EHS 36/12
6 April 2000
ENGLISH ONLY

WORKING GROUP ON THE
EVALUATION OF THE HAZARDS OF
HARMFUL SUBSTANCES CARRIED BY
SHIPS
36th session
Agenda item 12

# REPORT OF THE THIRTY-SIXTH SESSION

## 1 INTRODUCTION

1.1 The thirty-sixth session of the GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships was held at IMO Headquarters, London, from 3 to 7 April 2000 under the chairmanship of Dr C.T. Bowmer.

1.2 The IMO Technical Secretary of GESAMP, Dr M. Nauke, welcomed the Working Group on behalf of the Director of the Marine Environment Division and on behalf of the Secretary-General of IMO. He informed the Working Group that IMO had not been in a position to include, in its budget proposal for the 2000/2001 biennium, the additional funds requested by the Working Group to cover as anticipated the costs for evaluating within three years the hazards of all products listed in the International Bulk Chemical (IBC) Code. This was due to the "zero nominal growth" condition for the budget requested by several IMO Member States. Whereas some extrabudgetary resources had been allocated by some governments for this work, these were not sufficient to arrange for two meetings per year as had originally been planned by the Working Group. Subsequent to this decision, the Marine Environment Protection Committee of IMO considered a number of options for securing progress in the re-evaluation process, e.g., through the establishment of a correspondence mechanism. The Working Group was also informed that the IMO Council at its 20$^{th}$ extraordinary session, in its report to the IMO Assembly (C/ES 20/10), whilst reluctantly accepting that the current target date for the hazard profile review may have to be set back, agreed that GESAMP shall be requested to continue its work within the restrictions of the resources available. It invited interested parties to consider providing voluntary financial contributions to meet the funding requirement, if the original timeframe was to be met.

1.3 The Working Group expressed its disappointment that IMO could not provide the financial resources necessary to complete the work within the required timeframe especially as they had invested considerable amount of their own time and effort in order to carry out the work.

1.4 Dr Nauke informed the Working Group that he will retire at the end of July 2000, and that Mr John Crayford will take over duties as Secretary of the Working Group. Dr Nauke wished the Working Group every success in its future endeavours.

1.5 The Chairman thanked Dr Nauke for his involvement and support and wished him good luck and health during his forthcoming retirement.

1.6 A list of participants attending the 36th session of the Working Group is shown in annex 1. The agenda for this session, as adopted by the Working Group, is shown in annex 2.

## 2 MATTERS ARISING FROM GESAMP XXIX, IMO AND OTHER ORGANIZATIONS RELEVANT TO THE ACTIVITIES OF THE WORKING GROUP

### GESAMP XXIX

2.1 The Working Group noted that its Chairman and Secretary had informed GESAMP, at its twenty-ninth session in August 1999, of the progress made in re-evaluating the first batch of 65 bulk liquid products listed in the International Bulk Chemical (IBC) Code, according to the revised GESAMP evaluation procedures. However, due to the fact that OECD had recently changed its classification system for irritation/corrosive effects on skin and eye, resulting in incompatibilities between the OECD "harmonized" classification and GESAMP's rating system, the Working Group had not been able to complete the task.

2.2 GESAMP recommended that a panel of experts on the relevant criteria and aspects be established in co-operation with WHO and OECD to consider how a solution could be developed from the scientific viewpoint.

2.3 Rather than arranging for such a tripartite consultation immediately, the Chairman, Secretariat and several expert members of the Working Group, in their efforts to work out a compromise, developed a new conversion table between the OECD and the revised GESAMP rating systems during the intersessional period. Details of this new scheme are identified in section 3 of this report.

2.4 The above developments resulted in a delay in publishing the revised GESAMP Hazard Evaluation Procedure which the Group had requested the Secretariat to arrange as soon as possible. The Working Group considered this question in some detail under section 10 of this report.

### IMO

2.5 The IMO Sub-Committee on Bulk Liquids and Gases at its fourth session, 12-16 April 1999, expressed its opinion that finalization of the GESAMP revised hazard profiles was of paramount importance for the categorization of chemical substances and the revision of MARPOL, Annex II, and it further stressed that priority and resources should be given to the work of the GESAMP EHS Working Group to enable it to finalize revised hazard profiles as soon as possible. Accordingly, the Sub-Committee:

.1 suggested that the GESAMP EHS Working Group should be urged to identify work methods by which the costs for the work could be cut as much as possible, while maintaining its high quality;

.2 urged GESAMP to place the highest priority on the work of the EHS Working Group and consider re-allocating the funds available for other working groups, e.g., the Working Group on Endocrine Disrupting Substances; and

.3 invited Member Governments to provide financial contributions for the work of the EHS Working Group.

**UN**

2.6 The Working Group was informed that for the transport of packaged goods a set of UN model regulations for transport of dangerous goods had been prepared to form the basis of international model regulations. However, revisions would be made to the classification criteria in several areas, including hazards to the environment, in order to align with the Global Harmonized System. The UN Committee of Experts on the Transport of Dangerous Goods would complete its work by December 2002.

2.7 It was expected that, when criteria for substances hazardous to the environment were developed, this would be implemented through a "self classification" system. It remained to be seen whether IMO would accept a system of this nature for the identification of Marine Pollutants under MARPOL 73/78, Annex III, or retain a "list-based" system based on GESAMP hazard profiles, as currently used for the IMDG Code.

2.8 The Secretary informed the Group that requests for the hazard evaluation of packaged goods were still being received, although, because of its other commitments to high priority issues and due to time constraints, the Working Group had not been able to consider them.

## 3 REVIEW OF THE GESAMP HAZARD EVALUATION PROCEDURES RELATING TO COLUMNS D1, D2 AND E3 OF THE REVISED HAZARD PROFILE SCHEME, AND THEIR APPLICATION TO THE REVIEW OF THE FIRST 65 SUBSTANCES COMMENCED AT EHS 35

**Skin and eye irritation, sub-columns D1 and D2**

3.1 During the intersessional period attempts were made by members of the Working Group to develop a scheme for evaluating skin and eye irritation which would allow, compatibility of the revised GESAMP hazard evaluation procedures with the OECD harmonized classification system. In developing the scheme, the Working Group experts emphasized that GESAMP Hazard Profiles had, from their inception, recorded toxicity and effects on a scale from "0" (no effect) to higher numbers, with numerical values increasing as the toxicity of material increased, or the severity of an effect increased. This allowed for ready appreciation, and comparative evaluation, of toxicity and effect.

3.2 Sub-Column D1 on **skin irritation** was developed as follows:

| Rating | Descriptor | Signs |
|---|---|---|
| 0 | Not Irritating | No clinical signs and/or inflammation |
| 1 | Mildly Irritating | Mild erythema with or without oedema (rapidly reversible) |
| 2 | Moderately-Markedly Irritating | Marked erythema; obvious and marked oedema: other signs of local injury (ecchymoses) |
| 3A | Corrosive | Full-thickness skin necrosis by 4-hr occlusion |
| 3B | Corrosive | Full-thickness skin necrosis by 1-hr occlusion |
| 3C | Corrosive | Full-thickness skin necrosis by 3-min occlusion |

3.3 GESAMP ratings 1, 2 and 3A, 3B and 3C would be compatible with OECD classes 3 and 2 and 1C, 1B and 1A respectively. In order to maintain a complete rating scheme, without blanks in the profile to emphasize the absence of any hazards ("not irritating"), the Working Group agreed to keep a zero ("0") in its system.

3.4 Sub-Column D2 on **eye irritation** was developed as follows:

| Rating | Descriptor | Signs |
|---|---|---|
| 0 | Not irritating | No clinical signs of injury or inflammation |
| 1 | Slightly irritating | Reversible mild conjunctival hyperaemia with or without chemosis |
| 2 | Moderately irritating | Marked conjunctival hyperaemia, chemosis, corneal injury - all reversible within 3 weeks |
| 3 | Severe irritation with irreversible corneal injury | Severe conjunctoblepharitis, chemosis, and irreversible corneal injury (may be accompanied by deformity, ulceration, and neovascularisation) |

3.5 GESAMP ratings 1, 2 and 3 are compatible with OECD classes 2a, 2 and 1 respectively. As in Sub-Column D1, it was felt appropriate to include a zero ("0") for "not irritating" in the GESAMP rating scheme.

**Sub-Column D3: Specific health concerns**

3.6 This Sub-Column D3 had been intended to address specific organ or tissue toxicity and long-term and repeated exposure toxicity, including chronic, exposure-related, adverse health effects. As examples the Working Group had particularly mentioned persistent acute toxic effects, carcinogenicity, developmental and reproductive toxicity, mutagenicity and immune mediated responses, including skin, respiratory and photo-induced sensitization. The Working Group recalled that it had originally agreed that the presence of the above concerns should be indicated with a "YES" in D3.

3.7 However, the Working Group, after consideration of the mechanism of inclusions in Sub-Column D3 and of the nature of the effects in Column F, agreed that Sub-Column D3 should be left out, thus streamlining the profile system, without losing any of the relevant information.

**Effects on Marine Wildlife and on Sensitive Habitats: Sub-Column E2**

3.8 The Working Group agreed that all ratings describing the physical behaviour of substances discharged at sea as noted within the framework of the Agreement for Co-operation in Dealing with Pollution of the North Sea by Oil and Other Harmful Substances, 1983 (Bonn Agreement 1983), shall be set out in sub-column E2 rather than in the remarks column F.

**Coastal Amenities: Sub-Column E3**

3.9 The Working Group after reviewing the rating criteria of sub-column E3, agreed that the "Relative Interferences" and their ratings 0, 1, 2 and 3 should remain as originally proposed (EHS 34/12, annex 4, paragraph 2.5.7). Several members of the Working Group undertook to prepare guidance for allocating ratings in this respect.

**Remarks: Column F**

3.10 The Secretary informed the Working Group that IMO's ESPH Working Group had requested GESAMP to identify those specific health concerns set out in the remarks column which could cause long-term effects and accordingly should be taken into account by IMO for the establishment of pollution categories of bulk cargoes.

3.11 The Working Group emphasized that all its remarks were significant and should be taken into account particularly regarding their potential implications for occupational health and hygiene on board ships. The toxicologists of the Working Group nevertheless undertook to prepare a review of the significance of column F remarks, identifying those which from the environmental viewpoint were of less serious nature, for consideration of the Working Group at its next session.

## 4 IDENTIFICATION OF STEPS NECESSARY TO FULLY IMPLEMENT THE NEW HAZARD EVALUATION PROCEDURE AND ITS APPLICATION

4.1 At its thirty-fifth session, the Working Group evaluated the first 65 substances according to the revised GESAMP hazard evaluation procedure. While all the columns for this first group of substances are not yet complete, due to final changes to the rationale (see above, columns D1 and D2, and E3,), valuable experience has been gained with the development of ratings in the new columns.

4.2 During this session, the work of revising the MARPOL 73/78, Annex II substances in accordance with the revised GESAMP hazard evaluation procedure, was aided by a prototype database. This was used to combine the Secretariat's summaries of the industry data contained in the IMO files with the considerable amount of new data from the open literature for Columns A and B (Bioaccumulation, biodegradation and aquatic toxicity). As a result, the work on revising these columns proceeded at a rate of ca. 50 substances per day.

4.3 The Working Group recognised that the role of the Secretariat in summarising the files is considerable and essential to the updating of the hazard profiles. The Working Group considered it necessary to prepare the data for all columns in the same way using an electronic database, in order to complete the task in a timely manner.

4.4 Sufficient resources should be made available to the Secretariat to enable the completion of a permanent secretariat database structure by the end of 2000. This would be essential in maintaining the pace of work. Once a database was available, the members could then adapt their data gathering activities accordingly, saving much administrative time and improving efficiency. It should be recalled that MEPC at its 43rd session recommended the use of electronic media as a means to speed up the revision of the GESAMP hazard profiles according to the new procedure.

4.5 The Secretariat, in co-operation with some members, agreed to approach national administrations collectively with a view to finding additional resources for the work of completing and filling the database. The Group agreed to draft a proposal in this regard.

4.6 The Working Group, recalling that at its 35th session it had evaluated substances on both the basis of the old GESAMP Hazard Profile System and the new hazard evaluation procedures, agreed that in future only hazard profiles according to the new evaluation procedures shall be assigned. This was due to the high priority given to its current review. However, if there were specific requests to amend the old hazard profiles, the Working Group would do so.

## 5 EVALUATION OF NEW SUBSTANCES FOR MARINE TRANSPORT IN BULK

5.1 The following new substances were considered by the Working Group:

Antiblaze 80 (TN)
Glycolic acid
Hitec 3000 (TN)
*d*-Limonene
Mobilad G252 (TN)
Rapeseed oil fatty acid, methyl ester
Sorbitan monooleate
Terate products. (TN)
Thixatrol Plus (TN)

5.2 In some cases information in the form of back-up reports or data essential for the work of the group was missing from the proposals. In such instances no ratings or profiles were ascribed and the applicants would be asked to submit the necessary data or test reports as appropriate.

5.3 Where the Working Group ascribed ratings to the above substances these are to be found in annex 3.

## 6 REVIEW OF A FURTHER 150 SUBSTANCES CURRENTLY CARRIED IN BULK

6.1 The following progress was achieved:

| Columns | Criteria | Number considered | | Comments | Total |
|---|---|---|---|---|---|
| | | EHS 35 | EHS 36 | | |
| A1 & A2 | Bioaccumulation & Biodegradation | 65 | 140 | The remaining 15 to be completed by correspondence | 205 |
| B1 & B2 | Acute & chronic aquatic toxicity | 65 | 140 | Ditto | 205 |
| C1 to C3 | Acute mammalian toxicity: peroral, percutaneous & inhalation | 65 | 60 | | 125 |

| | | | | | |
|---|---|---|---|---|---|
| D1 and D2 | Skin and eye irritation & corrosion | 0 | 60 | Procedure revised at EHS 36 to harmonise with OECD system | 60 |
| D3 | Specific health concerns | | | *Deleted* | |
| E1 | Tainting of seafood | 0 | 0 | No new data vaialable | 0 |
| E2 | Effects on wildlife & bottom habitats (persistent floating & sinking substances) | 65 | 155 | Solubility, Vapour pressure, Viscosity, Specific gravity | 220 |
| E3 | Interference with coastal amenities (closing of beaches) | 0 | 60 | Related to C & D | 60 |
| F | Remarks (specify) | 65 | 60 | | 125 |

6.2 During the review of these 155 substances it became apparent that much more data were available than had been in previous decades and that many of the ratings would become even more reliable through this review process.

6.3 However, it was evident, that for some substances, there were very few data available either in the files at IMO or in the scientific literature. In some cases, this was found to be true for whole groups of related chemicals, e.g. coal tars, creosotes, coal tar naphtha and related distillates. Such chemicals had generally been evaluated several decades ago and often on the basis of scant information compared with today's standards.

6.4 Moreover, many complex chemicals of natural origin are difficult to test and the test results obtained are difficult to interpret as the individual components of the complex chemical may behave differently as the test conditions. Also the assessment of the hazard of a spill is difficult as even small fractions of very toxic components constitute a potential risk to aquatic organisms.

6.5 One member of the Working Group undertook to co-ordinate a missing data list and to assist the Secretariat in communicating with industry to find ways of obtaining the necessary information. The regional Branch Associations of chemical industries in North America, Japan and Europe were being approached to assist in providing missing data. The Group agreed to monitor the activities of the joint US Environmental Protection Agency – Chemicals Manufacturers Association High Production Volume Chemicals (HPVC) testing programme, as well as the CEFIC Enhanced Chemicals Management Programme and the European Union HPVC Risk Assessment Programme in Europe, with the aim of accessing data as these became available.

## 7 CORRESPONDENCE WITH THE CHEMICAL INDUSTRY

7.1 The Working Group considered requests for review of certain aspects of a number of products in the Composite List as raised by the following. It also considered information received back as a result of its requests to industry for information:

Albemarle Corporation
Aristech Chemical Corporation
Arizona Chemicals / HARRPA (Hydrocarbon and Rosin Resin Producers Association)
Cytec Industries Inc.
Directorate of Ports and Coasts, Rio de Janeiro
Dupont
Hüls Infracor GmbH.

7.2 The following substances were considered by the Working Group:

2,6-Di-*tert*-butylphenol
Diphenylamine (molten)
Ethoxylated tallowamine
1,6-Hexanediol, distillation overheads
Polyalkyl($C_{10}$-$C_{18}$) methacrylate / ethylene-propylene copolymer mixture
Polyether glycols
Tall oil crude and distilled
Tall oil fatty acids (resin acids <2%).

7.3 In some cases the information received was found to be inadequate for the purposes of the Working Group. In such cases the shortcomings would be identified to the companies and these would be asked to re-submit the necessary information. The hazard profiles of these substances are to be found in annex ..

## 8 CHEMICALS OF PARTICULAR INTEREST OR CONCERN

### Animal and Vegetable oils and their oleochemical derivatives

8.1 The Working Group noted that the Secretariat had collaborated with the animal and vegetable oil industry with a view to assisting it in collating the required data (for these products and their derivatives). This work was ongoing and active progress had been made by the industry in summarising the necessary information for submission to the Working Group.

### Review of pesticides

8.2 The Working Group recalled that work on this issue had been suspended in favour of the priority review of the hazard profiles of the bulk cargoes undertaken at the request of IMO.

### Polyester polyols

8.3 The Secretariat informed the Working Group that information and data are being prepared by the industry for submission to the Working Group.

### Coal Tar, Wood Tar, Tall Oil and their derivatives

8.4 The Chairman requested the members of the Working Group to collect data and information on the wide range of substances covered by the generic groups noted above. This would require approaches to relevant chemical manufacturers association.

## 9 REVIEW OF MEMBERSHIP OF THE WORKING GROUP

The Chairman noted that the scientific disciplines involved in the hazard evaluation process at this meeting were well represented in the Working Group. However, the Chairman also emphasized that some strengthening of the aquatic toxicity section of the Group seemed to be appropriate.

## 10 FUTURE WORK PROGRAMME AND DATE OF THE NEXT SESSION

### Data and Information

10.1 The Chairman welcomed the fact that several members of the Working Group declared their readiness to provide, during the forthcoming intersessional period, additional data and background material in support of ratings completed during this session, as well as information highlighting certain aspects of the revised hazard evaluation procedure.

10.2 In reviewing the progress achieved during this session, members of the Working Group emphasized that this would not have been achieved without the preparatory work carried out during the intersessional period by Mr. N. Soutar. IMO was requested to ensure the provision of continuing support for Mr Soutar's work.

10.3 The Chairman reiterated his view that the Secretariat should, in addition to Mr. Soutar's hard copy compilations, develop a comprehensive database collating the relevant technical data available at IMO and the hazard information that is available through other international, regional and national databases. This would facilitate data handling by the individual members of the Working Group and the quick distribution of relevant results.

10.4 The Secretariat was requested to co-operate with the Chairman in his preparation of a draft text for publication of the revised hazard evaluation procedure, including developments and achievements in this field since 1972 when the work started to facilitate the effective implementation of MARPOL 73/78, Annex II.

10.5 The Secretariat would distribute the draft text to the members of the Working Group for their comments. The revised evaluation procedures would be published before the end of the year 2000.

10.6 The Secretariat was further requested to prepare a "homework list" summarizing the tasks each member undertook to carry out during the intersessional period.

### Date of Next Session

10.5 The Working Group agreed that the thirty-seventh session of the Working Group should be convened from 30 April to 4 May 2001.

## 11 ANY OTHER BUSINESS

11.1 The Chairman informed the Working Group of the role of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), particularly its role in the international harmonization process. The Programme had been established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and OECD, following recommendations made in 1992 by UNCED, to strengthen co-operation and increase international co-ordination in the field of chemical safety.

Other UN organizations have joined IOMC with a view to promoting co-ordination of their policies and activities to achieve the sound management of chemicals in relation to human health and the environment.

11.2 The Working Group requested its Secretary to informally investigate the possibility of IMO joining the inter-organization programme with a view to exchanging chemical information.

**Ballast Water Screening Test**

11.3 The Working Group was informed by the Secretariat of current developments within the framework of ballast water management at IMO. These included the development of provisions for ballast water control with a view to minimizing the risk of transferring harmful organisms and pathogens with ballast water on board ships. A number of techniques were being developed and tested, including the use of rapidly degrading chemicals which kill organisms in ballast water. A benchmark test for the evaluation of the efficacy of chemical ballast water treatment options had been submitted, and the Working Group was requested to comment on the test procedure.

11.4 The Working Group reviewed the proposal briefly and noted that it would require some time to consider the matter more fully. The environmental management of chemicals, including biocides is achieved with reference to a range of 'benchmark' tests in case, e.g. fish, crustaceans and microalgae. The Working Group was undecided whether yet another new test (even though much research was carried out on the suggested species Artemia salina in the 1970's and 1980's) offered any significant advantages at a point in time where international bodies are attempting to harmonize chemicals evaluation on a global scale. It might be better to explore well known, regulatory tests first that are readily available at a wide range of commercial laboratories, e.g.

## 12 CONSIDERATION AND ADOPTION OF THE REPORT

The Chairman closed the session on Friday, 7 April 2000 at 17.00. He expressed his sincere thanks to the members of the Working Group for the hard work carried out both intersessionally and during this session.

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# ANNEX 1

## LIST OF MEMBERS ATTENDING THE THIRTY-SIXTH SESSION OF THE WORKING GROUP

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## ANNEX 2

## AGENDA FOR THE THIRTY-SIXTH SESSION OF THE WORKING GROUP

1 Adoption of the agenda

2 Matters arising from GESAMP XXIX, IMO and other organizations relevant to the activities of the Working Group

3 Review of the GESAMP hazard evaluation procedures relating to columns D1, D2 and E3 of the revised Hazard Profile scheme and their application to the review of the first 65 substances commenced at EHS 35

4 Identification of steps necessary to fully implement the new hazard evaluation procedure and its application

5 Evaluation of new substances proposed for bulk carriage by ships

6 Review of a further 150 substances currently carried in bulk

7 Correspondence with the chemical industry

8 Chemicals of particular interest or concern

9 Review of membership of the Working Group

10 Future work programme and date of the next session

11 Any other business

12 Consideration and adoption of the report

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# ANNEX 3

## Products discussed during the meeting

*16-May-00*

**Sorted by Lead Name**



| | --- Existing GHP ----- | | | | | ---------- Revised GESAMP Hazard Profile (GHP) system ---------- | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NAME** | **EHS** | **A** | **B** | **C** | **D** | **E** | **A1a** | **A1b** | **A2** | **B1** | **B2** | **C1** | **C2** | **C3** | **D1** | **D2** | **D3** | **E1** | **E2** | **E3** | **F** | **Last Update** |
| Benzyl acetate | 348 | 0 | 2 | 1 | I | 0 | 1 | NI | R | 3 | 1 | 1 | 0 | 2 | 1 | 1 | | 0 | 0 | 1 | | 01/04/00 |
| Benzyl alcohol | 349 | 0 | 2/BOD | 1 | I | XX | 1 | NI | R | 2 | NI | 1 | 1 | 2 | 2 | 2 | | 0 | 0 | 2 | | 01/04/00 |
| Benzyl chloride | 352 | 0 | 3 | 1 | II | XXX | NI | 1 | R | 3 | 1 | 1 | NI | 3 | 2 | 3 | Yes | 0 | S | 3 | Lachrymator; Aspiration hazard | 01/04/00 |
| Bromochloromethane | 2084 | 0 | 1 | 1 | I | X | 1 | 1 | NR | 1 | NI | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | | 01/04/00 |
| Butene oligomer | 386 | 0 | 3 | 0 | 0 | 0 | NI | NI | NI | 3 | NI | 0 | 0 | 0 | 0 | 1 | | 0 | | 0 | | 01/04/00 |
| Butyl acetate | 387 | 0 | 2 | 0 | I | X | 1 | NI | R | 2 | NI | 0 | 0 | 2 | 0 | 1 | | 0 | 0 | 1 | | 01/04/00 |
| Butyl acrylate | 390 | 0 | 3 | 1 | II | XXX | 2 | NI | R | 3 | NI | 1 | 1 | 2 | 1 | 1 | Yes | 0 | 0 | 3 | Lachrymator; Potent skin sensitizer; Aspiration hazard | 01/04/00 |
| Butylamine | 392 | 0 | 2 | 2 | II | XXX | 0 | NI | R | 2 | NI | 2 | 2 | 3 | 3C | 3 | Yes | 0 | 0 | 3 | Potent lachrymator; Aspiration hazard | 01/04/00 |
| Butyl benzyl phthalate | 398 | Z | 4 | 1 | 0 | X | 4 | 4 | R | 4 | 1 | 0 | 0 | 0 | 0 | 0 | | 0 | S | 0 | | 01/04/00 |
| Butyl butyrate | 399 | T | (2) | 0 | I | XX | 2 | NI | NI | 2 | NI | 0 | 0 | (0) | 1 | NI | | Tt | 0 | 1 | Tested for tainting | 01/04/00 |
| Butylene glycol(s) | 402 | 0 | 1/BOD | 0 | 0 | 0 | 0 | NI | R | 1 | NI | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | | 01/04/00 |
| 1,2-Butylene oxide | 403 | 0 | 2 | 1 | I | X | 0 | NI | NR | 2 | NI | 1 | 1 | 2 | 1 | 1 | | 0 | 0 | 1 | | 01/04/00 |
| Butyl methacrylate | 409 | 0 | 1 | 0 | I | XX | 2 | NI | NR | 1 | NI | 0 | 0 | 0 | 1 | 1 | Yes | 0 | 0 | 2 | Skin sensitizer | 01/04/00 |
| Butyl propionate | 1483 | T | 2 | 0 | I | X | 2 | NI | R | 2 | NI | 0 | 0 | 0 | 1 | 1 | | Ta | 0 | 1 | | 01/04/00 |
| Butyl stearate | 413 | 0 | 0 | 1 | 0 | 0 | 0 | NI | NI | 0 | NI | 0 | NI | NI | NI | NI | | 0 | 0 | NI | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Butyraldehyde | 416 | T | 2 | 1 | I | XX | 1 | NI | R | 2 | 0 | 0 | 1 | 0 | 1 | 2 | | Ta | 0 | 2 | | 01/04/00 |
| Butyric acid | 418 | 0 | 1 | 1 | II | XX | 0 | NI | R | 2 | 0 | 0 | 1 | 0 | 3A | 3 | | NT | 0 | 3 | Tested for tainting | 01/04/00 |
| Butyrolactone | 420 | 0 | 0 | 1 | II | XXX | 0 | NI | R | (3) | NI | 1 | (0) | 0 | 0 | 1 | Yes | 0 | 0 | 3 | Animal carcinogen | 01/04/00 |
| Calcium alkyl (long chain) salicylate (overbased) in mineral oil (LOA) | 70 | 0 | 2 | 0 | I | XX | NI | NI | nr | 2 | NI | 0 | 0 | NI | (1) | (1) | | 0 | Fp | 2 | | 01/04/00 |
| Calcium alkyl phenol sulphide,polyolefin phosphorosulphide mixture (LOA) | 1435 | 0 | 4 | 0 | I | XX | NI | NI | NR | 4 | NI | 0 | 0 | (0) | NI | NI | | 0 | | 2 | | 01/04/00 |
| Calcium carbonate slurry | 2016 | 0 | D | 0 | 0 | 0 | Inorg | 0 | Inorg | 1 | NI | 0 | NI | NI | 1 | 2 | | 0 | S | 2 | | 01/04/00 |
| Calcium hydroxide | 431 | 0 | 1 | 0 | I | 0 | Inorg | 0 | Inorg | 1 | | 0 | NI | NI | 1 | 2 | | 0 | S | 2 | | 01/04/00 |
| Calcium hypochlorite solutions containing 15% Ca(OCl)2 or more | 432 | 0 | 3 | 1 | II | XX | Inorg | 0 | Inorg | 5 | NI | 1 | 0 | 1 | 3A | 3 | | 0 | 0 | 3 | | 01/04/00 |
| Calcium hypochlorite solutions containing less than 15% but more than 1.5% Ca(OCl)2 | 2073 | 0 | 2 | 1 | II | XX | Inorg | 0 | Inorg | 4 | NI | 1 | 0 | 1 | 3A | 3 | | 0 | 0 | 3 | | 01/04/00 |
| Calcium lignosulphonate (52% solution in water) | 2087 | 0 | 0 | 1 | 0 | 0 | 0 | NI | NR | 0 | NI | 0 | NI | NI | 0 | 0 | | 0 | 0 | 0 | | 01/04/00 |
| Calcium long chain alkaryl sulphonate (C11-C50) (LOA) | 1973 | 0 | 0 | 0 | I | XX | NI | 0 | NR | 1 | NI | 0 | 0 | NI | NI | NI | | 0 | Fp or S | 2 | | 01/04/00 |
| Calcium long chain alkyl phenate sulphide (C8-C40) (LOA) | 1756 | 0 | 1 | 0 | I | XXX | NI | NI | NR | 0 | NI | 0 | 0 | 3 | NI | NI | | 0 | Fp or S | 3 | | 01/04/00 |
| Calcium nitrate | 1803 | 0 | 0 | 1 | I | X | | | | 0 | | 0 | NI | NI | 1 | 1 | | 0 | | 1 | | 01/04/00 |
| Calcium nitrate/ Magnesium nitrate/Potassium chloride solution | 1734 | 0 | 0 | 1 | I | X | Inorg | 0 | Inorg | 1 | 0 | 0 | NI | NI | NI | 1 | | 0 | 0 | 1 | | 01/04/00 |
| Camphor oil, white | 1897 | T | (3) | 2 | 0 | XX | | | | (3) | | 2 | NI | NI | 1 | NI | | Ta | 0 | 2 | | 01/04/00 |
| Caprolactam | 436 | 0 | 1 | 1 | I | XX | 0 | NI | R | 1 | 0 | 1 | 1 | 4 | 1 | 2 | | 0 | | 2 | | 01/04/00 |
| Caprolactam aqueous solution | 2216 | | | 1 | I | XX | | | | | | 1 | 1 | 2 | 1 | 2 | | | | 2 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carbolic oil | 437 | T | 3 | 2 | II | XX | 3 | NI | NI | 3 | NI | | | | | | | Ta | S | 2 | Rated as cresols | 01/04/00 |
| Carbon disulphide | 439 | 0 | 2 | 3 | II | XXX | 2 | 1 | NR | 3 | NI | 2 | NI | 4 | 3A | 2 | | NT | 0 | 3 | Teratogen; Tested for tainting | 01/04/00 |
| Cashew nut shell oil | 443 | 0 | 0 | 0 | I | XX | 0 | NI | NI | NI | NI | | | | | | | 0 | Fp | 2 | | 01/04/00 |
| Cetyl/Eicosyl methacrylate (mixture) | 445 | 0 | 0 | 0 | I | X | 0 | NI | | NI | | | | | | | | 0 | Fp | 1 | | 01/04/00 |
| Chlorinated paraffins (C10-C13) with 60% chlorine or more | 2021 | + | 4 | 0 | II | XX | 5 | 5 | NR | 5 | 2 | | | | | | Yes | 0 | S | 2 | Epigenetic carcinogen;additional hazards if organotin compounds used as stabilizer | 01/04/00 |
| Chlorinated paraffins (C10- C13) with less than 60% chlorine | 2020 | + | 4 | 0 | II | XX | 5 | 5 | NR | 5 | 2 | | | | | | Yes | 0 | S | 2 | Epigenetic carcinogen. Additional hazards if organotin compounds used as stabilizer | 01/04/00 |
| Chlorinated paraffins (C14-C17) with less than 1% shorter chain length | 2112 | 0 | 0 | 0 | 0 | XX | 0 | | | | | | | | | | | 0 | S | 2 | Additional hazard if organotin compounds used as stabilizer | 01/04/00 |
| Chloroacetic acid | 450 | 0 | 2 | 2 | II | XX | 0 | NI | R | 2 | 0 | 2 | 3 | (4) | 3C | 3 | Yes | 0 | 0 | 3 | Lachrymator; Aspiration hazard | 01/04/00 |
| Chlorobenzene | 456 | 0 | 3 | 1 | 0 | X | 2 | 2 | NR | 3 | 0 | 1 | 0 | 1 | 2 | 0 | 2 | 0 | S | 2 | | 01/04/00 |
| Chlorohydrins | 463 | 0 | (2) | 2 | II | XX | 0 | NI | R | 0 | NI | | | | | | Yes | 0 | 0 | 3 | Animal carcinogen, Methaemoglobin generator | 01/04/00 |
| Chloronitrobenzenes | 467 | Z | 3 | 2 | II | XX | 2 | 2 | NR | 3 | NI | 2 | 2 | NI | 1 | 1 | | 0 | S | 2 | | 01/04/00 |
| 2-Chloropropionic acid | 474 | 0 | 2 | 1 | II | XX | 0 | NI | R | 1 | NI | 1 | (3) | 2 | 3A | 3 | | 0 | 0 | 3 | | 01/04/00 |
| Chlorosulphonic acid | 479 | 0 | 2 | 3 | II | X | Inorg | 0 | Inorg | 2 | NI | 1 | 0 | 2 | 1 | 1 | | 0 | 0 | 1 | | 01/04/00 |
| m-Chlorotoluene | 481 | Z | 2 | (1) | I | X | 3 | NI | NR | 2 | NI | 2 | 0 | NI | 1 | 1 | | 0 | S | 1 | | 01/04/00 |
| o-Chlorotoluene | 480 | T | 3 | 1 | I | X | 3 | 3 | NR | 3 | 1 | 0 | 0 | 0 | 1 | 1 | | Ta | S | 1 | | 01/04/00 |
| p-Chlorotoluene | 482 | Z | 3 | 1 | I | X | 3 | 3 | NR | 3 | 0 | | | | | | | 0 | S | 1 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Choline chloride, solutions | 485 | 0 | 1 | 1 | 0 | 0 | 0 | NI | R | 1 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Citric acid | 493 | 0 | 1/BOD | 0 | 0 | 0 | 0 | NI | R | 1 | 0 | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Clay | 495 | 0 | 0/D | 0 | 0 | 0 | Inorg | 0 | Inorg | 0 | 0 | | | | | | | 0 | S | 0 | | 01/04/00 |
| Coal slurry | 498 | 0 | 0/D | 0 | 0 | X | Inorg | 0 | Inorg | 0 | 0 | | | | | | | 0 | S | 1 | | 01/04/00 |
| Coal tar | 499 | T | 3 | - | II | XXX | NI | NI | NR | 3 | | | | | | | Yes | Ta | S | 3 | Human carcinogen;Phototoxic | 01/04/00 |
| Coal tar naphtha | 500 | T | 2 | 1 | II | XXX | NI | NI | NR | 3 | NI | | | | | | Yes | Ta | 0 | 3 | Human carcinogen | 01/04/00 |
| Coal tar pitch (molten) | 491 | 0 | 1 | - | II | XXX | NI | NI | NR | NI | NI | | | | | | Yes | 0 | S | 3 | Human carcinogen;Phototoxic | 01/04/00 |
| Cobalt naphthenate in solvent naphtha | 501 | T | 3 | 1 | II | XXX | NI | NI | NR | 3 | NI | | | | | | Yes | Ta | S | 3 | Human carcinogen | 01/04/00 |
| Coconut oil fatty acid | 505 | 0 | 2 | - | - | - | 4 | 0 | NI | 0 | NI | | | | | | | 0 | F | NI | | 01/04/00 |
| Coconut oil fatty acid methyl ester | 506 | 0 | 0 | - | - | - | 5 | 0 | NI | 0 | NI | | | | | | | 0 | F | NI | | 01/04/00 |
| Creosote (coal tar) | 524 | T | 3 | 1 | II | XXX | NI | NI | NR | 5 | NI | | | | | | Yes | Ta | S | 3 | Human carcinogen;Phototoxic | 01/04/00 |
| Creosote (wood tar) | 525 | T | 3 | 2 | II | XXX | NI | NI | NR | NI | NI | | | | | | Yes | Ta | | 3 | | 01/04/00 |
| Cresols (mixed isomers) | 527 | T | 3 | 2 | II | XXX | 2 | 2 | R | 3 | 0 | | | | | | | Tt | 0 | 3 | Tested for tainting | 01/04/00 |
| Cresylic acids, dephenolized | 1875 | T | 3 | 1 | II | XXX | 2 | 2 | R | 3 | 0 | | | | | | | Ta | 0 | 3 | | 01/04/00 |
| Crotonaldehyde | 528 | 0 | 4 | 2 | II | XX | 0 | NI | NR | 3 | 1 | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| 1,5,9-Cyclododecatriene | 534 | + | 4 | 1 | II | XXX | 5 | 5 | NR | 4 | NI | | | | | | Yes | 0 | F | 3 | Skin sensitizer | 01/04/00 |
| Cycloheptane | 535 | 0 | 3 | (1) | II | X | 4 | NI | NI | 3 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Cyclohexane | 536 | 0 | 3 | 1 | II | X | 3 | 3 | NR | 3 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Cyclohexanol | 537 | 0 | 2 | 1 | II | XX | 1 | NI | R | 2 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Cyclohexanone | 539 | 0 | 1 | 1 | II | XX | 0 | 1 | R | 1 | 0 | | | | | | | 0 | 0 | 2 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyclohexanone/Cyclohexanol mixture | 1436 | 0 | 1 | 1 | II | XX | 1 | 1 | R | 2 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Cyclohexyl acetate | 541 | 0 | (3) | 0 | II | XX | 2 | NI | (R) | (2) | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Cyclohexylamine | 542 | 0 | 2 | 2 | II | XXX | 1 | NI | R | 2 | NI | | | | | | Yes | 0 | 0 | 3 | Lachrymator; Aspiration hazard | 01/04/00 |
| 1,3-Cyclopentadiene dimer (molten) | 545 | T | 3 | 2 | II | XXX | 3 | 3 | NR | 3 | NI | | | | | | Yes | Ta | F | 3 | Lachrymator | 01/04/00 |
| Cyclopentane | 546 | 0 | 3 | (1) | I | X | 3 | NI | NR | 3 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Cyclopentene | 547 | 0 | (3) | 1 | 0 | 0 | 2 | NI | NI | 3 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Decahydronaphthalene | 551 | 0 | (1) | 1 | 0 | X | 4 | 4 | NR | 3 | NI | | | | | | | 0 | F | 1 | | 01/04/00 |
| Decanoic acid | 555 | 0 | 2 | 0 | II | XX | 4 | NI | (NR) | 4 | NI | | | | | | | 0 | F | 2 | | 01/04/00 |
| 1-Decene | 558 | 0 | 3 | (1) | 0 | 0 | 5 | NI | NI | NI | NI | | | | | | | 0 | F | 0 | | 01/04/00 |
| Decyl acetate | 1767 | 0 | (3) | 0 | I | X | | | | | | | | | | | | 0 | F | 1 | | 01/04/00 |
| Decyl acrylate | 559 | 0 | 4 | 1 | I | X | 5 | NI | NI | 5 | NI | | | | | | | 0 | Fp | 1 | | 01/04/00 |
| Decyloxytetrahydrothiophene dioxide | 1859 | 0 | 4 | 0 | I | XX | 3 | NI | NI | 4 | NI | | | | | | | 0 | Fp | 2 | | 01/04/00 |
| Diacetone alcohol | 563 | 0 | 1 | 1 | I | X | 0 | NI | R | 1 | 0 | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Dibromomethane | 574 | 0 | 2 | 2 | I | X | 1 | NI | NR | (2) | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Di-n-butylamine | 577 | 0 | 2 | 2 | II | XX | 2 | NI | R | 3 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Di-butyl ether | 578 | 0 | 2 | 0 | I | X | 3 | 3 | NR | 2 | NI | 0 | 0 | 0 | 1 | 1 | | 0 | 0 | 1 | | 01/04/00 |
| Dibutyl hydrogen phosphonate | 1857 | 0 | 2 | 1 | II | XXX | 1 | NI | NI | 2 | NI | | | | | | Yes | 0 | 0 | 3 | Severe irritant; Aspiration hazard | 01/04/00 |
| 2,6-Di-tert-butyl phenol | 2082 | - | 4 | 0 | I | X | | | | 4 | | 0 | 0 | NI | 1 | 1 | | NI | | 1 | | 01/04/00 |
| m-Dichlorobenzene | 586 | Z | 3 | 1 | I | X | 3 | 3 | NR | 3 | 1 | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| 3,4-Dichlorobut-1-ene | 2079 | 0 | 3 | 1 | II | XX | 2 | 2 | NR | 3 | NI | | | | | | | 0 | S | 2 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 590 | 0 | (1) | 1 | 0 | 0 | 1 | NI | NR | 1 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| 1,6-Dichlorohexane | 593 | Z | 3 | 1 | 0 | 0 | 3 | NI | NI | 3 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Dichloromethane | 594 | 0 | 1 | 1 | II | XX | 1 | 2 | NR | 1 | 0 | | | | | | Yes | 0 | 0 | 2 | Animal carcinogen | 01/04/00 |
| 2,4-Dichlorophenol | 596 | T | 3 | 1 | II | XX | 3 | 2 | R | 3 | 2 | | | | | | | Tt | S | 2 | Tested for tainting | 01/04/00 |
| 2,4-Dichlorophenoxyacetic acid, diethanolamine salt, solution | 599 | T | 3 | 1 | II | XX | 0 | 1 | R | 3 | NI | | | | | | | Ta | 0 | 2 | | 01/04/00 |
| 2,4-Dichlorophenoxyacetic acid, dimethylamine salt, 70 % or less solution | 600 | T | 3 | 1 | II | XX | 0 | 1 | R | 3 | NI | | | | | | Yes | Tt | 0 | 2 | Sensitizer;Tested for tainting | 01/04/00 |
| 2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt soln. | 602 | T | 3 | 2 | II | XX | 0 | 1 | R | 3 | NI | | | | | | | Ta | 0 | 2 | | 01/04/00 |
| 1,1-Dichloropropane | 605 | 0 | 2 | 0 | I | X | 2 | 1 | NR | 2 | 1 | | | | | | | 0 | S | 1 | | 01/04/00 |
| 1,2-Dichloropropane | 606 | 0 | 2 | 1 | II | XX | 2 | 1 | NR | 2 | 1 | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| 1,3-Dichloropropane | 607 | 0 | 1 | (1) | I | X | 2 | 1 | NR | 2 | 1 | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Dichloropropane and dichloropropene, mixture | 608 | 0 | 3 | 2 | II | XX | 2 | 1 | NR | 4 | 1 | | | | | | Yes | 0 | 0 | 2 | Animal carcinogen | 01/04/00 |
| 1,3-Dichloropropene | 612 | 0 | 3 | 2 | II | X | 1 | NI | NR | 4 | 1 | | | | | | Yes | 0 | 0 | 1 | Animal carcinogen | 01/04/00 |
| 2,2-Dichloropropionic acid | 609 | 0 | 1 | 1 | II | X | 2 | 2 | NR | 2 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Di-(2-chloro-iso-propyl) ether | 615 | 0 | 2 | 2 | I | XX | 2 | 2 | NR | 2 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Diethanolamine | 620 | 0 | 1 | 1 | II | XX | 0 | NI | R | 1 | 0 | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Diethylamine | 621 | 0 | 2 | 2 | II | XXX | 0 | NI | R | 2 | NI | | | | | | Yes | 0 | 0 | 3 | Lachrymator; Aspiration hazard | 01/04/00 |
| 2,6-Diethylaniline | 1437 | 0 | 2 | 1 | II | X | 3 | 3 | NR | 2 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Diethyl benzene (mixed isomers) | 624 | T | 3 | 1 | I | X | 4 | 4 | NR | 3 | NI | | | | | | | Ta | F | 1 | | 01/04/00 |
| Di-(2-ethylbutyl) phthalate | 625 | 0 | 0 | 0 | 0 | XX | 5 | NI | R | 0 | 2 | | | | | | | 0 | 0 | 2 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diethylene glycol | 628 | 0 | 0 | 2 | I | XX | 0 | NI | R | 0 | 0 | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Diethylene glycol di-n-butyl ether | 629 | 0 | 1 | 1 | I | X | 2 | NI | NI | 1 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Diethylene glycol diethyl ether | 630 | 0 | 0 | 1 | I | X | 0 | NI | NR | 0 | NI | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| Diethylene glycol phthalate | 1438 | 0 | 1 | 0 | 0 | 0 | NI | NI | NR | 1 | NI | | | | | | | 0 | S | 0 | | 01/04/00 |
| Diethylene triamine | 638 | 0 | 1 | 1 | II | XX | 0 | 1 | (R) | 2 | NI | | | | | | Yes | 0 | 0 | 2 | Skin sensitizer | 01/04/00 |
| Diethylenetriamine pentaacetic acid, pentasodium salt (40% solution in water) | 2076 | 0 | 0 | 1 | 0 | 0 | 0 | NI | NR | 0 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Diethyl ethanolamine | 622 | 0 | 2 | 1 | II | XX | 0 | NI | NR | 3 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Diethyl ether | 640 | 0 | 0 | 1 | I | XX | 0 | 1 | NR | 0 | NI | | | | | | | 0 | | 2 | | 01/04/00 |
| Di-(2-ethylhexyl) adipate | 641 | 0 | 0 | 0 | II | XX | 0 | 2 | R | 4 | 2 | | | | | | Yes | 0 | Fp | 2 | Male reproductive toxicity; Carcinogen | 01/04/00 |
| Di-(2-ethylhexyl) phosphoric acid | 643 | 0 | 2 | 1 | I | X | (2) | 1 | NR | 2 | NI | | | | | | | 0 | Fp | 1 | | 01/04/00 |
| Diethyl phthalate | 648 | 0 | 2 | 1 | II | X | 3 | 3 | R | 2 | 0 | | | | | | | 0 | S | 1 | | 01/04/00 |
| Diethyl sulphate | 649 | 0 | (2) | 1 | II | XXX | 1 | NI | (NR) | (2) | NI | | | | | | Yes | 0 | 0 | 3 | Animal carcinogen | 01/04/00 |
| Diglycidyl ether of Bisphenol A | 653 | 0 | 3 | 0 | II | XX | 3 | NI | NR | 4 | NI | | | | | | Yes | 0 | S | 2 | Testicular toxicity | 01/04/00 |
| Diglycidyl ether of Bisphenol F | 728 | 0 | 3 | 0 | II | XX | 2 | NI | NI | 3 | NI | | | | | | Yes | 0 | S | 2 | Testicular toxicity | 01/04/00 |
| Diheptyl phthalate | 655 | 0 | 0 | (0) | 0 | XX | 0 | 2 | R | 0 | NI | | | | | | | 0 | Fp | 2 | | 01/04/00 |
| Di-n-hexyl adipate | 656 | 0 | 3 | 0 | 0 | XX | 5 | NI | (NR) | 5 | | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| 1,4-Dihydro-9,10-dihydroxy anthracene disodium salt (soln.) | 657 | 0 | 1 | 0 | 0 | 0 | 1 | NI | NI | 1 | NI | | | | | | | 0 | 0 | 0 | | 01/04/00 |
| Diisobutylamine | 576 | 0 | (2) | 2 | II | XX | 2 | NI | R | 3 | NI | | | | | | | 0 | 0 | 2 | | 01/04/00 |
| Diisobutyl ketone | 579 | 0 | 2 | 1 | I | X | 3 | NI | R | 2 | NI | | | | | | | 0 | F | 1 | | 01/04/00 |
| Diisobutyl phthalate | 581 | 0 | 3 | 0 | 0 | X | 4 | NI | R | 4 | 1 | | | | | | Yes | 0 | S | 1 | Male reproductive toxicity | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diisononyl adipate | 690 | 0 | 0 | 0 | 0 | XX | 0 | NI | NI | 0 | NI | | | | | | | 0 | Fp | 2 | | 01/04/00 |
| Diisooctyl phthalate | 693 | 0 | 0 | 0 | II | XX | 0 | 4 | (NI) | 0 | 0 | | | | | | Yes | 0 | Fp | 2 | Testicular toxicity; Animal carcinogen | 01/04/00 |
| Diisopropanolamine | 703 | 0 | 2 | 0 | I | X | 0 | NI | NR | 1 | NI | | | | | | | 0 | F | 1 | | 01/04/00 |
| Diisopropylamine | 705 | 0 | 2 | 3 | II | XXX | 1 | NI | NR | 2 | 0 | | | | | | Yes | 0 | 0 | 3 | Lachrymator; Aspiration hazard | 01/04/00 |
| Diisopropylnaphthalene, mixed isomers | 712 | + | 3 | 1 | I | XX | 5 | 4 | NR | (3) | NI | | | | | | | 0 | Fp | 2 | | 01/04/00 |
| Dimethyl acetamide | 658 | 0 | 0 | 1 | II | XX | 0 | NI | R | 1 | NI | | | | | | | 0 | | 2 | | 01/04/00 |
| Dimethyl adipate | 659 | 0 | 3 | 0 | I | 0 | 1 | NI | NI | 4 | NI | | | | | | | 0 | | 0 | | 01/04/00 |
| Dimethylamine (40-50% aq.sol.) | 661 | 0 | 2 | 2 | II | XX | | | | 2 | | | | | | | Yes | 0 | 0 | 2 | Aspiration hazard | 01/04/00 |
| Dipentene | 686 | T | 2 | 1 | I | X | 4 | NI | R | 2 | 0 | | | | | | | Ta | | 1 | | 01/04/00 |
| Diphenylamine (molten) | 2186 | 0 | 3 | 0 | I | X | | | | 3 | | 0 | 0 | NI | 1 | 1 | | 0 | | 1 | Methaemoglobin generator | 01/04/00 |
| d-Limonene | 2217 | 0 | 4 | 0 | 1 | X | 4 | NI | R | 4 | NI | 0 | 0 | NI | 1 | 1 | | | | 1 | | 01/04/00 |
| Ethoxylated tallowamine | 2182 | 0 | 3 | 1 | 1 | XX | | | NR | 3 | NI | 1 | 0 | NI | 1 | 2 | | 0 | | 2 | | 01/04/00 |
| Glycolic acid | 2218 | 0 | 1 | 1 | II | XXX | 0 | 0 | R | 1 | NI | 1 | * | 2 | 3C | 3 | | | | 3 | *Not tested due to corrosivity | 01/04/00 |
| 1,6-Hexanediol, distillation overheads | 2143 | 0 | 2 | 1 | I | XX | 4 | NI | NI | 2 | NI | 0 | 0 | 2 | 1 | 2 | | NI | | 2 | | 01/04/00 |
| Hitec 3000 | 2213 | - | 4 | 2 | I | XXX | NI | NI | NR | 4 | NI | 2 | 3 | 4 | 1 | 1 | | | | 3 | | 01/04/00 |
| Isobutyl methacrylate | 408 | 0 | 1 | 0 | I | XX | 2 | NI | NR | 1 | NI | | | | | | Yes | 0 | | 2 | Skin sensitizer | 01/04/00 |
| Isobutyraldehyde | 417 | T | 2 | 1 | II | XX | | | | 2 | | 0 | 0 | 0 | 1 | 2 | | Ta | | 2 | | 01/04/00 |
| Isodecanol | 557 | T | 3 | 0 | II | X | 3 | NI | R | 3 | NI | | | | | | | Ta | Fp | 1 | | 01/04/00 |
| Isopropyltoluenes | 549 | T | 4 | 1 | I | X | 4 | 4 | (NR) | 3 | NI | | | | | | | Ta | 0 | 1 | | 01/04/00 |
| L-Lysine solution (50% or less) | 2199 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | R | 1 | 0 | 0 | 0 | 0 | 1 | NI | | NI | 0 | 0 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Magnesium nitrate | 1811 | 0 | 0 | 0 | I | X | | | | 0 | | 0 | NI | NI | 1 | 1 | | 0 | | 1 | | 01/04/00 |
| MCPA (ISO) | 111 | 0 | 2 | 1 | 0 | 0 | | | | 2 | | 1 | 0 | 2 | 1 | 1 | | 0 | S | 1 | | 01/04/00 |
| 2-Methyl-4-chlorophenoxyacetic acid, diethylamine salt solution | 1538 | 0 | 2 | 2 | I | XXX | 2 | NI | NI | 2 | NI | | | | | | Yes | 0 | | 3 | Sensitizer; Lachrymator | 01/04/00 |
| Mobilad G252 | 2214 | - | - | 0 | 0 | 0 | | | | | | 0 | 0 | NI | 0 | 0 | | | 0 | 0 | | 01/04/00 |
| Octene (all isomers) | 1079 | 0 | 3 | 0 | I | X | | | | 3 | | | | | | | | 0 | 0 | 1 | | 01/04/00 |
| OLOA 224 | 1728 | 0 | 0 | 0 | I | 0 | NI | NI | NR | 0 | NI | | | | | | | 0 | Fp | 0 | | 01/04/00 |
| Poly alkyl(C10-C18) methacrylate/ethylene-propylene copolymeer mixture | 2201 | 0 | 0 | 0 | 1 | XX | 0 | 0 | NR | 0 | 0 | 0 | 0 | NI | 1 | 1 | | NI | Fp | 2 | Aspiration hazard | 01/04/00 |
| Polyether glycol (mw 1350-1450) | 2149 | - | - | 0 | I | XX | | | | NI | | NI | NI | NI | 1 | 1 | | NI | | 1 | Stabilized with 2,6-di-tert-butyl-p-cresol which may enhance aquatic toxicity | 01/04/00 |
| Polyether glycol (mw 1900-2100) | 2150 | - | - | 0 | I | XX | | | | NI | | NI | NI | NI | 1 | 1 | | NI | | 1 | | 01/04/00 |
| Polyether glycol (mw 2825-2975) | 2151 | - | - | 0 | I | XX | | | | NI | | NI | NI | NI | 1 | 1 | | NI | | 1 | Stabilized with 2,6-di-tert-butyl-p-cresol which may enhance aquatic toxicity | 01/04/00 |
| Polyether glycol (mw 600-700) | 2147 | 0 | 3 | 0 | I | X | 2 | NI | NI | 3 | NI | 0 | NI | NI | 1 | 1 | | NI | | 1 | Stabilized with 2,6-di-tert-butyl-p-cresol which may enhance aquatic toxicity | 01/04/00 |
| Polyether glycol (mw 950-1050) | 2148 | 0 | 3 | 0 | I | XX | | | | 3 | | 0 | NI | NI | 1 | 1 | | 0 | | 1 | Stabilized with 2,6-di-tert-butyl-p-cresol which may enhance aquatic toxicity | 01/04/00 |
| Potassium chloride | 1513 | 0 | 0 | 2 | I | 0 | | | | 0 | | 1 | (0) | NI | NI | 1 | | 0 | | 0 | | 01/04/00 |
| Rape seed oil fatty acid, methyl ester | 2209 | 0 | 0 | 0 | I | X | 0 | 0 | R | 0 | NI | 0 | (0) | NI | 1 | 1 | | | F | 1 | | 01/04/00 |
| Sorbitan monooleate | 2215 | 0 | 3 | 0 | 0 | 0 | (5) | NI | R | 3 | NI | 0 | NI | NI | 0 | 0 | | | Fp | 0 | | 01/04/00 |
| sym-Dichlorodiethyl ether | 588 | T | 2 | 2 | I | XX | 1 | 1 | NR | 1 | 0 | | | | | | | Tt | 0 | 2 | Tested for tainting. | 01/04/00 |
| Tall oil, crude and distilled | 1285 | 0 | 3 | 0 | I | XX | | | | 3 | | 0 | NI | NI | 1 | 1 | Yes | 0 | | 1 | | 01/04/00 |

| NAME | EHS | A | B | C | D | E | A1a | A1b | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 | F | Last Update |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tall oil fatty acid (resin acids less than 2%) | 1287 | 0 | 0 | 0 | II | XX | 0 | 0 | R | 0 | NI | 0 | NI | NI | 1 | 1 | | 0 | | 1 | | 01/04/00 |
| Tetrachloromethane | 1296 | Z | 2 | 1 | II | XX | 2 | 2 | NR | 3 | 0 | 0 | 0 | 0 | 1 | 1 | Yes | 0 | S | 3 | Animal carcinogen, Teratogen, Hepatotoxic, Nephrotoxic, Narcosis | 01/04/00 |
| Thixatrol plus | 2210 | - | - | 0 | - | - | | | | | | 0 | 0 | NI | NI | NI | | | | NI | | 01/04/00 |
| Trichloromethane | 1328 | 0 | 2 | 2 | II | XX | 1 | 1 | NR | 2 | 0 | 2 | 0 | 2 | 1 | 1 | Yes | 0 | 0 | 3 | Animal carcinogen | 01/04/00 |
| Tris (monochloropropyl) phosphate | 2212 | 0 | 2 | 1 | I | XX | 2 | 1 | NR | 2 | NI | 1 | 0 | 2 | 1 | 1 | | | | 2 | | 01/04/00 |

APPENDIX TO ANNEX 3

ABBREVIATED LEGEND TO THE EXISTING HAZARD PROFILES

**Column A - Bioaccumulation and Tainting**

| | |
|---|---|
| + | Bioaccumulated to significant extent and known to produce a hazard to aquatic life or human health |
| Z | Bioaccumulated with attendant risk to aquatic organisms or human health, however with short retention of the order of one week or less |
| T | Liable to produce tainting of seafood |
| O | No evidence to support one of the above ratings (+, Z, T) |

**Column B - Damage to living resources**

| **Ratings** | | **96 hr LC50** |
|---|---|---|
| 5 | Extremely toxic | less than 0.01 mg/l |
| 4 | Highly toxic | less than 1 mg/l |
| 3 | Moderately toxic | 1-10 mg/l |
| 2 | Slightly toxic | 10-100 mg/l |
| 1 | Practically non-toxic | 100-1000 mg/l |
| 0 | Non-hazardous | greater than 1000 mg/l |
| D | Substance likely to blanket the sea-bed | |
| BOD | Substance with oxygen demand | |

**Column C - Hazard to human health by oral intake**

| **Ratings** | | **LD50** (laboratory mammal) |
|---|---|---|
| 4 | Highly hazardous | less than 5 mg/kg |
| 3 | Moderately hazardous | 5-50 mg/kg |
| 2 | Slightly hazardous | 50-500 mg/kg |
| 1 | Practically non-hazardous | 500-5000 mg/kg |
| 0 | Non-hazardous | greater than 5000 mg/kg |

**Column D - Hazard to human health by skin and eye contact or inhalation**

II Hazardous (severe irritation, strong sensitizer, lung injury, percutaneous toxicity, carcinogenic, or other specific long-term adverse health effect)

I Slightly hazardous (mild irritation, weak sensitizer)

0 Non-hazardous (non-irritant, not a sensitizer)

**Column E - Reduction of amenities**

XXX Highly objectionable because of persistency, smell or poisonous or irritant characteristics; as a result contaminated beaches liable to be closed; also used when there is clear evidence that the substance is a human carcinogen or that the substance has the potential to produce other serious specific long-term adverse health effects in humans.

XX Moderately objectionable because of the above characteristics, but short-term effects leading only to temporary interference with use of beaches; also used when there is credible scientific evidence that the substance is an animal carcinogen but where there is no clear evidence to indicate that the material has caused cancer in humans, or when there is evidence from laboratory studies that the substance could have the potential to produce other serious specific long-term adverse health effects.

X Slightly objectionable, non-interference with use of beaches

0 No problem

Ratings in brackets, ( ), indicate insufficient data available to the GESAMP experts on specific substances, hence extrapolation was required.

N Not applicable (e.g. if gases)

\- Indicate data were not available to the GESAMP Working Group

**Note**: The descriptive terms such as highly toxic, non-hazardous, etc., were used by the original panel for the purposes of the 1973 International Conference on Marine Pollution. They have no particular significance in terms of hazard posed outside the particular circumstances addressed by that Conference and IMO, i.e. marine pollution as a consequence of discharges or spillages from ships.

ABBREVIATED LEGEND TO THE REVISED HAZARD PROFILE SYSTEM

**Column A1 - Bioaccumulation**

0 - No potential to bioaccumulate
(*log Pow <1 or >ca7, or molecular weight >700; no measurable BCF*)

1 - Very low potential to bioaccumulate
(*log Pow 1 - <2; BCF 1 - <10*)

2 - Low potential to bioaccumulate
(*log Pow 2 - <3; BCF 10 - <100*)

3 - Moderate potential to bioaccumulate
(*log Pow 3 - <4; BCF 100 - <500*)

4 - High potential to bioaccumulate
(*log Pow 4 - <5; BCF 500 - <4, 000*)

5 - Very high potential to bioaccumulate
(*log Pow >5; BCF >4, 000*)

**Column A2 - Biodegradation**

R - Readily Biodegradable

NR - Not Readily Biodegradable

**Column B1 - Acute Aquatic Toxicity ($LC_{50}$, $EC_{50}$ or $IC_{50}$)**

0 - Non-toxic
(*> 1000 mg/l*)

1 - Practically non-toxic
(*100 - 1000 mg/l*)

2 - Slightly toxic
(*10 - 100 mg/l*)

3 - Moderately toxic
(*1 - 10 mg/l*)

4 - Highly toxic
(*0.1 - 1 mg/l*)

5 - Very highly toxic
(*0.01 - 0.1 mg/l*)

6 - Extremely toxic
(*< 0.01 mg/l*)

**Column B2 - Chronic Aquatic Toxicity, No Effect Concentration (NOEC)**

| | | |
|---|---|---|
| 0 | - | Low chronic toxicity (*NOEC > 1 mg/l*) |
| 1 | - | Moderate chronic toxicity (*NOEC 0.1 - 1 mg/l*) |
| 2 | - | High chronic toxicity (*NOEC 0.01 - 0.1 mg/l*) |
| 3 | - | Very high chronic toxicity (*NOEC 0.001 - 0.01 mg/l*) |
| 4 | - | Extremely high chronic toxicity (*NOEC < 0.001 mg/l*) |

**Column C1 - Acute mammalian oral toxicity ($LD_{50}$ mg/kg)**

| | | |
|---|---|---|
| 0 | - | > 2000 |
| 1 | - | > 300 to $\leq$ 2000 |
| 2 | - | >50 to $\leq$ 300 |
| 3 | - | >5 to $\leq$ 50 |
| 4 | - | $\leq$ 5 |

**Column C2 - Acute mammalian dermal toxicity ($LD_{50}$ mg/kg)**

| | | |
|---|---|---|
| 0 | - | > 2000 |
| 1 | - | > 1000 to $\leq$ 2000 |
| 2 | - | >200 to $\leq$ 1000 |
| 3 | - | >50 to $\leq$ 200 |
| 4 | - | $\leq$ 50 |

**Column C1 - Acute mammalian inhalation toxicity ($LC_{50}$ mg/l/4h)**

| | | |
|---|---|---|
| 0 | - | > 20 |
| 1 | - | > 10 to $\leq$ 20 |
| 2 | - | >2 to $\leq$ 10 |
| 3 | - | >0.5 to $\leq$ 2 |
| 4 | - | $\leq$ 0.5 |

**Column D1 Skin Irritation**

Under development

**Column D2 - Eye Irritation**

Under development

**Column D3 - Specific Health Concerns**

| | | |
|---|---|---|
| Yes | - | Specific health concerns identified in column F |
| blank | - | No specific health concerns have been identified BUT this does not mean that there are not any. |

**Column E1 - Tainting of seafood**

| | | |
|---|---|---|
| T | - | The substance has been tested for tainting of seafood and found to taint at concentrations at or below 1 mg/l. |
| (T) | - | Evidence exists that tainting may occur (e.g. due to chemical analogy with known tainting substances, organoleptic properties, data from spillages resulting in tainting of seafood). |
| NT | - | The substance has been tested for tainting and found not to taint below 1 mg/l.. |

**Column E2 - Effects on marine wildlife and on benthic habitats**

| | | |
|---|---|---|
| F | - | Floating substance, not likely to evaporate or to dissolve quickly. |
| Fp | - | Persistent slick forming substance. |
| S | - | Sinking substance that would deposit on the seabed, not likely to dissolve quickly. |

**Column E3 - Interferences with coastal amenities**

| | | | |
|---|---|---|---|
| 0 | - | None | No action required. |
| 1 | - | Slightly objectionable | A warning may be issued but no interference with amenities expected and hence no closure required. |
| 2 | - | Moderately objectionable | A warning should be issued and possible partial closure of amenities due to short-term physical hazards or minor health effects. |
| 3 | - | Highly objectionable | A warning should be issued leading to closure of amenities because of physical hazards or serious potential adverse health effects. |

**Column F - Remarks**

This column includes specific remarks related to the chemical that are not reflected in the other columns.

**General**

In cases where sufficient data are not available, or where the information submitted for evaluation is of poor or suspect quality, the note "NI" (No Information available) is included in the respective column of the hazard profile.

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