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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF
DANGEROUS GOODS AND ON THE GLOBALLY
HARMONIZED SYSTEM OF CLASSIFICATION
AND LABELLING OF CHEMICALS**

Sub-Committee of Experts on the Globally Harmonized System
of Classification and Labelling of Chemicals

Seventh session, 14-16 July 2004
Item 3 (b) of the provisional agenda

DEVELOPMENT OF GUIDANCE FOR IMPLEMENTATION

Safety Data Sheets (SDS)

Transmitted by the expert from Australia

Introduction

1. The document ST/SG/AC.10/C.4/2004/1 provides a formal paper on SDS guidance material to support the GHS document. At its sixth session (December 2003), the Sub-Committee raised a number of issues that required further discussion by the SDS Correspondence Group (ST/SG/AC.10/C.4/12, Annex 2). The Correspondence Group provided further feedback on the guidance document for SDS up to and including comments received on 23rd April 2004. The current document represents the 3rd draft of the SDS guidance document and has been re-drafted in accordance with the outcomes of the 6th session of the Sub-Committee. The most substantial change to the document is that, as requested in paragraph 32 of ST/SG/AC.10/C.4/12, it will now be published as an annex of the GHS document, instead of as a stand-alone document.

Background and History

2. At its fourth session in December 2002, the Sub-Committee agreed to set up a Correspondence Group on Safety Data Sheets (with Australia as lead Country), the objective of which would be to give guidance and more information to help develop SDS in accordance with the provisions contained in the GHS (see report of the 4th session ST/SG/AC.10/C.4/8, para. 28).
3. The SDS Guidance Document has been developed by Australia, and was originally based on the draft guidance material for the development of safety data sheets in Australia and New Zealand, which are aligned with the GHS. It is intended to assist countries in providing guidance for the preparation of SDS in accordance with the information requirements of the GHS.

4. Copies of the draft document was circulated in April and November 2003 and April 2004 to those members of the Sub-Committee that asked to be involved in the development of this GHS guidance material as SDS Correspondence Group members, namely Austria, Belgium, Brazil, Canada, China, Finland, Germany, Italy, Japan, New Zealand, South Africa, Sweden and the United States of America; AISE, CEFIC, IFPCM, ICCA and ISO.
5. The 2nd draft of the document, which was developed in consultation with a smaller drafting group, was considered by the entire Correspondence Group in two separate sessions in the margins of the 6th Meeting of the Sub-Committee. A number of changes to content and format were made at that time.
6. The Sub-Committee asked the Correspondence Group to make some further changes to the document, and to bring a revised draft back to its seventh session in July 2004 as a formal document for consideration (see ST/SG/AC.10/C.4/12, Annex 2). Comments from Correspondence Group members were received by Australia as late as 23 April 2004, and the Guidance Document revised accordingly. This revised 3rd draft of the SDS Guidance Document is attached for the consideration of the 7th session of the Sub-Committee.

Proposal

7. The SDS Correspondence Group requests the Sub-Committee to provide any necessary further comments/amendments to these draft guidelines at its 7th session so that a final document could be proposed for adoption at its 8th session in December 2004, which is the end of the current biennium.

"Annex 10

GUIDANCE ON THE PREPARATION OF SAFETY DATA SHEETS (SDS)

INTRODUCTION

A10.1 The UNSCEGHS, at its fourth session (9-11 December 2002), established a correspondence working group on safety data sheets (SDSs) with Australia as lead country. The objective of the group was to give guidance and more information to help fill in the SDS forms, as detailed in this guidance document.

A10.2 This document provides guidance on the preparation of an SDS under the requirements of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). SDS are an important element of hazard communication in the GHS, as explained in Chapter 1.5. Use of this guidance document and compliance with competent authority (CA) requirements should allow the SDS to be prepared in accordance with the GHS.

A10.3 The use of this guidance document is dependent on importing countries requirements for GHS implementation. Timing of the implementation of this guidance document will depend on transitional arrangements put in place by individual countries. It is hoped that the application of the GHS worldwide will eventually lead to a fully harmonized situation.

A10.4 Unless otherwise stated, all Chapters, Sections and Tables referred to in this annex can be found in the main text of the GHS.

Annex 10

- Part 1 -

GENERAL GUIDANCE FOR COMPILING AN SDS

A10.1.1 Scope and application

Safety Data Sheets (SDS) should be produced for all substances and mixtures which meet the harmonized criteria for physical, health or environmental hazards under the GHS and for all mixtures which contain substances that meet the criteria for carcinogenic, toxic to reproduction or target organ systemic toxicity in concentrations exceeding the cut-off limits for SDS specified by the criteria for mixtures (See Table 1.5.1 of the GHS). The competent authority (CA) may also require SDS for mixtures not meeting the criteria for classification as hazardous but which contain hazardous substances in certain concentrations (See Section 3.2 of the GHS). The CA may also require SDS for substances or mixtures that meet the criteria for classification as hazardous for non-GHS classes/end-points. An SDS is a well-accepted and effective method for the provision of information, and may be used to convey information for substances or mixtures that do not meet or are not included in the GHS classification criteria.

A10.1.2 General guidance

A10.1.2.1 The writer of the SDS needs to keep in mind that an SDS must inform its audience of the hazards of a substance or a mixture and provide information on the safe storage, handling and disposal of the substance or a mixture. An SDS contains information on the potential health effects of exposure and how to work safely with the substance or mixture. It also contains hazard information derived from physicochemical properties or environmental effects, on the use, storage, handling and emergency response measures related to that substance or a mixture. The purpose of this guidance is to ensure consistency and accuracy in the content of each of the mandatory headings required under GHS, so that the resulting safety data sheets will enable users to take the necessary measures relating to protection of health and safety at the workplace, and the protection of the environment. The information in the SDS shall be written in a clear and concise manner. The SDS shall be prepared by a competent person who shall take into account the specific needs of the user audience, as far as it is known. Persons placing substances and mixtures on the market shall ensure that refresher courses and training on the preparation of SDS be regularly attended by the competent persons.

A10.1.2.2 When writing the SDS, information should be presented in a consistent and complete form, with the workplace audience firmly in mind. However, it should be considered that all or part of the SDS can be used to inform workers, employers, health and safety professionals, emergency personnel, relevant government agencies, as well as members of the community.

A10.1.2.3 Language used in the SDS should be simple, clear and precise, avoiding jargon, acronyms and abbreviations. Vague and misleading expressions should not be used. Phrases such as 'may be dangerous', 'no health effects', 'safe under most conditions of use', or 'harmless' are also not recommended. It may be that information on certain properties is of no significance or that it is technically impossible to provide; if so, the reasons for this must be clearly stated under each heading. If it is stated that a particular hazard does not exist, the safety data sheet should clearly differentiate between cases where no information is available to the classifier, and cases where negative test results are available.

A10.1.2.4 The date of issue of the SDS should be stated and be very apparent. The date of issue is the date the SDS version was made public. This generally occurs shortly after the SDS authoring and publishing process is completed. Revised SDSs should clearly state the date of issue as well as a version

number, revision number, supersedes date or some other indication of what version is replaced.

A10.1.3 SDS format

A10.1.3.1 The information in the SDS should be presented using the following 16 headings in the order given below (also see Para 1.5.3.2.1 of the GHS):

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

A10.1.3.2 An SDS is not a fixed length document. The length of the SDS should be commensurate with the hazard of the material and the information available.

A10.1.3.3 All pages of an SDS should be numbered and some indication of the end of the SDS should be given. For example, 'page 1 of 3'. Alternatively, number each page and indicate whether there is a page following (e.g. 'Continued on next page' or 'End of SDS').

A10.1.4 SDS content

A10.1.4.1 General information on SDS content can be found in paragraph 1.5.3.3 of the GHS. More practical information is given below.

A10.1.4.2 The minimum information outlined in Part 2 of this guidance document should be included on the SDS, where applicable and available¹, under the relevant headings. When information is not available or lacking this should be clearly stated. The SDS should not contain any blanks.

A10.1.4.3 In addition, the SDS should contain a brief summary/ conclusion of the data given, making it easy even for non-experts in the field to identify all the hazards for the hazardous substance/mixture.

A10.1.4.4 Use of abbreviations is not recommended because they may lead to confusion or decreased understanding.

¹ Where "applicable" means where the information is applicable to the specific product covered by the SDS. Where "available" means where the information is available to the supplier or other entity that is preparing the SDS.

A10.1.5 Other information requirements

A10.1.5.1 There are information requirements for the preparation of an SDS. The minimum information requirements are outlined in Part 2 of this guidance.

A10.1.5.2 In addition to the minimum information requirements (see A10.1.4.2 of this annex), the SDS may also contain 'additional information'. Where a material has additional relevant and available information about its nature and/or use, that information should be included in the SDS. See A10.2.16 – *Other Information* of this annex for further advice on additional information requirements.

A10.1.6 Units

A10.1.6.1 Numbers and quantities should be expressed in units appropriate to the region into which the product is being supplied. In general, the International System of Units (SI) should be used.

- Part 2 -

MINIMUM INFORMATION REQUIREMENTS FOR THE PREPARATION OF THE SDS

This part describes the minimum GHS information requirements for SDSs. Additional information may be required by competent authorities.

A10.2.1 SECTION 1 – Identification

Identify the substance or mixture and provide the name of the supplier, recommended uses and the contact detail information of the supplier including an emergency contact in this section.

A10.2.1.1 GHS product identifier

In addition, or as an alternative, to the GHS product identifier, the identity of the substance or mixture (GHS product identifier) should be exactly as found on the label. If one generic SDS is used to cover several minor variants of a substance or mixture, all names and variants should be listed on the SDS or the SDS should clearly delineate the range of substances included.

A10.2.1.2 Other means of identification

The substance or mixture may be identified by alternative names, numbers, company product codes, or other unique identifiers. Provide other names or synonyms by which the substance or mixture is labelled or commonly known, if applicable.

A10.2.1.3 Recommended use of the chemical and restrictions on use

Provide the recommended or intended use of the substance or mixture, including a brief description of what it actually does, e.g. flame retardant, anti-oxidant, etc. Restrictions on use should, as far as possible, be stated including non-statutory recommendations by the supplier.

A10.2.1.4 Supplier's details

The name, full address and phone number(s) of the supplier should be included on the SDS.

A10.2.1.5 Emergency phone number

References to emergency information services should be included in all SDS. If any restrictions apply, such as hours of operation (e.g. Monday - Friday, 8:00 a.m. - 6:00 p.m., or 24 hours) or limits on specific types of information (e.g., medical emergencies, or transportation emergencies), this should be clearly stated.

A10.2.2 SECTION 2 – Hazards Identification

This section describes the hazards of the substance or mixture and the appropriate warning information (signal word, hazard statement(s) and precautionary statement(s)) associated with those hazards.

A10.2.2.1 Classification of the substance or mixture

A10.2.2.1.1 This section indicates the hazard classification of the substance or mixture.

A10.2.2.1.2 If the substance or mixture is classified in accordance with Parts 2 and/or 3 of the GHS, provide the appropriate hazard class and category to indicate the hazard. For example, Flammable Liquid Category 1.

A10.2.2.2 GHS label elements, including precautionary statements

A10.2.2.2.1 Based on the classification, provide the appropriate labelling elements: signal word(s), hazard statement(s) and precautionary statement(s).

A10.2.2.2.2 Pictograms (or hazard symbols) may be provided as a graphical reproduction of the symbols in black and white or the name of the symbol, e.g. flame, skull and crossbones.

A10.2.2.3 Other hazards which do not result in classification

Provide information on other hazards which do not result in classification but may contribute to the overall hazards of the material, for example, formation of air contaminants during hardening or processing, dust explosion hazards, suffocation, freezing or environmental effects such as hazards to soil-dwelling organisms.

A10.2.3 SECTION 3 – Composition/information on ingredients

Identify the ingredient(s) of the product in this section. This includes identifying impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. This section may also be used to provide information on complex substances.

NOTE: For information on ingredients, the competent authority rules for Confidential Business Information (CBI) take priority over the rules for product identification. When applicable, indicate that confidential information about the composition was omitted.

A10.2.3.1 Substances***A10.2.3.1.1 Chemical identity of the substance***

The identity of a substance is provided by its common chemical name. The chemical name can be identical to the GHS product identifier.

NOTE: The 'common chemical name' may, for example, be the CAS-name or IUPAC name, as applicable.

A10.2.3.1.2 Common name(s), synonym(s) of the substance

Common names and synonyms should be provided where appropriate.

A10.2.3.1.3 CAS number, EC number for the substance

The Chemical Abstract Service (CAS) Registry Number provides a unique chemical identification and should be provided when available. Other unique identifiers such as the European Community (EC) number could be added, including national or regional identifiers.

A10.2.3.1.4 Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance

Identify any impurities and/or stabilizing additives, which are themselves classified and which contribute to the classification of the substance.

A10.2.3.2 Mixtures

A10.2.3.2.1 For a mixture, provide the chemical identity, identification number and concentration or concentration ranges of all hazardous ingredients, which are hazardous to health or the environment within the meaning of the GHS, and are present above their cut-off levels. Some CA's may require hazard information on all ingredients of a mixture. Manufacturers may choose to list all ingredients, including non-hazardous ingredients.

A10.2.3.2.2 The concentrations of the ingredients of a mixture should be described as:

- (a) exact percentages in descending order by mass or volume; or
- (b) ranges of percentages in descending order by mass or volume if such ranges are acceptable to the appropriate competent national authority.

A10.2.3.2.3 When using a proportion range, the health and environmental hazard effects should describe the effects of the highest concentration of each ingredient, provided that the effects of the mixture as a whole are not available.

NOTE: The 'proportion range' refers to the concentration or percentage range of the ingredient in the mixture.

A10.2.4 SECTION 4 – First-aid measures

This section describes the initial care that can be given by an untrained responder without the use of sophisticated equipment and without a wide selection of medications available. If medical attention is required, the instructions should state this, including its urgency. It may be useful to provide information on the immediate effects, by route of exposure, and indicate the immediate treatment, followed by possible delayed effects with specific medical surveillance required.

A10.2.4.1 Description of necessary first aid measures

A10.2.4.1.1 Provide first-aid instructions by relevant routes of exposure. Use subheadings to indicate the procedure for each route (e.g. inhalation, skin, eye, and ingestion). Describe expected immediate and delayed symptoms.

A10.2.4.1.2 Provide advice whether:

- (a) immediate medical attention is required and if delayed effects can be expected after exposure;
- (b) movement of the exposed individual from the area to fresh air is recommended;
- (c) removal and handling of clothing and shoes from the individual is recommended; and

(d) personal protective equipment (PPE) for first-aid responders is recommended.

A10.2.4.2 Most important symptoms/effects, acute and delayed

Provide information on the most important symptoms/effects, acute and delayed, from exposure.

A10.2.4.3 Indication of immediate medical attention and special treatment needed, if necessary

Where appropriate, provide information on clinical testing and medical monitoring for delayed effects, specific details on antidotes (where they are known) and contraindications.

A10.2.5 SECTION 5 – Fire-fighting measures

This section covers the requirements for fighting a fire caused by the substance or mixture, or arising in its vicinity.

A10.2.5.1 Suitable extinguishing media

Provide information on the appropriate type of extinguishers or fire-fighting agents. In addition, indicate whether any extinguishers are inappropriate for a particular situation involving the substance or mixture.

A10.2.5.2 Specific hazards arising from the chemical

Provide advice on specific hazards that may arise from the chemical, such as hazardous combustion products that form when the substance or mixture burns. For example:

- (a) ‘may produce toxic fumes of carbon monoxide if burning’; or
- (b) ‘produces oxides of sulphur and nitrogen on combustion’.

A10.2.5.3 Special protective equipment and precautions for fire fighters

A10.2.5.3.1 Provide advice on any precaution to be taken during fire-fighting. For example, ‘keep containers cool with water spray’.

A10.2.5.3.2 Provide advice on appropriate protective equipment for fire-fighters. For example, boots, overalls, gloves, eye and face protection and breathing apparatus.

A10.2.6 SECTION 6 – Accidental release measures

This section recommends the appropriate response to spills, leaks, or releases in order to prevent or minimize the adverse effects on persons, property and the environment in this section. Distinguish between responses for large and small spills where the spill volume has a significant impact on the hazard. The procedures for containment and recovery may indicate that different practices are required.

A10.2.6.1 Personal precautions, protective equipment and emergency procedures

Provide advice related to accidental spills and release of the substance or mixture such as:

- (a) the wearing of suitable protective equipment (including personal protective

equipment, see section 8 of this annex) to prevent any contamination of skin, eyes and personal clothing;

- (b) removal of ignition sources and provision of sufficient ventilation; and
- (c) emergency procedures such as the necessity to evacuate the danger area or to consult an expert.

A10.2.6.2 Environmental precautions

Provide advice on any environmental precautions related to accidental spills and release of the substance or mixture, such as keeping away from drains, surface and ground water.

A10.2.6.3 Methods and materials for containment and cleaning up

A10.2.6.3.1 Provide appropriate advice on how to contain and clean up a spill. Appropriate containment techniques may include:

- (a) bunding², covering of drains; and
- (b) capping procedures³.

A10.2.6.3.2 Appropriate clean up procedures may include:

- (a) neutralisation techniques;
- (b) decontamination techniques;
- (c) adsorbent materials;
- (d) cleaning techniques;
- (e) vacuuming techniques; and
- (f) equipment required for containment/clean up (include the use of non-sparking tools and equipment where applicable).

A10.2.6.3.3 Provide any other issues relating to spills and releases. For example, including advice on inappropriate containment or clean up techniques.

A10.2.7 SECTION 7 – Handling and storage

This section provides guidance on safe handling practices that minimize the potential hazards to people, property and the environment from the substance or mixture. Emphasize precautions that are appropriate to the intended use and to the unique properties of the substance or mixture.

² A **bund** is a provision of liquid collection facilities which, in the event of any leak or spillage from tanks or pipe work, will capture well in excess of the volume of liquids held, e.g. an embankment. Bunded areas should drain to a capture tank which should have facilities for water/oil separation.

³ Providing a cover or protection (e.g. to prevent damage or spillage).

A10.2.7.1 Precautions for safe handling

A10.2.7.1.1 Provide advice that:

- (a) allows safe handling of the substance or mixture;
- (b) prevents handling of incompatible substances or mixtures; and
- (c) minimizes the release of the substance or mixture to the environment.

A10.2.7.1.2 Include general warnings on what practices to avoid or restrict. It is good practice to provide advice on general hygiene. For example:

- (a) 'eating, drinking and smoking in work areas is prohibited';
- (b) 'wash hands after use'; and
- (c) 'remove contaminated clothing and protective equipment before entering eating areas'.

A10.2.7.2 Conditions for safe storage, including any incompatibilities

Ensure that the advice provided is consistent with the physical and chemical properties in section 9 – *Physical and Chemical Properties* of this annex. If relevant, provide advice on specific storage requirements including:

- (a) How to avoid:
 - i. explosive atmospheres;
 - ii. corrosive conditions;
 - iii. flammability hazards;
 - iv. incompatible substances or mixtures;
 - v. evaporative conditions; and
 - vi. potential ignition sources (including electrical equipment).
- (b) How to control the effects of:
 - i. weather conditions;
 - ii. ambient pressure;
 - iii. temperature;
 - iv. sunlight;
 - v. humidity; and
 - vi. vibration.

- (c) How to maintain the integrity of the substance or mixture by the use of:
 - i. stabilizers; and
 - ii. anti-oxidants.
- (d) Other advice including:
 - i. ventilation requirements;
 - ii. specific designs for storage rooms/vessels;
 - iii. quantity limits under storage conditions (if relevant); and
 - iv. packaging compatibilities.

A10.2.8 SECTION 8 – Exposure controls/personal protection

Within this guidance the term ‘occupational exposure limit(s)’ refers to limits in the air of the workplace or biological limit values. In addition, for the purposes of this document ‘exposure control’ means the full range of specific protection and prevention measures to be taken during use in order to minimize worker and environmental exposure. Engineering control measures that are needed to minimize exposure to, and risks associated with the hazards of, the substance or mixture should be included in this section.

A10.2.8.1 Control parameters

A10.2.8.1.1 Where available, list the occupational exposure limits (limits in the air of the workplace or biological limit values), including notations, for a substance and for each of the ingredients of a mixture. If air contaminants are formed when using the substance or mixture as intended available occupational exposure limits for these should also be listed. Where possible, the occupational exposure limit for the relevant country(ies) or region, in which the SDS is being supplied, should be listed. The source of the occupational exposure limit should be stated on the SDS. When listing occupational exposure limits, use the chemical identity as specified in section 3 – *Composition/Information on Ingredients* of this annex. Where readily available, list occupational exposure limits established in other countries or regions.

A10.2.8.1.2 Where available, list the biological limit values, including notations, for a substance and for each of the ingredients of a mixture. Where possible, the biological limit value should be relevant to the countries or regions in which the SDS is being supplied. The source of the biological limit value should be stated on the SDS. When listing biological limit values, use the chemical identity as specified in section 3 of this annex.

A10.2.8.2 Appropriate engineering controls

The description of appropriate exposure control measures should relate to the intended modes of use of the substance or mixture. Sufficient information should be provided to enable a proper risk assessment to be carried out. Indicate when special engineering controls are necessary, and specify which type. Examples include:

- (a) ‘maintain air concentrations below occupational exposure standards’, using engineering controls if necessary;

- (b) 'use local exhaust ventilation when...';
- (c) 'use only in an enclosed system';
- (d) 'use only in spray paint booth or enclosure';
- (e) 'use mechanical handling to reduce human contact with materials'; or
- (f) 'use explosive dust handling controls'.

The information provided here should complement that provided under section 7–*Handling and Storage* of this annex.

A10.2.8.3 Individual protection measures, such as personal protective equipment (PPE)

A10.2.8.3.1 Consistent with good occupational hygiene practices, personal protective equipment (PPE) should be used in conjunction with other control measures, including engineering controls, ventilation, and isolation. See also section 5 – *Fire Fighting Measures* of this annex for specific fire/chemical PPE advice.

A10.2.8.3.2 Identify the PPE needed to minimise the potential for illness or injury due to exposure from the substance or mixture, including:

- (a) Eye/face protection - specify the type of eye protection and/or face shield required, based on the hazard of the substance or mixture and potential for contact;
- (b) Skin protection - specify the protective equipment to be worn (e.g. type of gloves, boots, bodysuit) based on the hazards associated with the substance or mixture and the potential for contact;
- (c) Respiratory protection – specify appropriate types of respiratory protection based on the hazard and potential for exposure, including air-purifying respirators and the proper purifying element (cartridge or canister) or breathing apparatus; and
- (d) Thermal hazards - when specifying protective equipment to be worn for materials that represent a thermal hazard, special consideration should be given to the construction of the PPE.

A10.2.8.3.3 Special requirements may exist for gloves or other protective clothing to prevent skin, eye or lung exposure. Where relevant, this type of PPE should be clearly stated. For example, 'PVC gloves' or 'nitrile rubber gloves', and thickness and breakthrough time of the glove material. Special requirements may exist for respirators.

A10.2.9 SECTION 9 – Physical and chemical properties

A10.2.9.1 Describe the empirical data of the substance or mixture (if possible) in this section.

A10.2.9.2 In the case of a mixture, the entries should clearly indicate to which ingredient the data apply, unless it is valid for the whole mixture. The data included in this subsection should apply to the substance or mixture as used.

A10.2.9.3 Clearly identify the following properties and note if specific characteristics do not apply or are not available. Specify appropriate units of measure and/or reference conditions where appropriate.

If relevant for the interpretation of the numeric value, the method of determination should also be provided (e.g. flash point, open-cup/closed-cup):

- Appearance (physical state, colour etc)
- Odour
- pH
- Melting point/freezing point
- Initial boiling point and boiling range
- Flash point
- Evaporation rate
- Flammability (solid, gas)
- Upper/lower flammability or explosive limits
- Vapour pressure
- Vapour density
- Relative density
- Solubility(ies)
- Partition coefficient: n-octanol/water
- Auto-ignition temperature
- Decomposition temperature

A10.2.10 SECTION 10 – Stability and reactivity

A10.2.10.1 Reactivity

A10.2.10.1.1 Describe the reactivity hazards of the substance or mixture in this section. Provide specific test data for the substance or mixture as a whole, where available. However, the information may also be based on general data for the class or family of chemical if such data adequately represent the anticipated hazard of the substance or mixture.

A10.2.10.1.2 If data for mixtures are not available, ingredient data should be provided. In determining incompatibility, consider the substances, containers, and contaminants that the substance or mixture might be exposed to during transportation, storage and use.

A10.2.10.2 Chemical stability

Indicate if the substance or mixture is stable or unstable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

A10.2.10.3 Possibility of hazardous reactions

If relevant, state if the substance or mixture will react or polymerize, releasing excess pressure or heat, or creating other hazardous conditions. Describe under what conditions the hazardous reactions may occur.

A10.2.10.4 Conditions to avoid

List conditions such as heat, pressure, shock, static discharge, vibrations or other physical stresses that might result in a hazardous situation.

A10.2.10.5 Incompatible materials

List classes of chemicals or specific substances with which the substance or mixture could react to produce a hazardous situation (e.g. explosion, release of toxic or flammable materials, liberation of excessive heat).

A10.2.10.6 Hazardous decomposition products

List known and reasonably anticipated hazardous decomposition products produced as a result of use, storage and heating. Hazardous combustion products should be included in section 5 – *Fire Fighting Measures* of this annex.

A10.2.11 SECTION 11 – Toxicological information

A10.2.11.1 This section is used primarily by medical professionals, occupational health and safety professionals and toxicologists. A concise but complete and comprehensible description of the various toxicological (health) effects, and the available data used to identify those effects, should be provided. Under GHS classification, the relevant hazards, for which data should be provided, are:

- (a) acute toxicity;
- (b) skin corrosion/irritation;
- (c) serious eye damage/irritation;
- (d) respiratory or skin sensitisation;
- (e) germ cell mutagenicity;
- (f) carcinogenicity;
- (g) reproductive toxicity;
- (h) stost-single exposure; and
- (i) stost-repeated exposure.

If data for one of these hazards is not available, this should be clearly stated.

A10.2.11.2 The data included in this subsection should apply to the substance or mixture as used. The toxicological data should describe the mixture or formulation. If that information is not available, the classification under GHS and the toxicological properties of the hazardous ingredients should be provided.

A10.2.11.3 The health effects included in the SDS should be consistent with those described in the studies used for the classification of the substance or mixture.

A10.2.11.4 General statements such as ‘toxic’ with no supporting data or ‘safe if properly used’ are not acceptable as they may be misleading and do not provide a description of health effects. Phrases such as ‘not applicable’, ‘not relevant’, or leaving blank spaces in the health effects section can lead to confusion and misunderstanding and should not be used. For health effects where information is not available, this should be clearly stated. Health effects should be described accurately and relevant distinctions made. For example, allergic contact dermatitis and irritant contact dermatitis should be distinguished from each other.

A10.2.11.5 Where there is a substantial amount of test data on the ingredient or the material, it may be desirable to summarise results. e.g. by route of exposure (See A10.2.11.1 of this annex).

A10.2.11.6 Also provide information on the relevant negative data. For example, the statement ‘carcinogenicity studies in the rat have shown no significant increase in the incidence of cancer’.

A10.2.11.7 Information on the likely routes of exposure

Provide information on the likely routes of exposure and the effects of the substance or mixture via each possible route of exposure, that is, through ingestion (swallowing), inhalation or skin/eye exposure. A statement should be made if health effects are not known.

A10.2.11.8 Symptoms related to the physical, chemical and toxicological characteristics

Describe the potential adverse health effects and symptoms associated with exposure to the substance or mixture and its ingredients or known by-products. Provide information on the symptoms related to the physical, chemical, and toxicological characteristics of the substance or mixture following exposure related to the intended uses. Describe the first symptoms at the lowest exposures through to the consequences of severe exposure; for example, 'headaches and dizziness may occur, proceeding to fainting or unconsciousness; large doses may result in coma and death'.

A10.2.11.9 Delayed and immediate effects and also chronic effects from short and long term exposure

Provide information on whether delayed or immediate effects can be expected after short or long term exposure. Also provide information on acute and chronic health effects relating to human exposure to the substance or mixture. Where human data are not available, animal data should be summarised and the species clearly identified. It should be indicated in the SDS whether toxicological data is based on human or animal data.

A10.2.11.10 Numerical measures of toxicity (such as acute toxicity estimates)

A10.2.11.10.1 Provide information on the dose, concentration or conditions of exposure that may cause adverse health effects. Where appropriate, doses should be linked to symptoms and effects, including the period of exposure likely to cause harm.

A10.2.11.11 Interactive effects

Information on interactions should be included if relevant and readily available.

A10.2.11.12 Where specific chemical data are not available

It may not always be possible to obtain information on the hazards of a substance or mixture. In cases where data on the specific substance or mixture are not available, data on the chemical class, if appropriate, may be used. Where generic data are used or where data are not available, this should be stated clearly in the SDS.

A10.2.11.13 Mixtures

If a mixture has not been tested for its health effects as a whole then information on ingredients should be provided (See Section 1.3.2.3 of the GHS). After collecting data on health effects and dose-response for each ingredient, an estimation of the combined health effects needs to be made. When using ingredient data to estimate the health effects of a mixture the following should be taken into account:

- (a) the concentrations of the ingredients, including airborne concentrations;
- (b) the relevant hazard of the material; and

- (c) any potential interactions in the body between the ingredients.

A10.2.11.14 Mixture versus ingredient information

A10.2.11.14.1 Ingredients may interact with each other in the body resulting in different rates of absorption, metabolism and excretion. As a result, the toxic actions may be altered and the overall toxicity of the mixture may be different from its ingredients.

A10.2.11.14.2 It is necessary to consider whether the concentration of each ingredient is sufficient to contribute to the overall health effects of the mixture. The information on toxic effects should be presented for each ingredient, except:

- (a) if the information is duplicated, it is not necessary to list this more than once. For example, if two ingredients both cause vomiting and diarrhoea, it is not necessary to list this twice. Overall, the mixture is described as causing vomiting and diarrhoea;
- (b) if it is unlikely that these effects will occur at the concentrations present. For example, when a mild irritant is diluted in a non-irritating solution, there comes a point where the overall mixture would be unlikely to cause irritation.
- (c) Predicting the interactions between ingredients is extremely difficult, and where information on interactions is not available, assumptions should not be made and instead the health effects of each ingredient should be listed separately.

A10.2.11.15 Other information

Other relevant information on adverse health effects should be included even when not required by the GHS classification criteria.

A10.2.12 SECTION 12 – Ecological information

A10.2.12.1 Provide information to evaluate the environmental impact of the substance or mixture if it were released to the environment. This information can assist in handling spills, and evaluating waste treatment practices and should clearly indicate species, media, units, test duration and test conditions. Where information is not available this should be stated. Provide also a short summary of the data given under A10.2.12.3. to A10.2.12.7 of this annex.

A10.2.12.2 Some ecotoxicological properties are substance specific, i.e. bioaccumulation, persistence and degradability. The information should therefore be given, where available and appropriate, for each substance of the mixture.

A10.2.12.3 Toxicity

Information on toxicity can be provided using data from tests performed on aquatic and/or terrestrial organisms. This should include relevant available data on both acute and chronic aquatic toxicity for fish, crustaceans, algae and other aquatic plants. In addition, toxicity data on other organisms (including soil micro-and macro-organisms) such as birds, bees and plants, should be included when available. Where the substance or preparation has inhibitory effects on the activity of micro-organisms, the possible impact on sewage treatment plants should be mentioned.

A10.2.12.4 Persistence and degradability

Persistence and degradability is the potential for the substance or the appropriate constituents of a mixture to degrade in the environment, either through biodegradation or other processes, such as oxidation or hydrolysis. Test results relevant to assess persistence and degradability should be given where available. If degradation half lives are quoted it must be indicated whether these half lives refer to **mineralization or to primary degradation**. The potential of the substance or certain constituents (also see A10.2.12.6 of this annex) of a mixture to degrade in sewage treatment plants should also be mentioned.

A10.2.12.5 Bioaccumulative potential

Bioaccumulation is the potential for the substance or certain constituents of a mixture to accumulate in biota and, possibly, pass through the food chain. Test results relevant to assess the bioaccumulative potential should be given. This should include reference to the octanol-water partition coefficient (K_{ow}) and bioconcentration factor (BCF), if available.

A10.2.12.6 Mobility in soil

Mobility in soil is the potential of a substance or the constituents of a mixture, if released to the environment, to move under natural forces to the groundwater or to a distance from the site of release. The potential for mobility in soil should be given where available. Information on mobility can be determined from relevant mobility data such as adsorption studies or leaching studies. For example, K_{ow} values can be predicted from octanol/water partition coefficients. Leaching and mobility can be predicted from models.

NOTE: Where real data on the substance or mixture is available this data will take precedence over models and predictions.

A10.2.12.7 Other adverse effects

Information on any other adverse effects to the environment should be included where available, such as environmental fate (exposure), ozone depletion potential, photochemical ozone creation potential, endocrine disrupting potential and/or global warming potential.

A10.2.13 SECTION 13 – Disposal Considerations**A10.2.13.1 Disposal methods**

A10.2.13.1.1 Provide information for proper disposal, recycling or reclamation of the substance or mixture and/or its container to assist in the determination of safe and environmentally preferred waste management options, consistent with the requirements of the national competent authority. For the safety of persons conducting disposal, recycling or reclamation activities, please refer to the information in section 8 – *Exposure Controls and Personal Protection* of this annex.

A10.2.13.1.2 Specify disposal containers and methods.

A10.2.13.1.3 Discuss physical/chemical properties that may affect disposal options.

A10.2.13.1.4 Discourage sewage disposal.

A10.2.13.1.5 Where appropriate, identify any special precautions for incineration or landfill.

A10.2.14 SECTION 14 – Transport information

This section provides basic classification information for the transporting/shipment of a hazardous substance or mixture by road, rail, sea or air. Where information is not available or relevant this should be stated.

A10.2.14.1 UN Number

Provide the UN Number from the UN *Recommendations on the Transport of Dangerous Goods*.

A10.2.14.2 UN Proper Shipping Name

Provide the UN Proper Shipping Name from the UN *Recommendations on the Transport of Dangerous Goods*⁴. For substances or mixtures the UN Proper Shipping Name, as identified in the UN *Recommendations on the Transport of Dangerous Goods*, should be provided in this subsection if it has not appeared as the GHS product identifier or national or regional identifiers.

A10.2.14.3 Transport hazard class(es)

Provide the transport hazard class and subsidiary risk for those substances or mixtures that present a hazard during transport in accordance with the UN *Recommendations on the Transport of Dangerous Goods*.

A10.2.14.4 Packing Group, if applicable

Provide the Packing Group number, if applicable. The Packing Group number is a convention used to classify the degree of hazard within some classes which present a physical hazard.

A10.2.14.5 Environmental hazards

Indicate whether the substance or mixture is a known marine pollutant according to the IMDG-code⁵, and if so, whether it is a 'marine pollutant' or a 'severe marine pollutant'. Also indicate whether the substance or mixture is environmentally hazardous according to the UN⁶, ADR⁷, RID⁸ and ADN⁹.

A10.2.14.6 Special precautions for user

Provide information on any special precautions, which a user needs to be aware of, or needs to comply with in connection with transport.

⁴ United Nations, *Recommendations on the Transport of Dangerous Goods: Model Regulations (as revised)*, New York and Geneva.

⁵ **IMDG-code** means the *International Maritime Dangerous Goods code*.

⁶ **UN** means *United Nations*.

⁷ **ADR** means the *European Agreement concerning the International Carriage of Dangerous Goods by Road, as amended*.

⁸ **RID** means the *European Agreement concerning the International Carriage of Dangerous Goods by Rail, as amended*.

⁹ **ADN** means the *European Agreement concerning the International Transport of Dangerous Goods by Inland Waterways, as amended*.

A10.2.15 SECTION 15 – Regulatory information

Describe any other regulatory information on the substance or mixture that is not provided elsewhere in the SDS.

A10.2.15.1 Safety, health and environmental regulations specific for the product in question

Provide relevant national and/or regional information on the regulatory status of the substance or mixture (including its ingredients) under relevant safety, health and environmental regulations.

A10.2.16 SECTION 16 – Other information

Provide information relevant to the preparation of the SDS in this section. This should incorporate other information that does not belong in sections 1 to 15 of this annex, including information on preparation and revision of the SDS such as:

- (a) the date of preparation of the latest revision of the SDS. When revisions are made to an SDS, unless it has been indicated elsewhere, clearly indicate where the changes have been made to the previous version of the SDS. Suppliers should maintain an explanation of the changes and be willing to provide it upon request;
- (b) a key/legend to abbreviations and acronyms used in the SDS; and
- (c) key literature references and sources for data used to compile the SDS.

NOTE: While references are not necessary in SDSs, references may be included in this section if desired."
