to the studies | | |
|--|---|----------------|
| Route of administration | | |
| caps | Gelatine capsules | |
| der | Dermal | |
| diet | Diet | |
| gav | Gavage | |
| ihl | Inhalation | |
| ip | Intraperitoneal | |
| orl | Oral | |
| wat | Drinking water | |
| Status | | |
| 1 | Planned | |
| 2 | Contracted | |
| 3 | Finalised | |
| * | Sponsored by the chemical Industry | |
| Examples | | |
| D90NT-orl-rat-2 | 90-day neurotoxicity study, oral, rat: Contracted | |
| TERAF-ihl-rbt-3 | Teratogenicity study (follow-up study), inhalation, rabbit: Finalised | |
| CTC-1* | Cytogenetic test in vitro (cultures): Planned, sponsored by the chemical Industry | |
| Substances in the project “Aromatic Amines” (PAA) | | |
| BG No. | Name of substance | CAS No. |
| | o-Anisidine | 90-04-0 |
| | o-Toluidine | 95-53-4 |
| 10 | 5-Chloro-2-aminotoluene | 95-69-2 |
| 31 | 2,4-Toluenediamine | 95-80-7 |
| | m-Toluidine | 108-44-1 |
| | m-Phenylenediamine | 108-45-2 |
| | 2-Aminobenzoic acid | 118-92-3 |
| | 2,5-Toluenediamine sulfate | 6369-59-1 |
| | 2,6-Toluenediamine dihydrochloride | 15481-70-6 |
| | 2-Chloro-p-phenylenediamine sulfate | 61702-44-1 |

| Legend to the abbreviations for the evaluating organisations | |
|--|---|
| In principle, the BG Chemie was the evaluating organisation. In special cases, there were agreements with other organisations in order to avoid duplication of work. | |
| BUA | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the <i>Beratergremium für Altstoffe</i> (German Advisory Committee on Existing Chemicals of Environmental Relevance). |
| MAK | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the <i>Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der Deutschen Forschungsgemeinschaft</i> (German Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area). |
| ECETOC | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the European Centre for Ecotoxicology and Toxicology of Chemicals, Brussels. |
| DECOS | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the Dutch Expert Committee on Occupational Standards, Rijswijk. |
| IPCS | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the International Programme on Chemical Safety. |
| ICCA | No TOXIKOLOGISCHE BEWERTUNG / TOXICOLOGICAL EVALUATION was prepared by the BG Chemie. Evaluation was conducted by the International Council of Chemical Associations. |