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WORKING GROUP ON THE EVALUATION
OF THE HAZARDS OF HARMFUL
SUBSTANCES CARRIED BY SHIPS

38th session
Agenda item 11

REPORT OF THE THIRTY-EIGHTH SESSION

1 INTRODUCTION

1.1 The thirty-eighth 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 22 to 26 April 2002 under the chairmanship of Dr C.T. Bowmer. The list of members attending this session is shown in annex 1 and the approved agenda is shown in annex 2.

1.2 On behalf of the Secretary-General of IMO and the Marine Environment Division, Mr Crayford welcomed Members to the thirty-eighth session.

1.3 It was noted that, in his opening remarks to MEPC, the Secretary-General had made specific reference to the work being undertaken by the Group in the re-evaluation of the hazards of products transported in bulk by sea under the revised GESAMP Hazard Evaluation Procedure. The Group noted that both the Secretary-General and MEPC had recognized the hard work required to complete this task, which was of particular importance in allowing IMO to meet its obligations resulting from the 1992 UNCED Conference.

1.4 The Group also noted that the *Independent and in-depth evaluation of GESAMP*, which had been requested by the Executive Director of UNEP and sponsored by the eight Sponsoring Organizations of GESAMP, had been completed and Published under IMO reference Pub.482/01. It was noted that this review had indicated that GESAMP fulfilled an important function and that its opinions and advice were held in great esteem. However it was also noted that the review of GESAMP indicated that its methods of work needed to be updated.

1.5 In this context, the Group noted that the United Kingdom had submitted a document to MEPC 47 in which the following two issues were raised:

.1 on completion of the re-evaluation of products subject to the IBC Code and Annex II of MARPOL 73/78, the related work of BLG and GESAMP/EHS would need to be reviewed, particularly regarding the liaison with the GHS; and

.2 the relationship between DSC, Annex III of MARPOL 73/78 and the GHS would need to be reviewed.

1.6 As a result of these issues being raised, the Group noted that MEPC had requested GESAMP/EHS to indicate how it could liaise most effectively with the UN Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) in order to ensure that GHS takes IMO's interests into account and IMO can respond to GHS developments appropriately.

1.7 The Group were also informed that, whilst MEPC had stressed the importance of its work, concern had been expressed that IMO had been unable to provide the necessary financial resources to allow its work to be completed

1.8 As a result, the Group noted that, recognizing the importance of the EHS Group to IMO, MEPC had indicated that the future reporting relationship of this Group, through GESAMP to IMO may have to be reviewed.

2 REPORT OF *AD HOC* MEETINGS OF THE MAMMALIAN TOXICOLOGY, THE ENVIRONMENTAL TOXICOLOGY AND THE PHYSICAL PROPERTY SUB-GROUPS

2.1 Report of the *ad hoc* meeting of the Mammalian Toxicology Sub-Group

2.1.1 The Group noted that an *ad* hoc meeting of the Mammalian Toxicology Sub-Group of the Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships (EHS) had been held at IMO Headquarters, London, from 6-10 August 2001.

2.1.2 The Group also noted that the Netherlands Government had generously financed this meeting in order to expedite the revision of Annex II to MARPOL 73/78. Whilst recognizing that the primary objective of this meeting had been to evaluate a predetermined list of IBC Code products, the Sub-Group took the opportunity to consider other important issues.

Evaluation of products listed in the IBC Code

2.1.3 The Group noted that the Mammalian Toxicology Sub-Group had evaluated 176 products, although it was recognised that not all of these were identified in the IBC Code as some other related products were considered in order to generate a meaningful evaluation for the IBC Code entries. The results of these evaluations are shown as part of the consolidated list of products evaluated by the Group at this session and the three sub-groups, which had met since EHS 37.

Consideration of the data provided by the Animal/Vegetable Oils Industry for evaluation

2.1.4 The Group noted that the Mammalian Toxicologists had considered a range of data associated with triglycerides derived from vegetables, animals and fish with the intention of trying to develop one Hazard Profile to cover them all.

2.1.5 It was noted that, during the discussions on this subject, the Mammalian Toxicologists had taken note of the data provided by FOSFA and took account of human experience gained in using or consuming these products. However, these discussions had raised the following questions which the Secretariat had been instructed to relay to the industry:

.1 are the products transported in bulk the same as those reaching the consumer or are they refined first;

.2 **Soyabean Oil** – is this correctly described as a carcinogen?

.3 **Palm Oil, Palm Olein and Palm Stearin** – Two different CAS numbers are used to describe these products but the associated description is the same. Whilst the different names suggest differing compositions can more details be provided?

.4 **Rapeseed Oil** – the impurities present in this product suggest that it may have toxic effects such as irritation, sensitisation and growth abnormalities, which are not reflected in the properties provided. Can the industry provide more details?

.5 **Rapeseed Oil/Canola Oil** – In the light of point 4, can the industry provide more information on the differences between the two products?

.6 **Olive Oil and Palm Kernel Oil** – can the industry confirm that the oral toxicity value provided is not correct as it appears to be the intra-venous toxicity?

.7 **Castor Oil** – Can the industry provide more information on the purity of this product, when shipped, particularly with regard to the ricin content?

2.1.6 Notwithstanding these questions, the Sub-Group had developed provisional evaluations, based on the data provided, with the intention of amending them as necessary, when further information became available.

2.1.7 Having developed provisional evaluations for these products, the Sub-Group had expressed its concern that, for such high volume products there was very little measured data available. It was agreed that, whilst it was possible to make certain assessments based on human experience for these products, this may not be possible for their derivatives such as the fatty acids, their esters and epoxides.

2.1.8 Having noted the outcome of the Sub-Group on this issues, the Group recognized that the evaluation of certain products, including vegetable oils is complex as the properties of the product being transported may differ from those of the product once it has been released into the environment when such changes as oxidation may take place causing the product to exhibit such properties as sensitisation.

2.1.9 Recognizing that the properties of such products can be influenced by a wide variety of factors and that, to take these into account would require the development of a *Risk Assessment Programme*, the Group agreed that it should maintain its current approach of evaluating the hazards of the product normally being transported but, where changes were known to occur which would lead to other associated hazardous properties, these would be referred to in the Remarks column (f) of the Hazard Profile (see GESAMP Reports and Studies 64, p. 68).

Consideration of criteria for assigning ratings to column E3

2.1.10 The Group noted that the Mammalian Toxicologists had refined the descriptive criteria for assigning ratings to column E3 of the revised GESAMP Hazard Profiles which had subsequently been incorporated in GESAMP Reports and Studies Number 64.

Consideration of the points made by the external reviewers of Reports and Studies 64

2.1.11 The Group noted that the Mammalian Toxicologists had considered the remarks made by the external reviewers of GESAMP Reports and Studies 64 on those aspects related to their expertise and had made consequential proposals for amending the document which had been included in the final report

2.2 Report of the *ad hoc* meeting of the Aquatic Toxicology Sub-Group

2.2.1 The Group noted that an *ad* hoc meeting of the aquatic toxicology sub-group of the Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships (EHS) was held at in Tokyo, from 5 to 9 November 2001.

2.2.2 The Group noted that this meeting had been generously financed by the Japanese Environment Ministry and hosted by E&E Solutions Inc., Environment and Energy Consultants, in order to expedite the revision of Annex II to MARPOL 73/78.

Animal, Vegetable and Marine Triglycerides

2.2.3 Whilst recognizing that the primary objective of the meeting was to evaluate a predetermined list of IBC Code products, the Group noted that the aquatic toxicologists had also given special consideration to a range of data associated with Animal, Vegetable and Marine Oils during which the following questions were raised and subsequently relayed to the industry:

.1 the proposed name and the footnote included on the main datasheet suggests that other, as yet unnamed oils, may be included. However, the Sub-Group agreed that a full list of the oils, intended for carriage under this name, should be provided to GESAMP as soon as possible;

.2 the composition of each oil intended for bulk marine transport should include:

.1 the percentage of saturated and unsaturated triglycerides with their chain lengths, particularly for those products with alkyl chain lengths of C14 and shorter;

.2 the actual percentage of free fatty acids per oil;

.3 the percentage of triglyceride related components (e.g. secondary alcohols) i.e. those structures other than true triglycerides; and

.4 the percentage and nature of any other impurities, e.g. as a result of processing etc.

.3 the environmental data contained in the submission on *Vegetable, animal and marine oils* consisted of a short report on the general environmental properties of such compounds. The submission implied that sufficient data are available to support the proposed broad entry. However, the Sub-Group expressed its concern that the potential hazards of such a diverse group of compounds might not be covered by the data submitted and made the following comments:

.1 *Column A1, Bioaccumulation:* the GESAMP working group agreed that bioaccumulation is unlikely for the oils mentioned in the submission and may therefore be prepared to accept a rating of '0' in column A for an appropriate grouping of such oils. Possible exceptions are those containing triglycerides with C14 and shorter alkyl chains, where free fatty acids may be present;

.2 *Column A2, (bio)degradation:* The data used to support the biodegradation statement should be submitted to GESAMP as soon as possible. The

industry was requested to note that R*eady Biodegradability* is a specific test criterion defined under the OECD 301, 306 or relevant ISO guidelines and that evidence of 'inherent' or 'primary' degradation or expert judgement is insufficient to support the rating of 'R' in A2;

.3 *Column B1, Acute aquatic toxicity to fish crustaceans and algae:* Subject to further clarification regarding which oils are to be included in the proposed group and the subsequent testing of representative oils (to be selected on the basis of the requested compositional information), the Sub-Group agreed that such oils may be rated as non-toxic (Column B1='0') depending on the content and properties of possible impurities. The Sub-Group noted the indications from preliminary screening tests carried out on behalf of the Netherlands with the intention of providing GESAMP with some indication of aquatic toxicity were encouraging in this regard. However, the Sub-Group agreed that a grouping of oils as broad as that proposed, and which represents in excess of 20,000,000 tons of product shipped p.a., should not be evaluated on preliminary screening tests of a very limited group of oils alone. As a result, the Sub-Group recommended that 'limit tests' at a single concentration of 1000mg/*l* be carried out on selected representative oils, under Good Laboratory Practice (GLP), at a reputable laboratory, using an appropriate method for poorly soluble substances. The Sub-Group agreed that, in this way, batches of 5-10 representative oils may be tested at once; and a full concentration series would not be necessary so reducing costs to a minimum. In this context, the Sub-Group indicated that it may be willing to accept a reduced number of species tested (e.g. crustaceans and microalgae) in order to allow more oils to be screened; and

.4 *Column B2, chronic toxicity to aquatic organisms:* The Group agreed that it was unlikely to require chronic toxicity tests to be carried out.

2.2.4 It was noted that the Chairman and Secretary had subsequently met with FOSFA, the industry association concerned to discuss these concerns and that the industry had agreed to carry out a series of acute toxicity limit tests on a range of commercial products in order to allow column B1 of the revised GESAMP Hazard Profiles to be completed.

Oleic Acid

2.2.5 The Group noted that a pilot submission on oleic acid had been submitted, by APAG, as the first part of the IMO review of fatty acids and oleo-chemical derivatives of vegetable and animal oils. Having noted this, the Group requested that copies of the supporting test reports and references accompany future submissions.

2.2.6 The Group also noted that the product contained 15-20% of other saturated and unsaturated C14-C18 fatty acids in addition to oleic and linoleic acid, and expressed its concern that the short saturated and unsaturated acids may be of eco-toxicological significance. In this context, the Secretariat was instructed to relay the following information to the industry which was requested to respond accordingly:

.1 *Column A1 bioconcentration.* In general, GESAMP can accept a calculated log Pow value of >7 (7.64 quoted in Sangster, J., 1989; J. Phys. Chem. Ref. Data, 16:1111-1229) for the main components of such a natural mixture of C18 fatty acids and a resultant Column A1 rating of '0'. However, the Sub-Group agreed that

the value for water solubility quoted in the submission of 7 mg/L which, it was considered, may be due to the presence of short chain fatty acids, does not seem to support the above Pow value.;

.2 *Column A2 Biodegradation.* The Sub-Group agreed that the biodegradation data provided indicated >70% degradation in 28d in a modified Sturm test reflected this property of the product, although no reference or copy of the data was submitted. The Sub-Group also noted that this result was supported by data from a MITI Type I test (OECD 301C, non-adapted) indicating 78% mineralisation in 28d (ref: http://www.citi.org.jp). It was agreed that this would lead to a rating of 'R' in column A2. The Sub-Group recognized that further data on 'ready biodegradability of some additional fatty acid homologues might allow the remaining members of the group to be rated by analogy;

.3 *Column B1, Acute aquatic toxicity.* The Sub-Group noted that the submission failed to supply any measured acute aquatic toxicity data, but quoted SAR values from a US-EPA 'SDA' report on aliphatic acids (report not provided as part of the submission). It was also noted that the GESAMP file, at IMO, contains one fish test using water accommodated fractions of oleic acid, which indicated 100% survival at a loading rate of 10000 mg/L (B1 rating '0'). This test was carried out by the original manufacturer, which submitted data on this substance to GESAMP in the early 1980's. However, it was also noted that the SRC 'Ecotox' database (http://www.epa.gov/cgi-bin) provided a measured 96h LC50 for fathead minnow of 205 mg/L, indicating slight toxicity (B1 rating of '1'). It was agreed that this may be due to the presence of a C14 fatty acid in the sample tested dissolving sufficiently in water to become toxic. As a result, it was agreed that SAR generated acute aquatic toxicity data should only be used when good quality experimental data are already available for a homologous series, and not as the starting point for the evaluation of a whole group, particularly when it is suspected that significant amounts of impurities may be present. As a result, the Sub-Group indicated that measured aquatic toxicity data would be required for this group of substances

.4 *Column B2, chronic toxicity to aquatic organisms:* The Group agreed that it was unlikely to required chronic toxicity tests to be carried out for this group of substances

2.2.7 The Group noted that the Secretariat had been instructed to request clarification on the above points from APAG, after which it should be possible for GESAMP to issue a rating for this product. The Group noted that the Secretariat had, as instructed, discussed these issues with APAG during which the following points emerged:

.1 Most of the information on fatty acids held by APAG was in summary format which neither identified the sources nor the individual data sets which may have been used to develop the summaries for each end-point under discussion;

.2 most of the available data were associated with mixtures such as Palm Oil Fatty Acid rather than individual fatty acids;

.3 these data were currently being used to evaluate the properties of such products as part of the High Production Volume (HPV) exercise;

.4 in order to be in harmony with the HPV exercise, it had been agreed that the industry would generate data sheets for the following fatty acids:

.4.1 C8 Octanoic acid;

.4.2 C10 Decanoic acid;

.4.3 C12 Dodecanoic acid;

.4.4 C12+ Saturated, unbranched fatty acids (typically coconut oil fatty acids);

.4.5 C16/18/22 Unsaturated, unbranched fatty acids;

Note: In nature, C14 and less fatty acids tend to be saturated.

.4.6 C8-C18 Saturated and unsaturated fatty acids (mainly tallow fatty acids)

Fatty alcohols (Alkyl alcohols)

2.2.8 The Group noted that the Secretariat had been informed that whilst fatty alcohols fall under the purview of APAG, these were being dealt with by the Alcohols Sector Group of CEFIC. However, as no information had been received on these products, they were not discussed at the meeting.

Polyols

2.2.9 The Group noted that the aquatic toxicologists had agreed to defer the evaluation of Polyalkylene oxide polyol, Polyether (molecular weight 2000+) and Polyethylene polyamines until further information had been provided by the industry regarding the grouping and naming of these and other polyol products.

2.2.10 Furthermore, it was noted that this activity, including the collection of supporting data, was being co-ordinated by CEFIC and that little or no data were available in the literature with which to allow GESAMP to proceed.

Lube-Oil Additives

2.2.11 The Group noted that the log Pow and BCF data for several Lube-Oil Additives and related compounds reviewed by the aquatic toxicologists were missing. The data needed to evaluate the bioconcentration of the 45 or more Lube-Oil Additives listed in the IBC Code, are also generally lacking. It was recognized that, in the past, less attention had been paid to this aspect, except for moderately to highly toxic substances. As a result, Industry representatives would be requested to co-operate in providing the necessary information to allow a full evaluation to be made for these products.

2.2.12 It was recognized that, in the past, generating experimental data for such complex, often poorly soluble substances had proved to be difficult. As a result, it was agreed that, for products with little aquatic toxicity (LC_{50}>1000mg/l), alternative data such as calculated log Pow values (ranges for mixtures including any short chain impurities, carrier oils etc.) may be adequate. For products with a molecular weight approximately >1000, indicating that the molecule is too big to pass through cell membranes and so bioaccumulation would not occur, may provide a useful exemption to testing, providing that lower molecular weight components are not present. For substances showing aquatic toxicity, measured data may still be required.

2.2.13 In this context, the Group noted the CONCAWE report on *Environmental Classification of Petroleum Substances* which contained a considerable amount of data which the Group may be able to utilise.

2.3 Report of the *ad hoc* meeting of the Physical Property Sub-Group

2.3.1 The Group noted that an *ad hoc* meeting of the Physical Property Sub-Group had been held at the Centre de Documentation de Recherche et D'Experimentations sur les Pollutions Accidentelles des Eaux (CEDRE), Brest, from 18-19 April 2002.

2.3.2 It was noted that members of CEDRE had informed the Sub-Group of research which was taking place to validate some of the theoretical predictions of the fate of floating chemicals released into the sea. It was recognized that the outcome of this research was relevant to the work of the EHS Group as it may influence the European Behaviour Classifications (EBC) calculations and so column E2 may have to be reconsidered in the future.

Definition of Solubility

2.3.3 It was noted that the Sub-Group had recognized that the definition of solubility may be described in terms of both weight of solute/volume of solvent or weight of solute/volume of solution. However, it was noted that this difference would only become important at high concentrations of solute but that the conversion of mg/l to % wt/wt solutions could lead to critical differences around the key cut-off values used in calculating the EBC. It was also noted that these differences are dependent on the density of the chemicals

2.3.4 Having noted these points, the Group recognized that for both aquatic and mammalian toxicological purposes, solubility was expressed in terms of weight of solute/volume of solution which the Group noted was the definition used in OECD Guideline 105 (Water solubility). However, it was also recognized that the EBC system did not provide any indication of the units intended to be associated with the percentage solubility.

2.3.5 However, it was recognized that the problem was more complex than first envisaged and so members of the Physical Properties Sub-Group agreed to investigate the issue and, in particular to establish:

.1 the units of solubility intended for use under the EBC system; and

.2 the units of solubility actually reported by industry i.e. in terms of mass solute/volume of solution, volume of solute/volume of solution, mass of solute/volume of solvent or volume of solute/volume of solvent.

2.3.6 It was recognized that, once the answers to these questions had been established, it would be necessary to reconsider the evaluations of column E2 for some of the products.

Evaluation of products listed in the IBC Code

2.3.7 It was noted that the Physical Property Sub-Group had been able to consolidate a considerable amount of background data which had been collated since the exercise had started which enabled it to evaluate 316 products.

Evaluation of Column E3

2.3.8 The Group agreed with the views of the Physical Property Sub-Group that, as the evaluation of column E3 was dependent on the outcome of columns C1, C2, C3, D1, D2, D3 and E2, it was appropriate to calculate this rating once all of these columns had been completed.

3 GESAMP REPORTS AND STUDIES 64

3.1 The Group noted that the GESAMP Reports and Studies 64 had now been printed and was in the process of being distributed to:

.1 members of GESAMP;

.2 UN sponsoring agencies of GESAMP;

.3 members of the review panel;

.4 focal points in the London Convention;

.5 members of IMO's Marine Environment Protection Committee;

.6 members of IMO's Sub-Committee on Bulk Liquids and Gases; and

.7 members of IMO's Working Group on the Evaluation of Safety and Pollution Hazards of Chemicals.

3.2 In addition, it was noted that copies of the report would be available, free of charge, on request, to any interested party.

3.3 The Group recognized that it would be necessary to develop an amendment procedure for this report in order to keep abreast with *inter alia* developments in OECD regarding issues associated with the Global Harmonized System (GHS) and make any technical changes deemed necessary.

3.4 The Group agreed that, in addition to issuing amendments, it would be useful to have a copy of the text of Reports and Studies 64 on the GESAMP Web Site together with associated amendments and requested IMO to consider this matter.

3.5 In order to identify all amendments, it was agreed that a consolidated list of these would be kept as an annex to each EHS report until such time as a new editon of the Report needed to be published when the process would restart.

3.6 The Group noted that one omission from a table and an error in the layout of one figure had been identified in the report and agreed that these should be corrected and issued as a corrigendum prior to the distribution of copies to the public.

3.7 In order to ensure that all interested parties were made aware of this report, the Group agreed that a description of its contents should be provided to various national and international industry bodies with a request to distribute it to their members via *inter alia* trade magazines and web sites. The Group noted that IMO would also be distributing copies of the report to members of the MEPC, the BLG Sub-Committee and the ESPH Working Group.

4 CONSIDERATION OF DEVELOPMENTS WITHIN THE OECD TASK FORCE ON HARMONIZATION OF CLASSIFICATION OF CHEMICALS

4.1 Aspiration Hazard

4.1.1 The Group recalled that, during the preparation of GESAMP Reports and Studies 64, it had been unable to develop criteria for assigning an Aspiration (A) rating under column D3, though, in the past, a few chemicals had been evaluated using physical data according to EU criteria and some had been rated on the basis of case reports.

4.1.2 The Group noted that the current criteria for defining products with aspiration hazards were under review by OECD, as part of the GHS, and was considering the following proposals:

.2.1 viscosity of 14 cSt (mm^2/sec) or less at 40°C or, 10% w/w of a substance posing aspiration hazard (Canada); or

.2.2 10% w/w of a substance posing aspiration hazard (United States) or;

.2.3 practical experience or Kinematic viscosity of 7 x 10^{-6} m^2/sec or less at 40°C and if 10% of w/w of a hydrocarbon and surfce tension less than 33 mN/m at 25°C. (EU).

4.1.3 The Group also noted that, according to the Canadian criteria, substances posing an aspiration hazard included ketones, primary alcohols, terpene alcohols and other hydrocarbons with a composition of 3-13 carbon atoms, whereas United States regulations lists toluene, xylene, benzene and petroleum distillates (naphtha, gasoline, kerosene, mineral spirits) as products with an aspiration hazard.

4.1.4 Having noted this information, the Group agreed that the most appropriate course of action would be to wait for the outcome of the GHS exercise rather than trying to apply any of the proposed criteria prematurely. However, it was agreed that, meanwhile, it would maintain its preliminary Aspiration Hazard ratings in column D3 whilst restricting such ratings to those substances which are well known to possess an Aspiration Hazard and which have been identified as such in the OECD documentation.

4.1.5 Recognizing that the relevance of Aspiration Hazards to marine mammals was outside the expertise of the Group, two members offered to consult experts in this field and report back to the Group at its next session.

4.2 *In vitro Skin Corrosion Test Guidelines*

4.2.1 The Group were informed of discussions that were taking place at OECD regarding *In vitro skin corrosivity testing*. During the presentation of this topic, the following points were noted:

.1 in November 2001, an OECD meeting had taken place, involving 13 experts from 8 member States and Organisations including GESAMP/IMO;

.2 the following test systems had been considered, by OECD, in the past:

.2.1 the **CORROSITEX** system is used in the USA and already accepted by the United States Department of Transport (DoT) for a number of applications (group of chemicals, transport of dangerous goods). This is

essentially a simplified artificial membrane used to model some properties of the skin. This test has gone through a pre-validation study in 1993-94 and has shown to have only limited applicability and insufficient total predictivity in the validation study. It did not meet the acceptance criteria.

.2.2 **Skin** is a human skin model test which went through a pre-validation study in 1993-94 but was found to be insufficiently sensitive, though appeared highly specific. It did not meet the acceptance criteria.

.2.3 The **TER** test measures the electrical resistance of rat skin in glass apparatus, a *semi in vitro* test developed in the UK. One rat can be used for about 15 slices of skin (15 tests). This test went through a pre-validation study in 1993-94.The Transcutaneous Electrical Resistance is a measure of the electrical impedance of the skin, as a resistance value in kilo Ohms. A simple and robust method of assessing the barrier function by recording the passage of ions through the skin. The corrosive effect is shown by low resistance.

.2.4 **EPISKIN** is based on a three dimensional human skin model with functional stratum corneum and multiple layers of viable epithelial cells developed by a cosmetic company. Due to marketing decisions of the producers, the test became unavailable in 1997. A similar model **EpiDerm** was considered by the management team to replace EPISKIN. The outcome of catch-up studies confirmed the robustness of the test principle. The magnitude of cell viability is a measure for non-corrosiveness of a substance. After an exposure time the cell viability is measured, e.g. as the ability of cellular dehydrogenases to reduce a dye, which is the crucial sub-test within the strategy.

.3 All tests had gone through a validation study in 1996-97, published in 1998. The pre-validation studies in 1993-94 had been performed in 2-3 labs only, the validation study was done by testing 60 chemicals backed by in vivo Draize rabbit skin test data. The inherent variability and uncertainty of the current in vivo test data was one of the problems for this validation exercise.

.4 **Guideline 430** will contain "In Vitro Skin Corrosion: Transcutaneous Electrical Resistance Test (TER)", which is a method avoiding pain and suffering of animals. The standardized preparation of animal skin discs seems to be the main challenge.

.4.1 The Group noted that positive results would have to be rated as 3 in the rGHP, as it allows no sub-categorisation.

.5 **Guideline 431** will contain "In Vitro Skin Corrosion: Human Skin Model Test" in general without referring to any specific manufacturer (EPISKIN, EpiDerm, etc.).

4.2.2 The Group noted the ongoing discussions on this issue and agreed to await the outcome prior to considering the matter any further.

4.3 Review of IBC Code Chemicals for CMR, Sensitization and TOST Properties

4.3.1 The Group recalled that some of the toxicity end points previously identified in the Remarks Column had only been recently developed and refined. As a result, these criteria had not been applied to some of the products, which had been subject to re-evaluation under the revised system. One member of the Group reported that he had since considered all of the products identified in the IBC Code and compared them with those products identified under various independent evaluation systems as well as checking the relevant data reported in IUCLID.

4.3.2 Recognizing that this extensive work would need to be reviewed by the Mammalian Toxicologists, it was agreed that this activity would be most appropriately carried out during the next *ad hoc* meeting of this Sub-Group in August 2002.

5 EVALUATION OF NEW SUBSTANCES PROPOSES FOR CARRIAGE BY SHIPS

5.1 The Group considered the following new products, which had been submitted for evaluation by industry and governments. The resultant *Revised GESAMP Hazard Profiles* are shown in annex 3

.1 Fatty acids, essentially linear, C6-C18, 2-ethylhexyl ester;

.2 Alkyl (C12+) Dimethylamines (Originally reported as Dodecyl-, Tetradecyl-, Hexadecyl-dimethylamine mixture);

.3 Ethoxylated tallow amine, glycol mixture

5.2 Noting that IMO would be classifying these products and assigning their carriage requirements, the Group evaluated them under the *Existing Hazard Evaluation System* as shown below as well as under the *Revised System* as shown in annex 3

	GESAMP Hazard Profile (Existing System)					
Product Name	**A**	**B**	**C**	**D**	**E**	**Remarks**
Fatty acids, essentially linear, C6-C18, 2-ethylhexyl ester (Similar to the Syndril product also evaluated)	0	1	0	0	XX	
Alkyl (C12+) Dimethylamines (Dodecyl-, Tetradecyl- dimethylamine mixture)	+	5	1	II	XX	
Ethoxylated tallow amine, glycol mixture	-	-	1	1	XX	

5.3 In addition, the Group was provided with additional information, from industry, which permitted the following *Existing Hazard Profiles* to be completed:

	GESAMP Hazard Profile (Existing System)					
Product Name	**A**	**B**	**C**	**D**	**E**	**Remarks**
2-Hydroxy-4-(methylthio)butanoic acid	0	1	1	II	XX	
N-Ethyl-2-methylallylamine	0	2	3	-	-	
Mobil Syndrill / 2-Ethylhexyl esters of fatty acids (C8-C16)	0	1	1	-	-	

6 RE-EVALUATION OF PRODUCTS IN THE IBC CODE IN ACCORDANCE WITH THE CRITERIA FOR THE REVISED GESAMP HAZARD EVALUATION PROCEDURE

6.1 In order to re-evaluate those product in the IBC code, in accordance with the criteria for the revised GESAMP Hazard Evaluation Procedure, the Group split into the following sub-groups:

.1 mammalian toxicology;
.2 aquatic toxicology; and
.3 physical properties.

6.2 The resultant evaluations generated by these sub-groups are reflected in annex 3

7 DISCUSSION ON THE CONSOLIDATION OF WORK CARRIED OUT UNDER AGENDA ITEM 6

7.1 Overview of substances evaluated at this meeting

7.1.1 The Group noted that the :

.1 Mammalian Toxicologists had considered about 100 products during the meeting;

.2 Aquatic Toxicologists had identified some complex problems with a number of products being reviewed but had still evaluated about 60 of them; and

.3 Physical Chemists had been able to review all of the products identified in the IBC Code.

7.2 Animal/Vegetable/Marine Oils

7.2.1 The Group recognized that the industry had answered most of the concerns put to it and, in addition, had carried out the requested ecotoxicity testing although the results obtained from these tests had shown that some of the products were more toxic than anticipated. However, based on the information provided by the industry on vegetable oils, the Group were able to develop Hazard Profiles as shown below:

	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E2	E3
Palm Oil	0	R	0	NI	0	0	0	0	0		F	2
Palm Olein	0	R	0	NI	0	(0)	(0)	(0)	0		Fp	2
Palm Stearin	0	R	0	NI	0	(0)	(0)	(0)	0		F	2
Palm kernel Oil	0	R	NI	NI	(0)	(0)	(0)	(0)	(1)		F	2
Linseed Oil	0	R	NI	NI	0	0	0	(0)	(1)		Fp	2
Rapeseed Oil/Canola Oil	0	R	NI	NI	0	0	(0)	NI	NI		Fp	2
Groundnut Oil	0	R	NI	NI	0	0	(0)	0	0		Fp	2
Soyabean Oil	0	R	0	NI	0	0	(0)	(0)	1		Fp	2
Olive Oil	0	R	NI	NI	0	0	(0)	0	1		Fp	2
Coconut Oil	0	R	NI	NI	0	0	(0)	0	1		Fp	2
Castor oil	0	R	NI	NI	0	0	(0)	1	1		Fp	2
Corn oil	0	R	NI	NI	0	(0)	(0)	0	1			2
Sunflower oil	0	R	NI	NI	0	0	(0)	(0)	(1)			2
Cottonseed oil	0	R	NI	NI	0	0	(0)	0	1			2
Tung oil	NI	R	NI	NI	(0)	(0)	(0)	(0)	(1)			2

Tallow	0	R	0	NI	0	0	(0)	0	0		F	2
Lard	0	R	0	NI	0	0	(0)	0	1		F	2
Fish Oil	0	R	NI	NI	0	0	0	0	(0)		Fp	2

7.2.2 In this context, the Group agreed on the following points which it considered should be forwarded to the industry:

.1 **A1A log Pow:** Calculated log Pow values for triglycerides and longer chain fatty acids are considered to be >8, allowing a '0' rating to be given in column A1A and a rating of '0' in column A1 overall.

.2 **A2 Biodegradation:** Data from the literature provided by FOSFA was sufficient to assign the rating 'R', indicating ready biodegradability, to all of the above products.

.3 **B1 Acute aquatic toxicity:** Acute ecotoxicity data on marine crustaceans and micro- algae was provided by FOSFA. It was noted that in all but one case (palm oil), chemical analysis of the samples revealed free fatty acid concentrations of < 3%. Little or no toxicity was observed at loading rates of 1000mg/L with palm oil, soyabean oil and tallow and '0' ratings were consequently given in column B1. However, with sunflower, coconut and fish oil, toxicity was observed at 1000mg/L. This requires further investigation to confirm that the animals were not physically hindered by micro-emulsions in the test media. However, should toxicity be consistently observed, then EL/LL50 values should be determined with the same samples of these substances. It would also be useful to explore whether this phenomenon is restricted to certain batches. Given these uncertainties, and the fact that toxicity to aquatic organisms had not been expected in these tests, it is recommended that the remaining nine products be tested with crustaceans and micro-algae at limit concentrations of 1000 mg/L.

7.2.3 As a result, it had been recognized that the industry would have to be requested to do further work in order to establish a proper rating for all of these products.

7.3 Fatty Acids

7.3.1 Whilst the physical properties available for these products had been sufficient to allow column E2 to be evaluated, both the Mammalian Toxicology and the Aquatic Toxicology Sub-Groups considered that there was only sufficient information available to allow evaluation of the three well defined fatty acids (octanoic, decanoic and dodecanoic acids). With regard to the other fatty acids submitted for evaluation, it was agreed that:

.1 the generic descriptors were too vague to allow an evaluation to be done without assuming a worst case scenario based on the shortest chain-length product in the description; and

.2 some of the data associated with these could not be regarded as representative of the broad description of these products.

7.3.2 As a result, it was agreed that the industry should be requested to reconsider the descriptions of these products and provide original data and reports to reflect the product being transported.

7.3.3 Whilst recognizing that only the C8, C10 and C12 fatty acids had been previously evaluated and identified in the IBC Code, the Group considered the new data provided by industry and made the following evaluations:

	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
Octanoic acid	3	R	1	NI	0	0	(2)	3	3				3
Decanoic acid	4	R	4	1	0	0	(1)	2	2				2
Dodecanoic (Lauric) acid	4	R	3	NI	0	(0)	(1)	1	2				
C_{12+} Saturated, unbranched fatty acids	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
$C_{16/18/22}$ unsaturated, unbranched fatty acids	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
C_8-C_{18} saturated and unsaturated fatty acids	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

7.4 Lube-Oil Additives

7.4.1 The Group recognized that, whilst significant progress had been made in the re-evaluation of of the Lube-Oil Additives (see paragraphs 2.2.10 to 2.2.12), further information was needed before they could all be completed. As a result, it was agreed that the data gaps needed to be identified and the industry requested to provide the additional information needed to complete the Hazard Profiles.

8 FUTURE WORK PROGRAMME AND DATES FOR THE NEXT MEETINGS

8.1 Recognizing that there was still a considerable amount of work to be done in order to complete the revised GESAMP Hazard Profiles for those products subject to the IBC Code, the Group agreed to the following meetings:

.1 Mammalian Toxicology Sub-Group 12 to 16 August 2002 at IMO, being generously financed by the Netherlands;

.2 Aquatic Toxicology Sub-Group 18 to 22 November 2002 at ISPRA; and

.3 Physical Property Sub-Group dates to be decided.

8.2 In addition, it was agreed that the next full meeting of the Group would be held from 28 April to 2 May 2003 and it was noted that this meeting would also be generously financed by the Netherlands

Identification of the next groups of products to evaluate

8.3 In order to complete the work, the Group agreed on the following course of action:

.1 finalize the remaining products currently identified in the IBC Code. In this context, it was noted that the mammalian and aquatic toxicologists had approximately 60-70 products remaining in the alphabetical list to complete prior to the consideration of chemicals previously identified as being complex and so requiring more detailed examination. The Physical Properties Sub-Group indicated that it had been able to find data for approximately 50 products, which were missing and would be able to reconsider a further 250 products which should enable it to complete its part of the re-evaluation exercise; then

.3 re-consider those products which did not have sufficient data to make a complete evaluation; then

.4 consolidate various groups such as homologous series and related compounds. In particular, the Group recognized that the following chemical groups should be considered at the next meeting:

.1 Alkanes;

.2 Alkenes;

.3 Lube-Oil Additives;

.4 Animal/Vegetable/Marine oils; and

.5 Fatty acids.

.5 consolidate Column E1 by the Secretariat, based on information supplied by one of the members on identification of Tainters;

.6 consolidation of column E3, by the Secretariat, based on the criteria described in Reports and Studies 64 using the evaluations in columns C1, C2, C3, D1, D2, D3 and E2.

9 ANY OTHER BUSINESS

9.1 Future role of EHS

9.1.1 The Group noted the discussions, which had taken place at IMO's Marine Environment Protection Committee (MEPC) as reported by the Secretariat in his opening remarks.

9.1.2 In addressing these issues, it was agreed that it was important that the scientific evaluation of the hazards of products be carried out by appropriate experts with the support of the Secretariat. It was also agreed that this evaluation be maintained independently of any legislative or commercial implications.

9.1.3 As a result, it was agreed that this independence could only be maintained by the Group being under the auspices of GESAMP which would continue to provide guidance regarding the membership of the Group, defining its method of work and reviewing the processes involved, such as the content of Reports and Studies 64.

9.1.4 In order to expedite the use of the Hazard Ratings by IMO, it was proposed that the hazard evaluations, developed by the Group, could be reported directly to IMO bodies at the same time as GESAMP.

9.1.5 It was recognized that some of the Group's activities overlapped with those of IMO's ESPH Working Group and it was agreed that consideration could be given to exploring the possibility of the EHS Group providing a scientific evaluation of all appropriate properties of products subject to the IBC Code. The results of these evaluations could then be forwarded to the ESPH Group for the classification and assignment of carriage requirements under Annex II of MARPOL 73/78 and SOLAS. In considering this possible approach, it was recognized that,

should IMO consider this to be an appropriate use of resources, the EHS Group might need to be supplemented with additional expertise.

9.1.6 The Group also recognized that once the re-evaluation of products subject to the IBC Code and Annex II of MARPOL Annex II was complete, its workload would be considerably reduced. However, the Group agreed that, at this time, it would be in a position to consider other important issues such as:

.1 occupational health issues, related to chemical hazards, on board ship;

.2 potential anti-fouling biocides which IMO may be considering;

.3 evaluation of potential chemicals to be used in ballast water to control unwanted organisms; and

.4 acting as an independent advisory body, should disagreements, between interested parties, arise over the *Self Classification* of packaged goods

9.2 Liaison with GHS

9.2.1 With regard to the specific question put to it regarding how it could most effectively liaise with the UN Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling (GHS), the Group indicated that it was already monitoring developments in this area and would continue to take these into account in the future. In order to ensure that GHS is aware of both IMO and GESAMP activities, the Group recommended that either the Secretariat of the Chairman of the Group attend GHS meeting when relevant topics of interest are to be addressed.

9.3 Consideration of criteria for defining packaged goods as Marine Pollutants

9.3.1 It was recalled that IMO's system for defining Marine Pollutants in packaged form is based on the *Existing GESAMP Hazard Profiles* and that IMO was considering how Marine Pollutants might be defined in the future. The Group noted that possible options for such definitions might include:

.1 adopting the criteria, made by UN Sub-Committee on the Transport of Dangerous Goods, for the Classification of products subject to the IMDG Code;

.2 defining new criteria based on the *GESAMP Revised Hazard Profiles*; or

.3 developing new criteria considered to be pertinent to the marine environment.

9.3.2 Having noted these points, the Group agreed that it would be impractical to evaluate all products carried in packaged form continuously but indicated that it could act as an independent advisory body where disagreements may arise under a self-classification system.

9.3.3 It was noted that, on request of IMO, the Group had been giving priority to developing *revised GESAMP Hazard Profiles* to those products identified in the IBC Code, and were only evaluating new entries to the IBC Code under the *Old System.*

9.3.4 It was recognized that this situation had caused problems for industry experts who had wanted to know whether some of the products being evaluated under the *New System* would have been rated with a '+' under the *Old System*.

9.3.5 In order to address these queries, the Group indicated that, in the past, the '+' rating had been assigned on the basis of clear evidence of bioconcentration combined with a high toxicity to either aquatic organisms or mammals. In general this rating had been applied to only the most hazardous chemicals. It was also indicated that these properties are now evaluated separately in columns A1, B1 and D3 of the *Revised System*.

9.4 Consideration of the use of biocides for the treatment of ballast water on board ships

9.4.1 The Group noted a document on *considerations in selecting and using toxicants to control marine organisms in ballast water* prepared by a member of GESAMP.

9.4.2 The Group were informed that the discharge of ballast water from ships was the cause of transferring non-indigenous species from one part of the world to another and that some such organisms had been known to proliferate in their new environment causing health and economic problems in doing so. It was noted that two of the most well known incidents of plague introductions were the zebra mussel transported from the Black Sea region into North America in the late 1980's and a plague of comb jellyfish introduced into the Caspian sea which had substantially altered the ecology and disrupted fisheries.

9.4.3 The Group were also informed that IMO had recognized the need to control this problem, through legislative means and, through its MEPC were exploring means of doing so. As a member of MEPC's Working Group addressing this issue, a member of GESAMP had requested that the Group provide him with some general advice on the potential use of biocides in controlling unwanted organisms in ballast water.

9.4.4 In this context, the Group were informed that other methods of control including filtration, ultraviolet light and ultrasonics were also being explored but that it was generally considered that some form of chemical treatment may also have to be employed in order to control the problem.

9.4.5 The Group noted that the prevention of non-indigenous species from being transported in ballast water and settling in other parts of the world was a complex issue which had occupied a lot of attention in recent years and that reviews on the technical aspects were already available.

9.4.6 It was noted that one of the options for cleaning ballast water currently being considered is the use of biocides. The members felt that the Group could provide advice on the intrinsic hazards and, in the future, possibly also on the risks of using biocides, to both human health and the marine environment.

9.4.7 The Group was informed that biocides were only regulated in a small number of countries (often as non-agricultural pesticides), e.g. The United Kingdom, the United States and The Netherlands. Furthermore, the European Chemicals Bureau of the European Commission, Joint Research Center had received from 350 to 400 notifications for biocides as the first step in the implementation of the EU biocides directive (98/8/EC). Each notification includes an overview of the toxicological and environmental information presently available to the notifying company and the availability of basic information, in the short term, may be limited for some potentially useful biocidal products.

Protection of the marine environment

9.4.8 It was recongnized that biocides are deliberately designed to be extremely toxic to biota and so their release into the sea would need to be considered with caution. The Group considered

that any proposed ballast water sterilization activities with a potential for causing build up of biocides or their metabolites in suspended matter, sediments or biota as well as other persistent chemicals, should be avoided.

9.4.9 It was noted that the use of effective biocides would, theoretically, leave no micro-flora alive in ballast water to ensure biodegradation. Therefore, it was suggested that biocides which would degrade chemically in the ballast water tanks, e.g. by hydrolysis would be preferable. It was pointed out that, as a second safeguard, biocides should be selected with very short degradation half lives in seawater, e.g. mineralisation to carbon dioxide and water within hours of discharge, ensuring that neither toxic effects nor any persistent metabolites would remain in the marine enviornment.

9.4.10 The Group noted that this would require environmental fate testing (at least hydrolysis and surface water die away degradation methods) as simple 'ready biodegradability' test data would not be sufficient. It was agreed that some attention should also be paid to the possible interaction between operational discharges from chemical and oil tankers and ballast water chemicals such as chlorine.

Occupational health issues on board ships in dealing with biocides

9.4.11 It was pointed out that the ballast water issue was one affecting all ocean-going ships and that the procedures and practices in operation on board chemical tankers in handling dangerous chemicals were generally not present on board other types of vessels.

9.4.12 The Group considered that there was a risk of exposure of the crew to potentially hazardous chemicals. Before, such risks could be investigated, the technology for loading, storage, dosing and mixing of biocides with ballast water and the manner of discharge of sterilized water needs to be made clear. It was agreed that, only when such information became available could 'exposure scenarios' be defined for the technological solutions under consideration, i.e. where the chance of acute or chronic exposure to the material is quantified and applied to knowledge of the intrinsic hazards of the biocides.

9.4.13 The Group agreed that, in this way, decisions on whether specific biocides are acceptable for use under the circumstances on board could be made. It was noted that ship design and level of technical sophistication may play a major role in this process. Furthermore, the Group considered that, as human exposure and risk assessment is generally specific for each type of chemical, some idea of the types of materials that could be encountered would be necessary before even preliminary advice could be given on the issue of occupational health and safety.

9.4.14 The Group recognized that the risks posed by the use of biocides would need to be evaluated in comparison to the risks of other techniques for preventing transport of indigenous species though the medium of ballast water.

9.4.15 In considering this issue, the Group also agreed on the following points:

.1 any chemical used should be effective during the time which the ballast water is on board. This is particularly important for short voyages;

.2 the potential damage to the structure of the ship should also be taken into account before approving any chemical treatment; and

10 CONSIDERATION AND ADOPTION OF THE REPORT

10.1 The Group adopted the report and, having thanked members for the considerable amount of effort which they had put into, *inter alia*, the collection, collation and evaluation of data to generate *Revised Hazard Profiles*, the Chairman closed the session on Friday 26 April 2002 at 13:00 hrs.

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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-EIGHTH SESSION OF THE GESAMP/EHS WORKING GROUP

1 Adoption of the agenda

2 Report of the *ad hoc* meetings of:

.1 the Mammalian Toxicology Sub-Group (August 2001, London);

.2 the Environmental Toxicology Sub-Group (November 2001, Tokyo); and

.3 the Physical Property Sub-Group (April, 2002, Brest).

3 GESAMP Reports and Studies 64

4 Consideration of developments within the OECD Task Force on Harmonisation of Classification of Chemicals including proposals for:

.1 Aspiration Hazard;

.2 *In Vitro* Skin Corrosion Test Guidelines; and

.3 Review of IBC Code Chemicals for CMR, Sensitization, and TOST Properties.

5 Evaluation of new substances proposed for carriage by ships (Existing and Revised procedure)

6 Re-evaluation of products in the IBC Code in accordance with the criteria for the Revised GESAMP Hazard Evaluation Procedure including:

.1 the alphabetical list of substances summarised by N. Soutar

.2 Animal/Vegetable/Marine oils;

.3 Fatty acids;

.6 Tall oil

7 Discussion on the consolidation of work carried out under agenda item 6 since 1998

8 Future work programme and date of the following sessions

.1 EHS 39;

.2 Additional meetings of the Mammalian, Ecotoxicology and Physico-chemical sub-groups

9 Any other business

10 Consideration and adoption of the report

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Products discussed during the meeting (April 2002)

07-Jun-02

	---- Existing GHP ------						---------- Revised GESAMP Hazard Profile (GHP) system ----------														
NAME	**EHS**	**A**	**B**	**C**	**D**	**E**	**A1a**	**A1b**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**	**C3**	**D1**	**D2**	**D3**	**E1**	**E2**	**E3**	**F**
Acid mixtures (nitrating acid)	289	0	2	2	II	X	Inorg	NI	0	Inorg	(2)	NI							0	D	1	
Alkanes (C6-C9)	2202		3				4	NI	4	NI	3	NI	(0)	(0)	(0)	(0)	(0)		NI	FE	NI	
Alkane (C14-C17) sulphonic acid, sodium salt	334	0	3	1	I	X	NI	NI	NI	NI	3	NI	0	0	(1)	2	2		0	D	2	
Ammonium sulphide soln.(45% or less)	310	0	3	2	II	XX	Inorg	0	0	Inorg	3	NI	0	0	(0)	(2)	(2)	N	NI	D	2	
Amyl propionate	1484	0	2	0	I	X	2	NI	2	R	2	NI	0	0	(1)	2	1		0	F	3	
Aviation alkylates (C8 paraffins and iso-paraffins BPt 95-120 Celcius)	286	0	3	(1)	0	0	4	NI	4	R	3	NI	0	0	(0)	(0)	(0)		0	FE	2	
Butyl benzyl phthalate	398	Z	4	1	0	X	4	4	4	R	4	1	0	0	(0)	(0)	(0)	R	0	S	3	
Butylene glycol methyl ether acetate	953	0	1	1	I	X	1	1	1	R	3	NI							0	FED	1	
Butylene glycol monomethyl ether	952	0	0	1	I	X	0	NI	0	R	(1)	NI							0	D	1	
Butyl octyl phthalate	410	0	-	-	-	X					NI		0	0	(0)	1	1	R	0		3	
Castor oil	442	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	1	1		0	Fp	2	
Citric juices	494	0	0	0	0	0													0	D	0	
Coconut oil	503	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	0	1		0	F	2	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Corn oil	521	0	0	0	0	XX	0	NI	0	R	NI	NI	0	(0)	(0)	0	1		0		2	
Cotton seed oil	523	0	0	(1)	I	XX	0	NI	0	R	NI	NI	0	0	(0)	0	1		0		2	
Decanoic acid	555	0	2	0	II	XX	4	NI	4	R	4	1	0	0	(1)	2	2		0	F	3	
Dialkyl (C6-C8) phthalates	2197	0	0	0	I	XX	0	0	0	R	0	0	0	0	(0)	1	1	R	NI	Fp	2	
Dialkyl phthalates C7-C9	564	0	1*	0	I	XX	0	4	4	(NR)	0	2	0	0	(0)	1	1	R	0		3	* Probably due to impurities
Dialkyl phthalates C9-C11	565	0	0	(1)	0	XX					0		0	0	(0)	1	1	R	0		3	
Dialkyl phthalates C9-C13	566	0	0	(1)	0	XX	0	4	4	(NR)	0	2	0	0	(0)	1	1	R	0	Fp	3	
Di-n-butyl phthalate	582	0	4	0	II	XX	4	4	4	R	4	NI	0	0	1	0	1	R	0	S	3	
Di-(2-ethylbutyl) phthalate	625	0	0	0	0	XX	5	NI	5	R	0	2	0	0	(1)	1	1	R	0	NI	3	
Diethylene glycol phthalate	1438	0	1	0	0	0	NI	NI	NI	NR	1	NI	0	0	(1)	NI	2		0	S	2	
Di-(2-ethylhexyl) phthalate	642	0	0	0	II	XX					0		0	0	(0)	1	1	CR	0	NI	3	
Diethyl phthalate	648	0	2	1	II	X	3	3	3	R	2	0	1	0	(1)	1	1		0	S	1	
Diheptyl phthalate	655	0	0	(0)	0	XX	0	2	2	R	0	NI	0	0	(0)	1	1	R	0	Fp	3	
Di-hexyl phthalate	2125	-	-	0	II	XX	5	NI	5	R	0	2	0	0	(0)	1	1	R	NI	Fp	3	
Diisobutyl phthalate	581	0	3	0	0	X	4	NI	4	R	4	1	0	0	(0)	0	0	R	0	S	3	
Diisodecyl phthalate	619	0	0	0	0	XX							0	0	(0)	0	0	R	0		3	
Diisononyl phthalate	691	0	0	0	0	XX							0	0	(0)	1	1	R	0		3	
Diisooctyl phthalate	693	0	0	0	II	XX	0	4	4	(NI)	0	0	0	0	(0)	1	0		0	Fp	1	
Diisopropyl ether	711	0	2	0	0	0	1	NI	1	NR	2	NI							0	E	0	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Dimethyl phthalate	678	0	2	1	0	X	2	2	2	R	2	0	0	0	(0)	0	1	R	0	SD	3	
Dinonyl phthalate	689	0	0	1	0	XX							0	0	(0)	1	1	R	0		3	
Di-n-octyl phthalate	692	0	0	0	I	XX							0	0	(0)	1	(1)	R	0	Fp	3	
Di-n-propyl phthalate	713	0	(3)	1	I	X							0	0	(0)	1	1	R	0		3	
Ditridecyl phthalate	714	0	0	0	0	XX							0	0	(0)	1	NI		0		1	
Diundecyl phthalate	715	0	0	(1)	0	XX	0	NI	0	NR	0	0	0	0	(1)	1	1		0	Fp	2	
Dodecanoic acid	2257												0	(0)	(1)	1	2			F		
Dodecene (all isomers)	720	0	(3)	(1)	I	0							0	0	(0)	1	0		0	F	1	
Dodecyl-, Tetradecyl-, Hexadecyl-dimethylamine mixture	2248	+	5	1	II	XX	5	NI	5	R	5	2	1	(1)	(2)	3A	3			F/Fp	3	
Ethoxylated tallowamine	2182	NI	NI	1	1	XX	NI	NI	NI	NI	NI	NI	1	0	NI	1	2		0	D	2	
Ethylene oxide	77	0	2	2	II	XXX							1	(1)	3	3	3	CMRS	0		3	
Ethylene-propylene copolymer	1508	-	-	-	-	-							NI	NI	NI	NI	NI		NI		NI	
N-Ethyl-2-methallylamine	2228	0	2	3	-	-	0	NI	0	NR	2	NI	3	2	2	3A	3			D	3	
Fatty acids, essentially linear, C6-C18, 2-ethylhexyl ester	2253	0	1	0	0	XX	0	NI	0	R	1	NI	0	0	(0)	1	0			Fp	1	
Fatty acids, linear, C8-C18 saturated with C18 unsaturated	2260						NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI					
Fatty acids, linear C12+ saturated with C12+ unsaturated	2261						NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI					
Fatty acids, saturated, linear, C12+	2258						NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI			F		

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Fatty acids, unsaturated, linear, C16+	2259						0	NI	0	R	NI	NI	0	0	(0)	0	0			Fp		
Ferric chloride	339	0	2	2	0	X	Inorg	5	5	Inorg	2	0	1	(0)	(1)	2	3		0		3	
Ferric hydroxyethyl ethylene diamine triacetic acid, tri- sodium salt, solution	796	0	1	1	II	0	NI	NI	NI	NI	NI	NI	0	0	(0)	(0)	1		0	D	1	
Ferric nitrate/nitric acid solution	337						Inorg	5	5	Inorg	2	0	0	(0)	(2)	3	3		?	D	3	
Fish oil	801	0	0	0	I	XX	0	NI	0	R	NI	NI	0	0	0	0	(0)		0	Fp	2	
Fish solubles	1509	0	0/BOD	0	0	X	NI	NI	NI	NI	NI	NI	(0)	(0)	(0)	(0)	(0)		0	NI	(2)	
Fluorosilicic acid	806	0	2	2	II	XXX	Inorg	0	0	Inorg	2	NI	2	(2)	4	3	3		0		3	
Fluorosilicic acid (20-30%) in water solution	2240												(1)	(1)	4	3	3			D	3	
Formaldehyde (37%-50% solution)	807	0	2	2	II	XX	0	NI	0	R	2	NI	2	2	3	3	3	CS	NT	D	3	
Formamide	808	0	0	1	I	XX	0	NI	0	NR	1	NI	0	0	1	1	2	R	0	D	3	
Formic acid	809	0	1	1	II	XX	0	NI	0	R	2		1	(1)	2	3C	3		0	D	3	
Fumaric adduct of rosin (water disper- sion)	810	0	3	1	0	X	0	NI	0	R	3	NI	(0)	NI	NI	NI	NI		0	NI	1	
Furfural	812	0	2	2	II	XX	0	NI	0	R	2	NI	2	(2)	3	2	2	C	0	D	3	
Furfuryl alcohol	813	0	2	2	0	0	0	NI	0	R	(3)	NI	2	2	3	2	2		0	D	2	
Glycerine	814	0	0	0	0	0	0	NI	0	R	0	NI	0	0	(0)	0	1		0	D	1	
Glycerine (83%)/ Dioxane-dimethanol (17%) mixture	1743	0	1	1	I	X	NI	NI	NI	R	1	NI	0	(0)	NI	(0)	1		0	D	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Glycerol monooleate	1898	0	(1)	0	0	XX							0	0	(0)	1	1		0		1	
Glycerol polyalkoxylate	815	0	0	0	0	0	NI	NI	NI	NR	0	NI	0	0	0	0	0		0	NI	0	
Glyceryl triacetate	816	0	(0)	1	0	0	0	NI	0	R	1	0	1	0	0	0	1		0	D	1	
Glycidyl ester of C10 trialkyl acetic acid	441	0	3	1	II	XX	3	NI	3	NR	3	NI	0	0	(0)	2	1		0	F	3	
Glycine, Sodium salt, solution	817	0	0	0	0	0	0	NI	0	NI	0	NI	0	(0)	(0)	(0)	(1)		0	D	1	
Glyoxal solutions (40% or less)	84	0	1	1	I	X	0	NI	0	R	1	NI	0	0	2	2	3	MS	0	D	3	
Groundnut oil	820	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	0	0		0	Fp	2	
Heptane	827	0	3	0	0	0							0	0	0	(1)	(1)	A	0		2	
Heptanoic acid	831	0	1	0	I	X	2	NI	2	R			0	(0)	NI	2	(3)		0	FD	3	
Heptanol (all isomers)	2223						2	NI	2	R	3	NI	(1)	(0)	(2)	(2)	(3)			F	3	
1-Heptanol	828	0	2	1	I	0	2	NI	2	R	3	NI	1	0	2	(2)	(3)		0	FD	(3)	
Heptene (all isomers)	2225						3	NI	3	NI	2	NI	(0)	(0)	(1)	(2)	(0)			E	2	
1-Heptene	832	0	2	(1)	0	0	3	NI	3	NI	2	NI	(0)	(0)	(1)	(2)	(0)		0	E	(2)	
Heptyl acetate	833	0	(3)	0	I	X	3	NI	3	NI	(3)	NI	0	0	(1)	1	2		0		2	
1-Hexadecene	836	0	0	0	0	0	0	NI	0	NR	0	NI	0	0	0	0	0		0	Fp	2	
Hexamethylene diamine	845	0	2	1	II	XX	0	NI	0	R	2	NI	1	1	(3)	3A	3	SR	0	D	3	
Hexamethylene diamine adipate, 50% in water	846	0	1	1	II	X	0	NI	0	R	1	NI	0	(0)	(0)	0	0		0	D	0	
Hexamethylene glycol	847	0	0	1	0	0	0	NI	0	R	1	NI	0	0	(0)	0	1		0	D	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Hexamethyleneimine	848	0	2	3	II	X	1	NI	1	NI	2	NI	3	1	2	NI	NI		0	FED	2	
Hexamethylene tetramine (40% solution)	849	0	0	1	II	XX	0	NI	0	R	0	NI	0	0	(0)	0	1	S	0	D	2	
Hexanoic acid	853	0	1	1	I	X	2	NI	2	R			0	0	(2)	1	3		0	FD	3	
1-Hexanol	854	0	1	1	II	XX	1	0	0	R	2	NI	1	0	(0)	1	3		0	FD	3	
Hexene (all isomers)	2224						3	NI	3	R	3	NI	(0)	(0)	(0)	(0)	(0)			E	(0)	
1-Hexene	855	0	2	(1)	0	0	3	NI	3	R	3	NI	0	0	0	0	0		0	E	0	
2-Hexene (mixed isomers)	856	0	(2)	-	0	0	3	NI	3	R	3	NI	(0)	(0)	(0)	(0)	(0)		0	E	(0)	
Hexyl acetate	857	0	3	0	0	0	2	NI	2	NI			0	0	(0)	1	1		0		1	
sec-Hexyl acetate	858	0	(2)	0	0	0	2	NI	2	NI	3	NI	0	0	0	1	(2)		0	FED	2	
Hexylene glycol	859	0	0	1	0	0	0	NI	0	R	0	0	0	0	(2)	2	2		0	D	2	
Hitec 320	2003	0	3	0	II	XX	NI	NI	NI	NI	3	NI	0	0	(0)	2	2		0		2	
Hydrochloric acid	864	0	1	1	0	0	Inorg	0	0	Inorg	1	NI	1	1	3	3C	3		0	DE	3	
Hydrogen peroxide, more than 60%	867	0	2	0	I	0	Inorg	0	0	Inorg	3	NI	1	0	2	3	3		0	D	3	
Hydrogen peroxide, more than 8% but not more than 60%	2231						Inorg	0	0	Inorg	3	NI	1	0	(2)	3	3			D	3	
N-(2-Hydroxyethyl) ethylene diamine triacetic acid, trisodium salt (solution)	870	0	1	1	II	0	0	NI	0	NI	1	NI	0	0	(0)	1	1	R	0	D	3	
2-Hydroxy-4-(methylthio) butanoic acid	871	0	1	1	II	XX	1	NI	1	R	1	NI	0	0	(2)	1	3		0	D	3	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Icosa(oxypropane-2,3-diyl)s	2092	0	3	(1)	I	X	NI	NI	NI	NI	NI	NI	0	(0)	(2)	2	(2)		0	Fp	3	
Isobutanol	382	0	0	1	I	X							0	0	1	2	3		0		3	
Isobutyl formate	405	0	1	1	I	X	1	NI	1	NI	1	NI	0	(0)	0	(1)	(2)		0		2	
Isooctanol	1076	T	2	1	0	X	3	NI	3	NI	2	0	1	0	(0)	2	(2)		Ta		2	
Isophorone diamine	880	0	1	1	II	XXX	0	0	0	NR	2	0	1	(1)	(2)	3	3	S	0	D	3	
Isophorone diisocyanate	881	-	3	1	II	XXX	1	NI	1	NR	4	NI	0	0	4	3	3	AS	NI	S	3	
Isoprene	882	0	2	0	I	0	2	2	2	NR	2	NI	0	0	0	1	2		0	E	2	
Isopropanol	1181	0	0	1	0	0	0	NI	0	R	0	0	0	0	0	1	2		0	D	2	
Isopropanolamine	1182	0	2	1	I	X	0	NI	0	R	2	NI	0	1	0	3	3		0	D	3	
Isopropylamine	1195	0	2	1	II	XXX	0	NI	0	R	2	NI	2	2	1	3	3		0	DE	3	
Isopropyl benzene	1197	T	3	1	I	X	3	2	2	R	3	NI	0	0	0	2	1		Tt	FE	2	
Isopropyl cyclohexane	1199	0	(3)	0	0	0	4	NI	4	(NR)	(3)	NI	NI	NI	NI	NI	NI		0	FE	NI	
Isovaleraldehyde	1390	T	2	1	II	XX							0	0	0	2	2		Ta	ED	2	
Kaolin slurry	883	0	D	0	0	0	Inorg	NI	0	Inorg	0	NI	0	0	0	0	0		0	S	0	
Lactic acid	886	0	1/BOD	1	0	0	0	NI	0	R	1	NI	0	0	(1)	2	3		0	D	3	
Lactonitrile solution (80% or less)	887	0	3	2	II	XX	0	NI	0	R	4	NI	2	4	(4)	NI	NI		0	D	3	
Lard	888	0	0	0	0	X	0	NI	0	R	NI	NI	0	0	(0)	0	1		0	F	1	
Latex,ammonia inhibited	889	0	1	0	0	XX	0	NI	0	R	(2)	NI	NI	NI	NI	NI	NI		0	NI	NI	
Lauric acid	891	0	3	0	0	0	4	NI	4	R	3	NI	0	0	(0)	1	1		0	F	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Lignin sulphonic acid, salt,solution	34	0	0	0	0	0	NI	NI	NI	NI	0	NI	0	(0)	NI	NI	NI		0	D	NI	
Linseed oil	905	0	0	0	I	XX	0	NI	0	R	NI	NI	0	0	0	0	(1)		0	Fp	2	
Long chain alkaryl polyether (C11-C20) (LOA)	1982	0	2	1	II	XX	(4)	NI	(4)	NR	3	(1)	0	0	(0)	0	2		0	NI	2	
Long chain alkaryl sulphonic acid (C16-C60) (LOA)	1966	0	0	0	II	XX	NI	NI	NI	(NR)	0	NI	0	0	(0)	(1)	2		0	NI	2	
Lubrizol polyolefin anhydride	1865	0	0	0	0	XX							0	0	(0)	1	2		0	NI	2	
Magnesium alkyl (long chain) salicylate (overbased) in mineral oil (LOA)	71	0	2	0	I	XX	NI	NI	NI	NR	1	NI	0	0	(0)	1	(1)		0	S	1	
Magnesium chloride	915	0	0	1	0	0	Inorg	0	0	Inorg	1	0	0	0	(0)	0	0		0		0	
Magnesium hydroxide slurry	916	0	0	0	0	0	Inorg	0	0	Inorg	0	NI	0	0	(0)	(0)	1		0	S	1	
Magnesium long chain alkaryl sulphonate (C11-C50) (LOA)	1967	0	0	0	0	XX	NI	NI	NI	(NR)	0	NI	0	0	(0)	0	0		0	NI	0	
Maleic anhydride	921	0	1	2	II	XX	1	NI	1	R	2	0	1	2	(2)	3	3	S	0	D	3	
2-Mercaptobenzothiazol	925	0	3	2	II	XX	2	1	1	NR	4	2	0	0	(0)	0	0	S	0	S	2	
Mesityl oxide	946	0	1	1	I	0	1	NI	1	R	(1)	NI	1	0	2	2	2		0	D	2	
Metam-sodium (ISO)	202	0	4	2	II	XX	0	NI	0	NR	5	NI	1	2	(2)	2	1	S	0	D	2	
Methacrylic acid, inhibited	948	0	(1)	1	II	XX	0	NI	0	R	2	0	1	2	2	3	3		0	D	3	
Methacrylonitrile	949	0	1	2	I	X	0	NI	0	R	2	0	3	2	4	1	1	S	NT	ED	3	
Methyl acetate	954	0	0	1	0	0	0	NI	0	R	1	NI	0	0	0	1	2		0	DE	2	
Methyl acetoacetate	335	0	1	1	I	X	0	NI	0	R	1	NI	0	0	(1)	1	2		0	D	2	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Methyl acrylate	955	0	3	2	II	XXX	0	NI	0	R	3	NI	2	1	2	2	2	MS	0	D	3	
Methylamine solution 42% or less	957	0	2	2	II	XXX	0	NI	0	R	2	NI	2	(2)	3	3	3	M	0	DE	3	
Methyl amyl alcohol	958	0	(2)	1	I	X	1	NI	1	R	1	NI	1	0	2	1	3		0	FED	3	
Methyl butenol	967	0	(1)	1	I	X	0	NI	0	R	2	NI	1	0	(1)	2	2		0	D	2	
Methyl butyl ketone	970	0	1	1	II	XXX	1	NI	1	R	1	0	0	0	0	1	1	NR	0	FED	3	
Methylbutynol	968	0	1	1	I	0							1	1	3	0	2		0	D	2	
Methyl butyrate	973	0	(2)	1	I	X	1	NI	1	NI	(2)	NI	0	0	2	2	(2)		0	ED	2	
Methyl cyclohexane	976	0	3	-	-	-	3	3	3	NR	3	1	0	0	1	1	1	A	0		2	
Methyl cyclopentadiene, dimer	977	0	(3)	1	I	X	4	NI	4	(NR)	(3)	NI	0	NI	NI	NI	NI		0	F	1	
N-Methyldiethanolamine	1491	0	1	1	I	X	0	NI	0	R	2	NI	1	0	(1)	1	2		0	D	2	
2-Methyl-6-ethylaniline	984	0	2	1	II	XX	2	NI	2	NR	2	NI	1	1	(1)	0	2		0	FD	2	
1,4-Methyl ethyl benzene	985	T	3	0	0	0	3	NI	3	NI	(3)	NI	0	0	0	2	2		Ta	F	3	
2-Methyl-5-ethylpyridine	986	(T)	(1)	1	II	XX	2	NI	2	NI	2	NI	1	2	(2)	3	3		Ta	FD	3	
Methyl formate	987	0	1	1	I	X	0	NI	0	R	1	NI	1	0	2	0	2		0	DE	2	
N-Methylglucamine, 60% aqueous solution	2048	0	0	0	I	X	0	NI	0	R	0	NI	1	0	(1)	0	3		0		3	
Methyl heptyl ketone	988	T	3	1	I	X	3	NI	3	R	3	NI	0	0	NI	NI	NI		Ta	FED	NI	
Methyl isobutyl ketone	971	0	1	1	I	X	1	NI	1	R	1	0	1	0	2	2	3		0	FED	3	
Methyl methacrylate	995	0	1	1	II	XXX	1	NI	1	R	2	NI	0	0	0	2	2	S	0	ED	2	
3-Methyl-3-methoxy butanol	996	0	0	0	I	X	1	NI	1	NR	0	NI	0	(0)	NI	1	NI		0	NI	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
3-Methyl-3-methoxybutyl acetate	997	0	0	0	I	X	1	NI	1	NR	0	NI	0	(0)	Ni	NI	NI		0	NI	NI	
Methyl naphthalenes	1999	T	(3)	1	0	X	4	NI	4	(NR)	(4)	NI	1	0	(1)	1	1		Ta	F	1	
Methyl propyl ketone	1003	0	0	1	I	X	0	NI	0	R	0	NI	1	0	(0)	1	2		0	FED	2	
2-Methyl pyridine	1005	0	1	1	II	XX	1	NI	1	R	1	NI	1	2	1	3A	3		NT	D	3	
3-Methylpyridine	1006	0	2	1	II	XXX	1	NI	1	R	1	NI	1	2	2	3	3		0	D	3	
4-Methylpyridine	1007	0	1	1	II	XX	1	NI	1	R	1	NI	1	2	2	3	3		0	D	3	
N-Methylpyrrolidone	1008	0	1	0	0	0	0	NI	0	R	1	NI	0	0	2	1	2	R	0	D	3	
Methyl salicylate	86	(T)	2	2	II	XX	2	NI	2	R	2	NI	1	1	1	2	1	R	Ta	SD	3	
alpha-Methylstyrene	1010	T	3	1	0	X	3	3	3	NR	3	NI							Ta	FE	1	
Metolachlor (ISO)	113	0	3	1	I	X	2	2	2	NR	5	1						S	0	S	2	Skin sensitizer
Mobil syndril E51	2221	0	1	1	-	-	0	NI	0	R	1	NI	0	(0)	NI	1	2			F	NI	
Mononitrobenzene	1017	(T)	2	2	II	XXX	1	1	1	R	3	(4)	(2)	2	2	1	1	CR	Ta	SD	3	
Morpholine	1018	0	2	1	I	0	0	0	0	R	2	NI							0	D	0	
Myrcene	1019	0	1	0	0	0	4	NI	4	R	4	1	0	0	NI	2	NI		0	F	3	
Naphthalene	1	T	3	2	I	X	3	3	3	NR	4	1	1	0	(1)	1	1	C	Tt	S	3	
Naphthalene sulphonic acid condensed with formaldehyde, sodium salt, solution	1020	0	1	1	II	XX	0	1	1	(NR)	1	NI	0	(0)	NI	0	NI		0	D	NI	
Naphthenic acids	1021	(T)	3	1	0	X							1	NI	NI	NI	NI		Ta	FD	1	
alpha-Naphthyl thiourea	82	0	3	3	II	XXX													0		3	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Neodecanoic acid	1025	0	2	1	II	XX	4	NI	4	NR	2	NI	0	0	(1)	0	2		0	Fp	3	
Nitric acid (90% or less)	1029	0	2	2	II	X	Inorg	NI	0	Inorg	2	NI	(3)	(1)	4	3C	3		0	D	3	
Nitrilotriacetic acid,trisodium salt	1030	0	0	1	II	XX	0	NI	0	R	1	0	1	(0)	0	1	1	CMR	0	D	3	
Nitroethane	1037	0	1	1	I	X	0	NI	0	NR	2	NI	1	0	(1)	(0)	(1)		0		1	
Nitroethane (80%)/Nitropropane (20%)	2245						0	1	1	NR	2	NI										
2-Nitrophenol	1041	0	3	1	I	XX	1	2	2	R	3	(2)	0	0	(0)	1	1		0	S	1	
1- or 2- Nitropropane	2242						0	1	1	NR	1	NI	1	0	2	0	1	CM		FED	3	
2-Nitropropane	1045	0	1	2	II	XX							2	0	2	0	0	CM	0	FED	3	
Nitropropane (60%) Nitroethane (40%) (mixture)	1046	0	1	2	II	XX	0	1	1	NR	2	NI	1	0	2	0	1	CM	0		3	
o-Nitrotoluene	1049	(T)	2	1	I	XX							1	0	(0)	0	1	M	Ta	S	3	
p-Nitrotoluene	1051	(T)	2	1	I	XX							1	0	NI	NI	NI	M	Ta		3	
o- or p-Nitrotoluenes	2241						2	2	2	NR	3	1	1	0	NI	NI	NI	M		S	3	
Nonane	1054	0	3	(0)	0	0							0	0	1	(0)	(0)	A			2	
Nonanoic acid	1055	0	1	1	II	XX	3	NI	3	R	2	NI	0	0	NI	2	3		0	F	3	
Nonene (All isomers)	2222						4	NI	4	NI	3	NI	0	0	0	1	1			FE	1	
1-Nonene	1060	0	3	(1)	0	0	4	NI	4	NI	3	NI	0	0	0	1	1		0	FE	0	
Nonyl acetate	1766	0	(2)	0	-	-	4	NI	4	NI	NI	NI	0	0	NI	NI	NI		0	F	1	
Nonyl methacrylate monomer	1061	0	0	-	-	-							NI	NI	NI	NI	NI		0	NI	NI	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Nonyl phenol	1062	Z	4	1	II	XX	5	4	4	NR	5	3	1	0	(1)	3	3		0	FD	3	
Nonyl(C6-C12)phenol poly(4-12)ethoxylate	1063	0	3	1	I	X	4	NI	4	NR	3	1	0	0	NI	2	1		0	D	2	
Octane	1072	0	3	(1)	0	0	5	NI	5	(R)	4	NI	(0)	(0)	0	0	0	A	0		2	
Octanoic acid (Caprylic acid)	1074	0	1	0	I	X	3	NI	3	R	1	NI	0	0	(2)	3	3		0	F	3	
1-Octanol	1075	T	2	1	0	X	3	NI	3	NI	2	0	1	0	(0)	2	2		Ta	Fp	3	
Octene (all isomers)	1079	0	3	0	I	X	4	NI	4	NR	3	NI	0	0	(1)	2	0		0	FE	2	
Octyl acetate	1080	0	2	1	I	X	3	NI	3	R	2	NI	0	0	NI	1	NI		0	FD	1	
Octyl decyl adipate	1082	0	0	-	-	-	0	NI	0	NI	(0)	NI	NI	NI	NI	NI	NI		0	NI	NI	
Octyl decyl phthalate	1084	0	0	0	0	XX							0	0	(0)	1	1	R	0		3	
OGA 480 OGA 492 (Polyether amine)	1457	0	2	1	II	XX	NI	NI	NI	NR	2	NI	0	0	(1)	2	2		0	NI	2	
Olefin/Alkyl ester copolymer (molecular weight 2000+) (LOA)	1965	0	0	-	-	XXX	NI	NI	0	NR	0	NI	0	0	(0)	0	0		0	Fp	2	
Oleic acid	1089	0	1	0	I	XX	0	NI	0	R	0	NI	0	1	(0)	1	1		0	Fp	2	
Oleylamine	1862	0	4	1	II	XX	NI	NI	NI	NR	4	NI	1	(1)	(2)	3B	3		0	Fp	3	
Olive oil	1090	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	0	1		0	Fp	2	
OLOA 225	1754	0	0	0	I	X	NI	NI	NI	(NR)	0	NI	0	0	(1)	2	2		0	NI	2	
Palm nut oil	1094	0	0	0	0	XX	0	NI	0	R	NI	NI	(0)	(0)	(0)	(0)	(1)		0	F	2	
Palm oil	2249						0	NI	0	R	0	NI	0	(0)	(0)	(0)	0			F	0	
Palm olein	2250						0	NI	0	R	0	NI	0	(0)	(0)	(0)	0			Fp	0	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Palm stearin	2251						0	NI	0	R	0	NI	0	(0)	(0)	(0)	0			F	1	
Paraffin wax	1086	0	0	0	0	0	0	NI	0	R	0	NI	(0)	(0)	(0)	1	1		0	F	1	
Paraldehyde	1098	0	2	1	I	X	0	0	0	NR	0	NI	1	0	0	1	3		0	D	3	
Pentachloroethane	1099	Z	3	2	0	X	3	2	2	NI	3	1							0	S	1	
1,3-Pentadiene	1102	0	2	-	-	-	2	NI	2	NI	2	NI	NI	NI	0	NI	NI		0	E	NI	
Pentaethylene hexamine	1103	0	(1)	1	II	XX	0	NI	0	NI	NI	NI	1	NI	NI	3	NI		0	D	3	
Pentane	1105	0	3	0	0	0	3	NI	3	R	3	NI	1	0	0	0	NI		0	E	1	
Pentanoic acid	1109	0	1	1	II	XX	1	NI	1	NI	2	NI	1	2	(2)	3	3		0	FD	3	
Pentene (all isomers)	1992	0	2	(1)	0	0	2	NI	2	NI	2	NI	(0)	(0)	(0)	(0)			0	E	0	
Petrolatum	2244												0	0	0	1	1	C		F	3	
Petroleum wax	1122	0	0	0	0	X	0	NI	0	NR	0	NI							0	F	1	
Phenylxylylethane	1135	-	-	1	-	-	5	4	4	NR	(2)	NI	1	0	(0)	(0)	0		NI	F	1	
Phosphorus (elemental yellow)	1139	+	4	4	II	XXX	Inorg	(3)	(3)	Inorg	6	4	4	(4)	(4)	3C	3		0	S	3	
Phthalic anhydride (molten)	1146	0	2	1	II	XX	1	NI	1	R	2	0	1	0	(2)	1	3	S	0	S	3	
alpha-Pinene	40	T	3	1	II	XX	4	NI	4	NI	4	NI	0	0	0	1	(1)	S	Tt	F	3	Skin sensitizer
beta-Pinene	41	0	3	1	II	XX	4	NI	4	NI	4	NI	0	0	0	1	(1)	S	NT	F	3	Skin sensitizer
Pine oil	1148	0	2	1	I	X							0	0	(0)	(1)	(1)	S	0	NI	2	Sensitizer
Poly(C18-C22)alkyl acrylate in xylene	1151	0	2	1	I	X													0	F	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Polyalkylene glycol-monobutyl ether	1152	0	(1)	(1)	I	X	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI		0	D	1	
Polyalkylene oxide polyol	1441	0	2	0	0	0							0	0	(0)	(1)	(1)		0	Fp	2	
Polyaluminium chloride (sol.)	1136	0	0	(0)	0	0	Inorg	0	0	Inorg	0	NI	(0)	(0)	(0)	(0)	(1)		0	NI	1	
Polybutene	1154	0	0	0	0	0	NI	NI	NI	NI	0	NI	(0)	(0)	(0)	(0)	(0)		0	Fp	2	
Polybutenylsuccinimide in oil	2055	0	0	0	0	XX	NI	NI	NI	NR	0	NI	(0)	(0)	(0)	0	(0)		0	NI	0	
Poly(2+)cyclic aromatics	2246						4	4	4	NR	(4)	NI	(1)	(1)	(1)	(1)	(1)	CM		S	3	
Polyether (molecular weight 2000+) (LOA)	1975	0	1	-	-	-							(0)	(0)	(0)	(0)	(0)		0	NI	NI	
Polyethylene amines	1991	0	(2)	1	0	0							0	0	0	0	0		0	D	0	
Polyethylene glycol	1157	0	0	0	0	0	0	NI	0	NR	0	NI	0	0	0	1	1		0	D	1	
Polyethylene glycol dimethyl ether	1158	0	0	0	0	0	0	NI	0	NR	0	NI	0	0	(0)	1	(1)		0	NI	1	
Polyferric sulphate solution	338	0	(2)	1	I	X	Inorg	0	0	Inorg	(2)	NI	1	(1)	(2)	3	(3)		0	D	3	
Polyglycerine, sodium salt, solution	1874	0	0	0	0	0	NI	NI	NI	NI	NI	NI	0	0	(0)	(2)	3		0	D	3	
Polyglycerol	1511	0	0	0	0	0	NI	NI	NI	NI	NI	NI	0	(0)	(0)	(0)	(0)		0	NI	0	
Polymethylene polyphenyl isocyanate	1153	0	0	0	II	XX	NI	NI	NI	NI	0	NI	0	0	(2)	3	3		0	S	3	
Polyolefin amide alkeneamine borate (C28-C250) (LOA)	1970	0	0	0	I	XXX	0	NI	0	NR	0	NI	0	0	(0)	0	(0)		0	Fp	2	
Polyolefin amide alkylene amine polyol	1989	0	0	0	I	XXX	0	NI	0	NI	0	NI	NI	NI	NI	NI	NI		0		3	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Polyolefinamine (C28-C250) (LOA)	2107	0	2	0	I	XX													0	FE	2	
Polyolefin ester (C28-C250) (LOA)	1969	0	0	0	0	XXX	0	NI	0	NR	0	NI	0	0	(0)	0	0		0	NI	0	
Polyolefin (molecular weight 300+) (LOA)	1968	0	0	0	0	0							0	0	0	0	0		0	Fp	2	
Polyolefin phenolic amine (C28-C250) (LOA)	1980	0	0	0	I	XX	0	NI	0	NI	0	NI	0	0	(0)	0	0		0	Fp	2	
Polyolefin phosphoro sulphide - barium derivative (C28-C250) (LOA)	1976	0	2	1	0	0	0	NI	0	NI	2	NI	0	(0)	(0)	(0)	(0)		0	Fp	2	
Polyoxyethylene sorbitan monooleate	1442	0	0	0	0	0	3	NI	3	NI	(3)	NI	0	(0)	(0)	0	1		0	D	1	
Polypropylene	1512	-	-	-	-	-	0	NI	0	NR	NI	NI	(0)	(0)	(0)	(0)	(0)		NI	NI	NI	
Polypropylene glycol	1159	0	1	0	0	0	0	NI	0	NI	1	NI	0	0	(0)	1	1		0	D	1	
Polysiloxane	1161	0	0	0	0	0	NI	4	4	NI	2	NI	0	(0)	(0)	0	0		0	F	1	
Potassium hydroxide (sol.)	1171	0	1	2	II	X	Inorg	0	0	Inorg	2	NI	2	(2)	(3)	3C	3		0	D	3	
Potassium oleate	1497	0	(2)	-	I	X	3	NI	3	R	4	NI	(0)	(0)	(0)	1	1		0	SD	1	
Propanol	1180	0	0	1	0	0	0	NI	0	R	0	NI	1	0	0	1	2	R	0	D	3	
Propanolamine	1183	0	2	1	I	X	0	NI	0	R	2	NI	0	1	(2)	3	3		0	D	3	
beta-Propiolactone	1184	0	1	2	II	XXX	0	NI	0	R	(2)	NI	2	(2)	4	3B	3	CM	0	D	3	Carcinogen
Propionaldehyde	1185	T	2	1	I	X	0	NI	0	R	2	NI	1	0	1	2	2		Ta	DE	2	
Propionic acid	1186	0	1	1	II	XX	0	NI	0	R	2	NI	0	0	(1)	3B	3		0	D	3	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Propionic anhydride	1187	0	2	1	I	X	0	NI	0	R	2	NI	0	0	(1)	2	3		0	F	3	
Propionitrile	1188	0	2	3	II	XX	0	NI	0	NI	0	NI	3	3	4	1	2	R	0	D	3	
Propyl acetate	1191	0	1	0	0	0	1	NI	1	R	2	NI	0	0	0	1	1		0	ED	1	
Propylamine	1194	0	2	1	II	XXX	0	NI	0	NI	1	NI	2	2	3	3	3	A	0	DE	3	Lachymator; Aspiration hazard
Propyl chloride	1198	0	1	(1)	0	0	2	NI	2	NI	1	NI	0	NI	NI	NI	NI		0	FED	0	
Propylene dimer	1201	0	(2)	1	0	0	3	NI	3	R	3	NI	NI	NI	NI	NI	NI		0	F	1	
1,2-Propylene glycol	1202	0	0	0	0	0	0	NI	0	R	0	0	0	0	(0)	0	1		0	D	1	
Propylene glycol methyl ether acetate	1759	0	1	1	I	X	0	NI	0	NR	1	NI	0	0	0	0	1		0	FD	1	
Propylene glycol mono ethyl ether	1203	0	(1)	0	I	X	0	NI	0	NR	0	NI	0	1	0	2	3		0	D	3	
Propylene oxide	76	0	2	1	II	XX	0	NI	0	R	2	NI	1	1	2	2	3	CMR	0	DE	3	
Propylene oxide/Ethylene oxide mixture	78	0	2	2	II	XX	0	NI	0	R	1	NI	1	1	3	3	3	CMR S	3	DE	3	
Pyridine	1213	0	1/B OD	1	I	XX	0	NI	0	NI	3	0	1	1	2	1	3		NT	D	3	
Rape seed oil	1217	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	NI	NI		0	Fp	2	
Rosin	1219	0	3	0	II	XX	3	NI	3	NR	3	NI	0	0	2	(1)	1	S	0	S	2	Skin sensitizer
Rosin soap (disproportionated solution)	1220	0	3	1	0	X	3	NI	3	NR	3	NI	0	NI	NI	NI	NI		0	S	1	
Sodium acetate	1498	0	(1)	1	I	X	0	NI	0	R	0	NI	0	0	0	1	1		0	D	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Sodium aluminate (solution)	1234	0	1	1	I	0	Inorg	0	0	Inorg	NI	NI	(0)	(0)	NI	(3)	(3)		0	D	3	
Sodium aluminosilicate slurry	1235	0	0	0	0	0	Inorg	0	0	Inorg	1	0	0	0	0	1	1		0	S	1	
Sodium benzoate	1475	0	1	1	I	X	0	NI	0	R	1	NI	0	(0)	(1)	0	1		0	D	1	
Sodium carbonate	1243	0	1	0	0	0	Inorg	0	0	Inorg	1	NI	0	0	3	1	2		0	D	2	
Sodium chlorate solid and solutions (50% or less)	1244	0	0	2	0	0	Inorg	0	0	Inorg	1	NI	1	0	(1)	1	1	S	0	D	2	
Sodium dichromate solution	487	0	2	2	II	XX	Inorg	0	0	Inorg	2	1	2	2	4	2	3	CMS	0	D	3	Animal carcinogen; Tetratogen
Sodium hydrogen sulphide/Ammonium sulphide(mixture)	1253	0	3	2	II	XX	Inorg	0	0	Inorg	3	NI	1	1	0	2	2		0	D	2	
Sodium hydrogen sulphide (6% or less)/sodium carbonate (3% or less)	2262												0	0	0	0	1				1	
Sodium hydrogen sulphide,solutions	1252	0	3	2	II	XX	Inorg	0	0	Inorg	1	NI							0	D	2	
Sodium hydrogen sulphite,solutions	1251	0	(2)	1	0	0	Inorg	0	0	Inorg	1	NI	0	(0)	(0)	0	0		0	D	0	
Sodium hydroxide	1254	0	1	1	II	X	Inorg	0	0	Inorg	2	NI	1	1	(4)	3C	3		0	D	3	
Sodium hypochlorite solutions containing 20% and less but more than 2% NaOCl	1256	0	2	2	II	XX	Inorg	0	0	Inorg	4	1	0	0	1	3	3	S	0	D	3	Skin sensitizer
Sodium nitrite	340	0	3	2	0	0	Inorg	0	0	Inorg	3	0	2	(2)	2	0	1		0	D	2	
Sodium petroleum sulphonate	1860	0	3	0	II	XXX	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI		0	S	3	
Sodium polyacrylate solution	1487	0	0	1	0	0	NI	NI	NI	NR	1	NI	0	(0)	(1)	2	(2)	S	0	D	2	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Sodium sulphate (solution)	1499	0	0	0	0	0	Inorg	0	0	Inorg	0	0	0	(0)	(0)	1	1		0	D	1	
Sodium sulphide (solution)	1263	0	2	2	II	XX	Inorg	0	0	Inorg	3	NI	1	1	(3)	3A	3		0	D	3	
Sodium sulphite (solution)	9	0	2	1	0	0	Inorg	0	0	Inorg	2	NI	0	(0)	(0)	0	1		0	D	1	
Sodium tartrate succinate/Sodium tartrate disuccinate mixtures	1771	0	1	1	I	0	NI	1	1	NI	1	NI	0	NI	NI	NI	NI		0	D	0	
Sodium thiocyanate	1264	0	(3)	1	0	0	Inorg	0	0	Inorg	2	NI	1	(0)	(0)	0	0		0	D	1	
Sorbitol	1265	0	0	0	0	0	0	NI	0	R	NI	NI	0	(0)	(0)	(0)	(0)		0	D	0	
Soya bean oil	1267	0	0	0	0	XX	0	NI	0	R	0	NI	0	0	(0)	(0)	1		0	Fp	2	
Styrene butadiene rubber latex	1274	0	0	0	I	X	0	NI	0	NI	0	NI	NI	NI	NI	NI	NI		0	NI	NI	
Sulpho hydrocarbon (C3-C88) (LOA)	1972	0	1	0	0	XX	NI	NI	NI	NR	1	NI	0	0	0	0	0		0		0	
Sulpholane	1277	0	1	1	0	0	0	1	1	NR	2	0	1	0	0	1	2		0	D	2	
Sulphur	906	0	0/D	0	0	0	Inorg	0	0	Inorg	0	NI	0	0	(0)	1	1		0	S	1	
Sunflower oil	1283	0	0	0	0	XX	0	NI	0	R	NI	NI	0	0	(0)	(0)	(1)		0		2	
Tall oil, crude and distilled	1285	0	3	0	I	XX							0	NI	NI	1	1	Yes	0	Fp	2	
Tall oil fatty acid (resin acids less than 2%)	1287	0	0	0	II	XX	0	0	0	R	0	NI	0	NI	NI	1	1		0	Fp	2	
Tall oil fatty acid, barium salt	1864	0	3	1	I	XX							(1)	(0)	(1)	1	2		0	S	2	
Tall oil soap (disproportionated solution)	1286	0	3	1	0	X							(1)	(0)	(1)	1	2		0	S	2	
Tallow	1288	0	0/BOD	0	0	XX	0	NI	0	R	0	NI	0	0	(0)	(0)	(0)	F	0	Fp	2	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Tallow fatty acid	1289	0	(0)	0	0	XX							0	0	(0)	(0)	(0)		0	Fp	2	
1,1,2,2-Tetrachloroethane	53	Z	2	2	II	X							2	0	2	2	2	MN	0	SD	3	
1,1,2,2-Tetrachloroethylene	1295	Z	2	0	0	X	3	2	2	NR	(3)	2	0	0	0	2	1	CN	0	S	3	
Tetraethylene glycol	1301	0	(0)	0	0	0							0	0	0	1	1		0	D	1	
Tetraethylene pentamine	1302	0	1	1	I	X							0	2	(3)	3	3	S	0	D	3	
Tetraethyl lead	1303	+	4	3	II	XXX	4	5	5	NR	5	NI						NR	0	S	3	Neurotoxic. Male reproductive toxicity.
Tetrahydrofuran	1304	0	1	1	0	0	0	NI	0	R	0	NI	0	(0)	0	1	2		0	DE	2	
Tetrahydronaphthalene	1305	0	2	1	I	X													0	F	1	
1,2,3,4-Tetramethylbenzene	1307	T	3	0	0	0													Ta	F	1	
Toluene diisocyanate	1315	0	2	0	II	XXX	(3)	1	1	NR	2	NI						S	0	S	2	Sensitizer
Toluidines	1316	0	2	2	II	XX													0	FD	2	
2,4-Tolylenediamine	1317	0	2	2	II	XX												C	0		3	Animal carcinogen
Tributyl phosphate	1319	0	3	1	II	XX													0	F	1	
1,2,4-Trichlorobenzene	1323	Z	3	1	I	X													0	S	1	
1,1,2-Trichloroethane	1327	0	2	1	0	0													0	SD	0	
1,2,3-Trichloropropane	1329	0	(2)	2	II	X													0	SD	1	
1,1,2-Trichloro-1,2,2-trifluoroethane	1330	0	2	0	I	X													0		1	
Tricresyl phosphate (less than 1% ortho-isomers)	1331	+	3	1	II	XX												Yes	0	S	2	Delayed neurotoxicity

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Tricresyl phosphate (more than 1% ortho-isomers)	1332	+	4	1	II	XXX												Yes	0	S	3	Delayed neurotoxicity
Tridecane	1333	0	0	-	-	-													0	Fp	2	
Tridecanoic acid	1334	0	3	(1)	0	X													0		1	
Tridecyl acetate	1768	0	0	0	I	X													0	F	1	
Triethylamine	1339	0	2	3	II	XXX												A	0	D	2	Lachrymator; Aspiration hazard
1,3,5-Triethylbenzene	1340	T	4	0	0	0													Tt	F	0	
Triethylene glycol	1341	0	0	0	0	0													0	D	0	
Triethylenetetramine	1346	0	1	1	II	XXX												SA	0	D	2	Skin sensitizer; Aspiration hazard
Triethyl phosphate	1348	0	1	1	II	XX													0	D	2	
Triisopropanolamine	1370	0	0	1	II	X													0	FD	1	
Triisopropylated phenyl phosphates	1375	+	3	0	I	X													0	S	1	
Trimethylacetic acid	1350	0	1	1	I	X													0	F	1	
Trimethylamine	1353	0	2	2	II	XXX												A	0	DE	2	Lachrymator; Aspiration hazard
1,2,3-Trimethyl benzene	1354	T	3	0	I	X													Ta	FE	1	
2,4,4-Trimethyl hexamethylene diamine	1359	0	(1)	(1)	I	XX													0	D	2	
Trimethyl hexamethylene diisocyanate	1360	0	3	-	I	X													0	NI	1	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Trimethylol propane polyethoxylate	1362	0	1	0	0	0													0	NI	0	
2,2,4-Trimethyl-1,3-pentanediol diisobutyrate	1845	0	0	1	I	X													0	F	1	
2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate	1364	0	2	1	0	0													0	Fp	2	
1,3,5-Trioxane	1844	0	0	0	II	XX													0	SD	2	
Tripropylene glycol	1372	0	0	0	0	0													0	D	0	
Trixylenyl phosphate	1377	+	3	(1)	II	XXX													0	S	3	
Tung oil	1378	0	0	0	0	XX			NI	NI	NI	NI	(0)	(0)	(0)	(0)	(1)		0		2	
Turpentine (wood)	1379	T	2	1	II	XX													Ta	FE	2	
Undecanoic acid	1381	0	3	(1)	I	XX													0		2	
1-Undecanol	1382	T	3	1	I	X													Ta	Fp	2	
1-Undecene	1383	0	3	(1)	0	0													0	F	1	
Urea/Ammonium mono and dihydrogen phosphate/ Potassium chloride solution	1386	0	1	0	0	0													0	NI	0	
Urea-ammonium nitrate solutions	1387	0	1	1	0	0													0	D	0	
Urea-formaldehyde resin solution	1388	0	0	1	0	0													0	NI	0	
Urea, solution containing aqueous ammonia	1385	0	2	1	I	X	0	0	0	R	3	2	1	(1)	3				NI	D	2	
Vegetable protein solution,hydrolyzed	1398	0	0	0	0	0													0		0	

NAME	EHS	A	B	C	D	E	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3	F
Vinyl acetate	1400	0	2	1	0	0	0	NI	0	R	2	NI	1	0	2	1	1	C	0	ED	3	
Vinyl ethyl ether	1405	0	2	0	0	XX													0	ED	2	
Vinylidene chloride	1406	0	1	2	II	XX												C	0	SD	3	Animal carcinogen
Vinyl neodecanoate	1404	0	3	0	II	X													0	F	1	
Vinyl toluenes	1409	T	3	1	I	X													Ta	F	1	
White spirit, low (15-20%)aromatic	1411	Z	3	1	II	X													0	FE	1	Not generally representative for all White Spirits
Xylene (mixed isomers)	1408	0	3	1	II	XX	3	2	3	NR	3	0	0	0	0	2	2		NT	FE	2	
Xylenols (mixtures)	1422	T	2	2	II	XX													Ta	FD	2	