

This is not an official text, just a translation
for convenience.

In case of any divergence of interpretation,
the Korean text shall prevail.

Standard for Classification and Labeling of Chemical Substance and Material Safety Data Sheet

Establishment 09 April 1996 (MoL Public Notice No. 96-12)
Amendment 17 June 1996 (MoL Public Notice No. 96-24)
Amendment 04 January 1997 (MoL Public Notice No. 96-58)
Amendment 17 October 1997 (MoL Public Notice No. 97-27)
Amendment 12 December 2006 (MoL Public Notice No. 2006-36)
Amendment 10 January 2008 (MoL Public Notice No. 2008-1)
Amendment 27 June 2008 (MoL Public Notice No. 2008-29)
Amendment 26 October 2009 (MoL Public Notice No. 2009-68)

Chapter 1 General Provisions

Article 1 (Purpose) The purpose of this notice is to set forth the details of classification, labeling of chemical substances, material safety data sheet (hereinafter referred to as “MSDS”) preparation, and education for workers, etc. for which employer should provide as prescribed in Article 39 Paragraph ① and Article 41 of Industrial Safety and Health Act (hereinafter referred to as “Act”), Article 32-2 of Enforcement Decree of the Act (hereinafter referred to as “Enforcement Decree”), and Article 81 Paragraph ①, Article 92-2 through Article 92-9 and Table 11-2 of Enforcement Regulation of the Act (hereinafter referred to as “Enforcement Regulation”).

Article 2 (Definition) Terms used in this notice shall be defined as follows.

1. “Chemical substance” means an chemical element or substance formed by chemical reaction between elements.
2. “Preparation containing chemical substances” means a product manufactured by adding excipients, solvents, stabilizers, etc. to active ingredient of chemical substance.

3. "Mixture" means a mixture of two or more chemical substances which do not chemically react with each other.
4. "Manufacturer" means a person who domestically produces, manufactures, blends or re-packages chemical substances or preparations containing chemical substances for self-consumption or sale.
5. "Importer" means a person who brings in or wishes to bring in chemical substance from abroad into the country for self-consumption or sale.
6. "Container" means a thing made of synthetic steel, plastic, storage tanks, glass, vinyl bags, paper bags etc. which directly holds chemical substance in solid, liquid or gas form or preparation containing chemical substances. However, cement mixer and cargo container shall not be deemed as a container.
7. "Package" means a thing which holds the containers containing chemical substance or preparation containing chemical substances.
8. "Semi-finished product container" means a container which contains chemical substance temporarily to transfer it from one process to another within a workplace.

Article 3 (Scope of Application and Exemption) ① Chemical substances for which the classification/labeling of chemical substance and the preparation/furnishing etc. of MSDS are required pursuant to Article 39 Paragraph ① and Article 41 of the Act refer to the chemical substances or preparations containing chemical substances falling under any of the following subparagraph (hereinafter referred to as "hazardous chemicals").

1. Physical hazards
 - a. Explosive substances
 - b. Flammable gases
 - c. Flammable aerosols
 - d. Oxidizing gases
 - e. High-pressure gases
 - f. Flammable liquids
 - g. Flammable solids
 - h. Self-reactive substances and mixtures thereof
 - i. Pyrophoric liquids

- j. Pyrophoric solids
 - k. Self-heating substances and mixtures thereof
 - l. Water-reactive substance and mixtures thereof
 - m. Oxidizing liquids
 - n. Oxidizing solids
 - o. Organic peroxides
 - p. Metal-corrosive substances
2. Health hazards
- a. Acute toxic substances
 - b. Skin corrosives/irritants
 - c. Substances causing serious eye damage/eye irritants
 - d. Respiratory sensitizers
 - e. Skin sensitizers
 - f. Germ cell mutagens
 - g. Carcinogens
 - h. Reproductive toxicants
 - i. Specific target organ toxicants (single exposure)
 - j. Specific target organ toxicants (repeated exposure)
 - k. Aspiration hazard

3. Environmental hazards

- a. Hazardous to the aquatic environment

② “Other preparations publicly noticed by Minister of Labor as having less risks of toxicity/explosion, etc” in Article 32-2 Subparagraph 12 of the Enforcement Decree refer to substances as follows.

1. Substance which does not fall under the criteria in Table 1. However, a preparation containing less than 1% of substances defined in Article 3 Paragraph ① Subparagraph 1 shall be included.
2. A preparation as a finished product in solid form which has no risk of worker’s exposure to the product or hazardous chemicals contained therein when handled (except for products containing carcinogens).

Chapter 2 Classification and Labeling of Chemical Substance

Article 4 (Classification of Chemical Substances, etc) ① Detailed standards for classification of chemical substances, etc. pursuant to Article 81 and Table 11-2 Subparagraph 1 of the Enforcement Regulation are as specified in Table 1.

② Detailed standards for test required for the classification of chemical substances shall follow the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) guidelines stipulated by the United Nations (UN).

Article 5 (Attachment of labels) ① Manufacturer or importer of hazardous chemicals should attach or print a label in Korean language clearly showing hazard information (this includes where foreign language and Korean language are written together on the same label) on its container and package. However, a label in Korean language may not be attached on a reagent which is used solely for tests and research in laboratories, provided that it is labeled in a foreign language, or it is a finished product which is in storage or in transit for export.

② Notwithstanding the provision in the above Paragraph ①, hazardous substances covered by the [Recommendations on the Transportation of Dangerous Goods - Model Regulations] of the UN can be labeled on the package as per the [Recommendations on the Transportation of Dangerous Goods - Model Regulations].

③ A single container such as an unpackaged 200 liter drum can be labeled without pictograms, if it is labeled as per the [Recommendations on the Transportation of Dangerous Goods - Model Regulations] of the UN.

④ If it is difficult to attach or print a label on container and package, a printed label tag may be put on.

⑤ Employer who wishes to handle, transport or store a hazardous chemical should check whether it is labeled, and should attach a label if not labeled.

⑥ Employer pursuant to the above Paragraph ⑤ may request manufacturer or importer to attach a label.

Article 6 (Standards for Preparation of Label) ① Pictogram, signal word, hazard statement, and precautionary statement included in a label pursuant to Article 92-4 of the Enforcement Regulation are as specified in Table 2.

② A container or a package for hazardous chemicals with a volume ≤ 100 mL may be labeled with chemical name, pictogram, and signal word and indication that MSDS should be consulted for other information. However, a label should include supplier information if supplier information is not indicated on a container or package.

③ A semi-finished product container containing hazardous chemicals for self-consumption at the workplace may be labeled with only “Danger” or “Warning” statement according to the degree of hazard. In this case, however, label should be attached or MSDS should be posted on a location easily seen by workers at the storage site.

Article 6-2 (Standards for Preparation of Contents of Label) ① Chemical name is indicated as the product name on MSDS pursuant to Article 10 Paragraph ① Subparagraph 1.

② All pictograms meeting relevant criteria set forth in Table 2 shall appear on the label. However, it adheres to the following should it fall under any of the following subparagraphs.

1. If both pictograms of “skull and crossbones” and “exclamation mark (!)” apply, only pictogram of “skull and crossbones” shall appear.
2. If both pictograms of "corrosive" and "irritant" apply, only pictogram of "corrosive" shall appear.
3. If both pictograms of "respiratory sensitizer" and "skin sensitizer" apply, only pictogram of "respiratory sensitizer" shall appear.
4. If 5 or more pictograms apply, only 4 pictograms should appear on the label.

③ "Danger" or "Warning" shall be used as signal word according to Table 2. If both "Danger" and "Warning" apply to a hazardous chemical, only "Danger" shall appear.

④ All hazard statements meeting relevant criteria set forth in Table 2 shall appear on the label. However, repeated hazard statements may be omitted or similar hazard statements be combined.

⑤ All precautionary statements meeting relevant criteria set forth in Table 2 shall

appear on the label. However, it adheres to the following should it fall under any of the following subparagraphs.

1. Repeated precautionary statements may be omitted or similar precautionary statements be combined.
2. If 7 or more precautionary statements apply, only 6 precautionary statements including one or more statements for each of prevention, response, storage, and disposal (except for the cases with no relevance) shall appear. At this point, it should be indicated that MSDS should be consulted for non-expressed precautionary statements.

Article 7 (Format and Size of Label) The format and size of labels are as specified in Table 3.

Article 8 (Color and Location of Label) ① Labels should have white background with black writings and borders.

② If it is not feasible to have a white background due to the types of packages such as a vinyl cloth sack, etc., the surface color of the packages or containers may be used as the background, provided that those containers or packages in black or a similar color should have the writings and the borders in a contrasting color.

③ Pictogram shall consist of a symbol of relevant hazard and a frame; the symbol shall be in black and the frame shall be in red in principle but may be in black if it is not feasible, and the background color shall be white. However, if a label is to be printed directly on a small container or package of less than 1 liter in volume, the main color (except black or similar colors) of the container or package may be used as the background color of pictogram, provided that the surface colors of the container or package are of two colors or fewer.

④ Labels should be firmly affixed on locations where workers can easily see while they handle chemical substances.

Chapter 3 Preparation of MSDS, etc.

Article 9 (Responsibilities of Preparation) ① Employer who wishes to manufacture, import, use, transport or store hazardous chemicals falling under subparagraphs of Article 3 Paragraph ① should prepare MSDS pursuant to Article 41 Paragraph ① of the Act. However, if employer who wishes to use, transport or store them obtains MSDS from manufacture or importer, MSDS shall be considered to have been prepared.

② Notwithstanding the provision in the above Paragraph ①, MSDS may not be prepared for a finished product which is in storage or in transit for export.

Article 10 (Contents of MSDS) ① MSDS shall be prepared by using the following headings in the order given below.

1. Chemical product and company identification
2. Hazard 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 consideration
14. Transport information
15. Regulatory information
16. Other information

② Detailed contents and relevant information for each subparagraph under the

above Paragraph ① are as specified in Table 4. However, a person who prepares MSDS may add further detailed information if it is deemed necessary to improve the safety and health of workers.

Article 11 (Preparation Principles) ① MSDS shall be prepared in Korean in principle, but proper nouns such as the chemical name, the name of foreign entities, etc., may be written in English.

② Notwithstanding the provision in the above Paragraph ①, MSDS prepared in foreign language may not be translated into Korean if it is for a reagent which is used solely for tests and research in laboratories.

③ If you wish to reflect test results in the preparation of contents under each heading of subparagraphs of Article 10 Paragraph ①, results from test conducted in compliance with Good Laboratory Practice (GLP) of the country shall take precedence.

④ When MSDS written in foreign language is translated into Korean, the initial issuing date and the name of body preparing the original MSDS should be indicated for ensuring the reliability of data; and when MSDS is prepared by using other types of reference material, the sources of such references should be indicated.

⑤ The terms and the technical guidance required for the preparation of MSDS may be prescribed by Korea Occupational Safety and Health Agency.

⑥ The units used in the preparation of MSDS shall comply with the provisions of [Measures Act].

⑦ Contents under each heading should, to the extent possible, be prepared without omission. However, the phrase “no data available” shall be used under relevant headings in cases where the necessary information is inevitably unobtainable, and the “not applicable” shall be used under relevant headings which are not applicable or relevant.

⑧ The contents of the ingredients pursuant to Article 10 Paragraph ① Subparagraph 3 may be indicated in the form of ranges (by using the lower limit and the upper limit) within $\pm 5\%$ of the contents. In this case, if the contents are less than 5%, the lower limit shall be indicated as “ $\geq 1\%$ (0.1% for carcinogens and germ cell mutagens, 0.2% for respiratory sensitizers [gases only], and 0.3% for reproductive toxicants).”

⑨ Employer should prepare MDDS in good faith in conformity with the purpose of protecting the health of workers who handle hazardous chemicals.

Article 12 (Determination of Hazards of Mixture) ① Employer who prepares MSDS shall determine the hazards of mixture as follows.

1. The detailed criteria for the determination of the hazards of a mixture shall follow Table 1.
2. If a mixture has not been tested as a whole for physical hazards, the potential physical hazards of the mixture may be assessed on the basis of the information on single chemical substances which constitute the mixture.

② If a number of mixture products meet the following requirements, a representative MSDS may be prepared for all the products.

1. Same ingredients;
2. 10% or less variation in composition of ingredients
3. Similar hazards

Article 13 (Transfer and Supply of MSDS) ① Employer who transfers or supplies hazardous chemicals to other employer should transfer or supply the MSDS thereof together.

② If employer repeatedly transfers or supplies the same hazardous chemicals to the same employer twice or more, transfer or supply of the MSDS may be omitted after the second time provided that there have been no changes in the MSDS of the hazardous chemicals

③ When a manufacturer manufactures or an importer transfers or supplies chemical substances or preparations containing chemical substances which do not fall under any of the subparagraphs of Article 3 Paragraph ①, the manufacturer or the importer should notify in writing that the chemical substances or preparations do not fall under any of the subparagraphs of Article 3 Paragraph ①.

④ The manufacturer or the importer, and those who have been notified in writing by the manufacturer or the importer pursuant to the above Paragraph ③, should keep the concerned documents at workplace.

Article 14 (Application of New Information) If employer obtains new information on hazardous chemicals as follows, he/she should include the information in MSDS within

three months.

1. Hazards
2. Protective measures against hazards
3. Amendments of regulation
4. Other major changes in existing MSDS

Article 15 (Posting or Furnishing) ① Employer should, at one or more places among the followings which are easily seen by workers, post or furnish the MSDS of all hazardous chemicals used at the workplace, and examine and maintain such MSDS regularly or as needed.

1. Within process lines where hazardous chemicals are handled
2. Place with potential risk of safety accident or occupational disease
3. Place which is most easily seen by workers within workplace

② If all of the following measures are taken, MSDS pursuant to the above Paragraph ① shall be considered to have been furnished.

1. Read-only electronic equipment with MSDS stored has been installed and is in operation at the place readily accessible during work by workers who handle hazardous chemicals
2. Workers who handle the chemical substances (including all workers who are exposed to chemical substances, hereinafter the same shall apply) have been educated on how to operate MSDS programs, input product names, and check MSDS, etc.
3. Instruction for management as per Article 41 Paragraph ⑥ of the Act and Article 92-7 Paragraph ① of the Enforcement Regulation has been posted including health hazards of hazardous chemicals and how to search MSDS.

Chapter 4 Education for Workers and Indications of Identification Information, etc.

Article 16 < Deleted >

Article 17 (Confirmation of Contents of Education) If electronic equipment with MSDS stored has been installed as per Article 15 Paragraph ②, employer should confirm whether workers who handle the chemical substances can check MSDS using the equipment.

Article 18 < Deleted >

Article 19 (Indications of Identification Information) “Chemical substances or preparations containing chemical substances which could potentially cause significant health hazard to workers, as defined by the Minister of Labor” prescribed in Article 41 Paragraph ② of the Act shall refer to any of the following substances.

1. Hazardous substances prohibited from manufacturing, etc. as per Article 37 of the Act
2. Hazardous substances subject to permission for manufacturing, etc. as per Article 38 of the Act
3. Hazardous substances subject to control as per Article 166 of the Regulation on Industrial Health Standards
4. Toxic substances as per Toxic Chemicals Control Act

Addenda (12 December 2006)

Article 1 (Date of Enforcement) This Public Notice shall become effective as of the date of notification.

Article 2 (Interim Measures for Labeling, etc) At the time of the enforcement of this Notice, Article 3, Article 5 through Article 7, Article 12, Article 14, and Article 15 of the previous Standard for Classification and Labeling of Chemical Substance and MSDS may be used or applied together with Article 3, Article 4, Article 6 through Article 8, and Article 10 through Article 12 of Standard for Classification and Labeling of Chemical Substance and MSDS until 30 June 2010 (30 June 2013 in case of preparation containing 2 or more chemical substances).

Addenda (10 January 2008)

Article 1 (Date of Enforcement) This Public Notice shall become effective as of the date of notification.

Article 2 (Interim Measures for Labeling and MSDS, etc) At the time of the enforcement of this Notice, Standard for Classification and Labeling of Chemical Substance and MSDS pursuant to the previous Article 3, Table 1, Table 2, and Table 4 may be used or applied together with Standard for Classification and Labeling of Chemical Substance and MSDS pursuant to the amended regulation until 30 June 2010 (30 June 2013 in case of preparation containing 2 or more chemical substances)

Addenda (27 June 2008)

Article 1 (Date of Enforcement) This Public Notice shall become effective as of the date of notification.

Addenda (26 October 2009)

Article 1 (Date of Enforcement) This Public Notice shall become effective as of the date of notification.

Classification of substances and mixtures(Refer to Article 4)

Part 1 General principles for classification

1.1. Hazard • Risk classification

Physical hazards, health hazards, and environmental hazards of substances and mixtures should be classified by the available data for evaluating the hazard/risk as follows.

- A. The test data that determine hazardous and risk properties should be used for classification.
- B. Reliable epidemiological data and experience on humans should be taken into account in the classification of hazards.
- C. When several information is provided for evaluating a hazard/risk, the substances and mixtures should be classified on the basis of expert judgement as follows.
 - 1) Where evidence is available from humans or animals and there is a conflict between the findings, the quality and reliability of the evidence from both sources must be assessed in order to resolve the question of classification. Generally, data of good quality and reliability in humans will have precedence over other data.
 - 2) When it is clear that route of exposure, mechanistic information and metabolism studies are not relevant to humans, the substance of mixture should not be classified.
 - 3) Both positive and negative results are assembled together in the weight of evidence determination.

1.2. Classification of mixtures

- A. Health & Environmental Hazards

- 1) Where the mixture itself has been tested to determine its hazards, it will be classified according to the same criteria as those used for substances. In some cases of carcinogenicity, germ cell mutagenicity, and reproductive toxicity, the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations, sensitivity and statistical analysis of the test systems.
- 2) Where the mixture itself has not been tested to determine its hazards, but there are sufficient data on both the individual ingredients and similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the following bridging principles ; dilution, batching, concentration of highly hazardous mixtures, interpolation within one toxicity category, substantially similar mixtures, or aerosols.
 - a) Dilution : If a mixture is diluted with a substance which has an equivalent or lower hazard category classification than the least hazardous original ingredient substance and which is not expected to affect the hazard classification of other ingredient substances, then the new mixture may be classified as equivalent to the original mixture.
 - b) Batching : The hazard category of one production batch of a complex mixture can be assumed to be substantially equivalent to that of another production batch of the same commercial product, and produced by or under the control of the same supplier, unless there is reason to believe there is significant variation such that the hazard classification of the batch has changed. If the latter occurs, a new classification is necessary.
 - c) Concentration : If a mixture is classified in category 1, and the concentration of ingredients of the mixture that are in category 1 is increased, the new mixture should be classified in category 1 without additional testing.
 - d) Interpolation : For three mixtures with identical hazardous ingredients, where mixtures A and B are in the same hazard category and mixture C has the same active hazardous ingredients with concentrations intermediate to the concentrations of those hazardous ingredients in mixtures A and B, the mixture C is assumed to

be in the same hazard category as A and B.

- e) Substantially similar mixtures : Given the following, two mixtures each containing two ingredients; (i) A+B (ii) C+B, the concentration of ingredient B is essentially the same in both in both mixtures, the concentration of ingredient A in mixture (i) equals that of ingredient C in mixture (ii), and hazard data for A and C are available and substantially equivalent, i.e. they are in the same hazard category and are not expected to affect the hazard classification of B. If mixture (i) is already classified in a particular hazard class based on test data, mixture (ii) may be assigned the same hazard category.
- f) Aerosols : An aerosol form of a mixture may be classified in the same hazard category as the tested non-aerosolized form of the mixture for oral and dermal toxicity provided that the added propellant does not affect the hazardous properties of the mixture upon spraying. Classification of aerosolized mixtures for inhalation toxicity should be considered separately.
- 3) Where the mixture itself has not been tested to determine its hazards, but there are sufficient data on the individual ingredients, classification of mixtures subject to any specific provisions for mixtures in each hazard class, for each individual hazard class in part 3 and part 4. Generic cut-off values to be taken into account are as follows:

Hazard class	Cut-off values to be taken into account(%)
Acute toxicity : - Category 1-3 - Category 4	0.1 1
Skin Corrosion/Irritation	1
Serious damage to eyes/eye irritation	1
Hazardous to Aquatic Environment : - Acute Category 1 - Chronic Category 1 - Chronic Category 2-4	0.1 0.1 1

Part 2 Physical Hazards

2.1. Explosives

A. Definitions

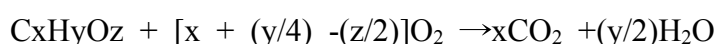
An explosive substance or mixture is a solid or liquid substance or mixture of substances which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.

B. Classification criteria

Category	Criteria
Unstable explosives	An explosive substance or mixture which is thermally unstable and/or too sensitive for normal handling, transport and use
Division 1.1	Substances, mixtures and articles which have a mass explosion hazard
Division 1.2	Substances, mixtures and articles which have a projection hazard but not a mass explosion hazard
Division 1.3	Substances, mixtures and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard ① combustion of which gives rise to considerable radiant heat; or ② which burn one after another, producing minor blast or projection effects or both
Division 1.4	Substances, mixtures and articles which present no significant hazard: substances, mixtures and articles which present only a small hazard in the event of ignition or initiation ① The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected ② An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package
Division 1.5	Very insensitive substances or mixtures which have a mass explosion hazard: substances and mixtures which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions
Division 1.6	Extremely insensitive articles which do not have a mass explosion hazard: articles which contain only extremely insensitive detonating substances or mixtures and which demonstrate a negligible probability of accidental initiation or propagation

- 1) A substance or mixture is not classified as explosive if:
- a) There are no chemical groups associated with explosive properties present in the molecule.
 - b) The substance contains chemical groups associated with explosive properties which include oxygen and the calculated oxygen balance is less than - 200;

The oxygen balance is calculated for the chemical reaction:



Using the formula:

$$\text{Oxygen balance} = -1600[2x + (y/2) - z]/\text{molecular weight}$$

- c) When the organic substance or a homogenous mixture of organic substances contains chemical groups associated with explosive properties but the exothermic decomposition energy is less than 500 J/g and the onset of exothermic decomposition is below 500 °C.
- d) For mixtures of inorganic oxidizing substances with organic material(s), the concentration of the inorganic oxidizing substance is:
 - less than 15 % by mass, if the oxidizing substance is assigned to Categories 1 or 2
 - less than 30 % by mass, if the oxidizing substance is assigned to Category 3

2.2. Flammable Gases

A. Definitions

A flammable gas is a gas having a flammable range with air at 20°C and a standard pressure of 101.3 kPa.

B. Classification criteria

Category	Criteria
1	Gases, which at 20 °C and a standard pressure of 101.3 kPa: ① are ignitable when in a mixture of 13 % or less by volume in air; or ② have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
2	Gases, other than those of Category 1, which, at 20 °C and a standard pressure of 101.3 kPa, have a flammable range while mixed in air.

2.3. Flammable Aerosols

A. Definitions

Aerosols should be considered for classification as flammable if they contain any component which is classified as flammable (Flammable components do not cover pyrophoric, self-heating or water-reactive substances and mixtures) according to the GHS criteria, i.e.: flammable liquids, flammable gases, flammable solids. Aerosols, this means aerosol dispensers, are any non-refillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.

B. Classification criteria

Category	Criteria
1	Aerosols, which contains $\geq 1\%$ of flammable components; and the chemical heat of combustion is ≥ 20 kJ/g; and ① Contains $\geq 85\%$ of flammable components; and the chemical heat of combustion is ≥ 30 kJ/g; or ② for spray aerosols, - in the ignition distance test, ignition occurs at a distance ≥ 75 cm, or ③ for foam aerosols, in the foam test, - the flame height is ≥ 20 cm and the flame duration ≥ 2 s; or - the flame height is ≥ 4 cm and the flame duration ≥ 7 s
2	Aerosols, other than those of Category 1; and ① for spray aerosols, - the chemical heat of combustion is ≥ 20 kJ/g; or - the chemical heat of combustion is < 20 kJ/g; and · in the ignition distance test, ignition occurs at a distance ≥ 15 cm, or · in the enclosed space ignition test, the time equivalent is ≤ 300 s/m ³ , or deflagration density is ≤ 300 g/m ³ ② for foam aerosols, - in the foam test, the flame height is ≥ 4 cm and the flame duration ≥ 2 s

2.4. Oxidizing Gases

A. Definitions

Oxidizing gas is any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

B. Classification criteria

Category	Criteria
1	Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

2.5. Gases under pressure

A. Definitions

Gases under pressure are gases which are contained in a receptacle at 20 °C and a pressure of 200 kPa (gauge) or more, or which are liquefied or liquefied and refrigerated.

B. Classification criteria

Category	Criteria
Compressed gas	A gas which when packaged under pressure is entirely gaseous at - 50 °C; including all gases with a critical temperature \leq - 50 °C.
Liquefied gas	A gas which, when packaged under pressure, is partially liquid at temperatures above - 50 °C. A distinction is made between: ① high pressure liquefied gas: a gas with a critical temperature between - 50 °C and + 65 °C; and ② low pressure liquefied gas: a gas with a critical temperature above + 65 °C.
Refrigerated liquefied gas	A gas which when packaged is made partially liquid because of its low temperature.
Dissolved gas	A gas which when packaged under pressure is dissolved in a liquid phase solvent.

2.6. Flammable Liquids

A. Definitions

Flammable liquid means a liquid having a flash point of not more than 60 °C at a standard pressure of 101.3 kPa.

B. Classification criteria

Category	Criteria
1	Flash point < 23 °C and initial boiling point ≤ 35 °C
2	Flash point < 23 °C and initial boiling point > 35 °C
3	Flash point ≥ 23 °C and ≤ 60 °C

2.7. Flammable Solids

A. Definitions

A flammable solid is a solid which is readily combustible, or may cause or contribute to fire through friction.

B. Classification criteria

Category	Criteria
1	Burning rate test: ① Substances and mixtures other than metal powders: wetted zone does not stop fire and burning time < 45 seconds or burning rate > 2.2 mm/s ② Metal powders: burning time ≤ 5 minutes
2	Burning rate test: ① Substances and mixtures other than metal powders: wetted zone stops the fire for at least 4 minutes and burning time < 45 seconds or burning rate > 2.2 mm/s ② Metal powders: burning time > 5 minutes and ≤ 10 minutes

2.8. Self-reactive substances and mixtures

A. Definitions

Self-reactive substances or mixtures are thermally unstable liquid or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air).

B. Classification criteria

Category	Criteria
Type A	any self-reactive substance or mixture which can detonate or deflagrate rapidly, as packaged
Type B	any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package
Type C	any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion
Type D	any self-reactive substance or mixture which in laboratory testing: ① detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or ② does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or ③ does not detonate or deflagrate at all and shows a medium effect when heated under confinement
Type E	any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement
Type F	any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power
Type G	any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (SADT is 60 °C to 75 °C for a 50 kg package), and, for liquid mixtures, a diluent having a boiling point not less than 150 °C is used for desensitization. If the mixture is not thermally stable or a diluent having a boiling point less than 150 °C is used for desensitization, the mixture shall be defined as self-reactive substance TYPE F.

- 1) Any self-reactive substance or mixture should be considered for classification in this class as a self-reactive substance or mixture unless:
 - a) they are explosives;
 - b) they are organic peroxides;
 - c) their heat of decomposition is less than 300 J/g;
 - d) their self-accelerating decomposition temperature (SADT) is greater than 75 °C for a 50 kg package; or
 - e) they are oxidizing liquids or solids, except that mixtures of oxidizing substances, which contain 5 % or more of combustible organic substances and which do not meet the criteria mentioned in a), b), c) or d) above, shall be subjected to the self-reactive substances classification procedure.
- 2) The classification procedures for self-reactive substances and mixtures need not be applied if:
 - a) There are no chemical groups present in the molecule associated with explosive or self reactive properties.
 - b) For a single organic substance or a homogeneous mixture of organic substances, the estimated SADT for a 50 kg package is greater than 75 °C or the exothermic decomposition energy is less than 300J/g.

2.9. Pyrophoric Liquids

A. Definitions

Pyrophoric liquid is a liquid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

B. Classification criteria

Category	Criteria
1	Pyrophoric liquids: ① ignites within 5 min when added to an inert carrier and exposed to air, or ② ignites or chars a filter paper on contact with air within 5 min

- 1) The classification procedure for pyrophoric liquids need not be applied when experience in production or handling shows that the substance or mixture does not ignite spontaneously on coming into contact with air at normal temperatures.

2.10. Pyrophoric Solids

A. Definitions

Pyrophoric solid is a solid which, even in small quantities, is liable to ignite within five minutes after coming into contact with air.

B. Classification criteria

Category	Criteria
1	The solid ignites within 5 minutes of coming into contact with air.

- 1) The classification procedure for pyrophoric solids need not be applied when experience in production or handling shows that the substance or mixture does not ignite spontaneously on coming into contact with air at normal temperatures.

2.11. Self-heating substances and mixtures

A. Definitions

A self-heating substance or mixture is a solid or liquid substance or mixture, other than a pyrophoric liquid or solid, which, by reaction with air and without energy supply, is liable to self-heat.

B. Classification criteria

Category	Criteria
1	a positive result is obtained using a 25 mm cube sample at 140 °C
2	any substances or mixtures: ① a positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 100 mm sample cube at 120 °C and the substance or mixture is to be packed in packages with a volume of more than 3 m ³ , or ② a positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm sample cube at 140 °C and a positive result is obtained in a test using a 100 mm sample cube at 120 °C and the substance or mixture is to be packed in packages with a volume of more than 450 litres; or ③ a positive result is obtained in a test using a 100 mm sample cube at 140 °C and a negative result is obtained in a test using a 25 mm sample cube at 140 °C and a positive result is obtained in a test using a 100 mm sample cube at 100 °C.

- 1) Substances and mixtures with a temperature of spontaneous combustion higher than 50 °C for a volume of 27 m³ should not be classified as a self-heating substance or mixture.
- 2) Substances and mixtures with a spontaneous ignition temperature higher than 50 °C for a volume of 450 litres should not be assigned to Category 1 of this class.
- 3) The classification procedure for self-heating substances or mixtures need not be applied if the results of a screening test can be adequately correlated with the classification test and an appropriate safety margin is applied.

2.12. Substances and mixtures which, in contact with water, emit flammable gases

A. Definitions

Substances or mixtures which, in contact with water, emit flammable gases are solid or liquid substances or mixtures which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

B. Classification criteria

Category	Criteria
1	① any substance or mixture which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or ② any substance or mixture which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 litres per kilogram of substance over any one minute.
2	any substance or mixture which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 litres per kilogram of substance per hour, and which does not meet the criteria for Category 1.
3	any substance or mixture which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 1 litre per kilogram of substance per hour, and which does not meet the criteria for Categories 1 and 2.

1) The classification procedure for this class need not be applied if:

- the chemical structure of the substance or mixture does not contain metals or metalloids; or
- experience in production or handling shows that the substance or mixture does not react with water; or
- the substance or mixture is known to be soluble in water to form a stable mixture.

2.13. Oxidizing Liquids

A. Definitions

An oxidizing liquid is a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

B. Classification criteria

Category	Criteria
1	any substance or mixture which, in the 1:1 mixture, by mass, of substance (or mixture) and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture, by mass, of substance (or mixture) and cellulose is less than that of a 1:1 mixture, by mass, of 50 % perchloric acid and cellulose.
2	any substance or mixture which, in the 1:1 mixture, by mass, of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 40 % aqueous sodium chlorate solution and cellulose; and the criteria for Category 1 are not met.
3	any substance or mixture which, in the 1:1 mixture, by mass, of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture, by mass, of 65 % aqueous acetic acid and cellulose; and the criteria for Category 1 and 2 are not met.

- 1) The classification procedure for this class need not be applied if:
- a) organic substance or mixture which does not contain oxygen, fluorine or chlorine; or
 - b) organic substance or mixture which contains oxygen, fluorine or chlorine that are chemically bonded only to carbon or hydrogen; or
 - c) inorganic substances or mixtures which do not contain oxygen or halogen atoms

2.14. Oxidizing Solids

A. Definitions

Oxidizing solid is a solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.

B. Classification criteria

Category	Criteria
1	any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture, by mass, of potassium bromate and cellulose.
2	any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for Category 1 are not met.
3	any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for Categories 1 and 2 are not met.

- 1) The classification procedure for this class need not be applied if:
 - a) organic substance or mixture which does not contain oxygen, fluorine or chlorine; or
 - b) organic substance or mixture which contains oxygen, fluorine or chlorine that are chemically bonded only to carbon or hydrogen; or
 - c) inorganic substances or mixtures which do not contain oxygen or halogen atoms

2.15. Organic Peroxides

A. Definitions

Organic peroxides are liquid or solid organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals.

B. Classification criteria

Category	Criteria
Type A	any organic peroxide which, as packaged, can detonate or deflagrate rapidly
Type B	any organic peroxide possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package
Type C	any organic peroxide possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion
Type D	any organic peroxide which in laboratory testing: ① detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or ② does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or ③ does not detonate or deflagrate at all and shows a medium effect when heated under confinement;
Type E	any organic peroxide which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement
Type F	any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power
Type G	any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable, i.e. the SADT is 60 °C or higher for a 50 kg package, and, for liquid mixtures, a diluent having a boiling point of not less than 150 °C is used for desensitization. If the organic peroxide is not thermally stable or a diluent having a boiling point less than 150 °C is used for desensitisation, the organic peroxide shall be defined as organic peroxide TYPE F.

1) Any organic peroxide shall be considered for classification in this class, unless it contains:

- a) not more than 1.0 % available oxygen from the organic peroxides when containing not more than 1.0 % hydrogen peroxide; or
- b) not more than 0.5 % available oxygen from the organic peroxides when containing more than 1.0 % but not more than 7.0 % hydrogen peroxide

The available oxygen content (%) of an organic peroxide mixture is given by the formula:

$$\text{The available oxygen content (\%)} = 16 \times \sum_i^n (n_i \times c_i / m_i)$$

where: : n_i = number of peroxygen groups per molecule of organic peroxide i;

c_i = concentration (mass %) of organic peroxide i;

m_i = molecular mass of organic peroxide i.

2) Mixtures of organic peroxides may be classified as the same type of organic peroxide as that of the most dangerous ingredient.

2.16. Corrosive to metals

A. Definitions

A substance or a mixture which is corrosive to metals is a substance or a mixture which by chemical action will materially damage, or even destroy, metals.

B. Classification criteria

Category	Criteria
1	Corrosion rate on either steel or aluminium surfaces exceeding 6.25 mm per year at a test temperature of 55 °C when tested on both materials.

- 1) Where an initial test on either steel or aluminium indicates the substance or mixture being tested is corrosive the follow-up test on the other metal is not required.

Part 3 Health Hazards

3.1. Acute Toxicity

A. Definitions

Acute toxicity refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance or a mixture, or multiple doses given within 24 hours, or an inhalation exposure of 4 hours.

B. Classification criteria for substances

Category	Criteria
1	Acute toxicity estimate(ATE): ① Oral : $ATE \leq 5$ (mg/kg) ② Dermal : $ATE \leq 50$ (mg/kg) ③ Inhalation • Gases : $ATE \leq 100$ (ppm) • Vapours : $ATE \leq 0.5$ (mg/L) • Dusts and Mists : $ATE \leq 0.05$ (mg/L)
2	Acute toxicity estimate(ATE): ① Oral : $5 < ATE \leq 50$ (mg/kg) ② Dermal : $50 < ATE \leq 200$ (mg/kg) ③ Inhalation • Gases : $100 < ATE \leq 500$ (ppm) • Vapours : $0.5 < ATE \leq 2.0$ (mg/L) • Dusts and Mists : $0.05 < ATE \leq 0.5$ (mg/L)
3	Acute toxicity estimate(ATE): ① Oral : $50 < ATE \leq 300$ (mg/kg) ② Dermal : $200 < ATE \leq 1,000$ (mg/kg) ③ Inhalation • Gases : $500 < ATE \leq 2,500$ (ppm) • Vapours : $2.0 < ATE \leq 10$ (mg/L) • Dusts and Mists : $0.5 < ATE \leq 1.0$ (mg/L)
4	Acute toxicity estimate(ATE): ① Oral : $300 < ATE \leq 2,000$ (mg/kg) ② Dermal : $1,000 < ATE \leq 2,000$ (mg/kg) ③ Inhalation • Gases : $2,500 < ATE \leq 20,000$ (ppm) • Vapours : $10 < ATE \leq 20$ (mg/L) • Dusts and Mists : $1.0 < ATE \leq 5$ (mg/L)

- 1) The acute toxicity estimate (ATE) for the classification of a substance or ingredient in a mixture is derived using:
 - a) the LD50/LC50 where available,
 - b) the appropriate conversion value from Table below that relates to the results of a range test, or
 - c) the appropriate conversion value from Table below that relates to a classification category

Exposure routes		Classification Category or experimentally obtained acute toxicity range estimate	Converted acute toxicity point estimate
Oral (mg/kg bodyweight)		0 < Category 1 ≤ 5	0.5
		5 < Category 2 ≤ 50	5
		50 < Category 3 ≤ 300	100
		300 < Category 4 ≤ 2000	500
Dermal (mg/kg bodyweight)		0 < Category 1 ≤ 50	5
		50 < Category 2 ≤ 200	50
		200 < Category 3 ≤ 1000	300
		1000 < Category 4 ≤ 2000	1100
Inhalation	Gases (ppmV)	0 < Category 1 ≤ 100	10
		100 < Category 2 ≤ 500	100
		500 < Category 3 ≤ 2500	700
		2500 < Category 4 ≤ 20,000	4500
	Vapours (mg/L)	0 < Category 1 ≤ 0.5	0.05
		0.5 < Category 2 ≤ 2.0	0.5
		2.0 < Category 3 ≤ 10.0	3
		10.0 < Category 4 ≤ 20.0	11
	Dust/mist (mg/L)	0 < Category 1 ≤ 0.05	0.005
		0.05 < Category 2 ≤ 0.5	0.05
		0.5 < Category 3 ≤ 1.0	0.5
		1.0 < Category 4 ≤ 5.0	1.5

2) Specific considerations for inhalation toxicity

- a) Values for inhalation toxicity are based on 4 hour tests in laboratory animals.

When experimental values are taken from tests using a 1 hour exposure, they can be converted to a 4 hour equivalent by dividing the 1 hour value by a factor of 2 for gases and vapours and 4 for dusts and mists.

- b) Units for inhalation toxicity are a function of the form of the inhaled material. Values for dusts and mists are expressed in mg/l. Values for gases are expressed in ppmV. Acknowledging the difficulties in testing vapours, some of which consist of mixtures of liquid and vapour phases, the table provides values in units of mg/l. However, for those vapours which are near the gaseous phase, classification shall be based on ppmV.

C. Classification criteria for mixtures

- 1) Where the mixture itself has been tested to determine its acute toxicity, it will be classified according to the same criteria as those used for substances.
- 2) Where the mixture itself has not been tested to determine its acute toxicity, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its acute toxicity, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the ATE of the mixture is determined by calculation from the ATE values for all relevant ingredients according to the following formula below, then it will be classified according to the same criteria as those used for substances.

- a) Data available for all ingredients

$$\frac{100}{ATE_{mix}} = \sum_n \frac{Ci}{ATE_i} \quad [\text{Formula 1}]$$

where: C_i = concentration of ingredient I (%)

ATE_i = Acute Toxicity Estimate of ingredient i

b) Data are not available for one or more ingredients of the mixture

- ① If the total concentration of the ingredient(s) with unknown acute toxicity is $\leq 10\%$ then the formula 1 should be used.
- ② If the total concentration of the ingredient(s) with unknown toxicity is $> 10\%$, the formula 2 should be applied. The total percentage of the unknown ingredient(s) should be marked separately.

$$\frac{100 - (\sum C_{\text{unknown}} \text{ if } > 10\%)}{ATE_{\text{mix}}} = \sum_n \frac{C_i}{ATE_i} \quad [\text{Formula 2}]$$

where: C_i = concentration of ingredient I (%)

ATE_i = Acute Toxicity Estimate of ingredient i

3.2. Skin Corrosion/Irritation

A. Definitions

Skin Corrosion is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis. (Corrosive reactions are typified by ulcers, bleeding, bloody scabs.) Skin Irritation is the production of reversible damage to the skin.

B. Classification criteria for substances

Category	Criteria
1 (Skin corrosive)	Any substance, which ① produces irreversible damage of skin tissue on the basis of the results of existing human or animal experience. However, the substance should not be classified to corrosive substance without further testing when the results of existing human or animal experience are not corrosive. or ② has similar structure-activity relationships to corrosive substance, or ③ has extreme pH of ≤ 2 or ≥ 11.5 , or ④ has positive response by means of valid and accepted <i>in vitro</i> skin corrosion test, or ⑤ produces irreversible damage of skin tissue, in at least 1 of 3 tested animals after exposure up to a 4 hour duration.
2 (Skin irritant)	Any substance, which ① produces reversible damage of skin tissue on the basis of the results of existing human or animal experience. However, the substance should not be classified to irritant substance without further testing when the results of existing human or animal experience are not irritant. or ② has similar structure-activity relationships to irritant substance, or ③ has positive response by means of valid and accepted <i>in vitro</i> skin irritation test, or ④ produces reversible damage below of skin tissue, after exposure up to a 4 hour duration in <i>in vivo</i> skin irritation test - mean value of $\geq 2.3 \leq 4.0$ for erythema/eschar of for oedema, or - when inflammation persists to the end of the observation period in at least 2 of 3 tested animals.

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its skin corrosion/irritation, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its skin corrosion/irritation, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.
 - a) The mixture will be classified according to the theory of additivity as below, such that each corrosive or irritant ingredient contributes to the overall irritant of corrosive properties of the mixture in proportion to its potency and concentration.

Category	Criteria
1 (Skin corrosive)	Sum of concentration of category 1 ingredients \geq 5%
2 (Skin irritant)	Mixtures, ① Sum of concentration of category 1 ingredients \geq 1% but $<$ 5%, or ② Sum of concentration of category 2 ingredients \geq 10%, or ③ (Sum of concentration of category 1 ingredients x 10) + Sum of concentration of category 2 ingredients \geq 10%

- b) The mixture will be classified according to the approach as below, when classifying certain types of chemicals such as acids and bases, inorganic salts, aldehydes, phenols, and surfactants that cannot be classified based on the additivity approach.

Category	Criteria
1 (Skin corrosive)	Mixtures, ① Sum of concentration of acid with $\text{pH} \leq 2$ ingredients $\geq 1\%$ ② Sum of concentration of base with $\text{pH} \geq 11.5$ ingredients $\geq 1\%$ ③ Sum of concentration of other corrosive (Category 1) ingredients for which additivity does not apply $\geq 1\%$
2 (Skin irritant)	Sum of concentration of other irritant (Category 2) ingredients for which additivity does not apply, including acids and bases $\geq 3\%$

3.3. Serious eye damage/eye irritation

A. Definitions

Serious eye damage is the production of tissue damage in the eye, or serious physical decay of vision, following application of a test substance to the anterior surface of the eye, which is not fully reversible within 21 days of application. Eye irritation is the production of changes in the eye following the application of test substance to the anterior surface of the eye, which are fully reversible within 21 days of application.

B. Classification criteria for substances

Category	Criteria
1 (Irreversible effects on the eye)	Any substance, which ① is skin corrosive substance, or ② has a basis that eye damage are not fully reversed within an observation period of normally 21 days in existing human or animal experience, or ③ has similar structure-activity relationships to substance of serious damage on eye, or ④ has extreme pH of ≤ 2 or ≥ 11.5 , or ⑤ has positive response by means of valid and accepted <i>in vitro</i> test available to assess severe damage to eyes, or ⑥ has the results of animal testing that produces: - at least in one animal effects on the cornea, iris of conjunctiva that are not expected to reverse or have not fully reversed within an observation period of normally 21 days, or - at least in 2 of 3 tested animals, a positive response of corneal opacity ≥ 3 or iritis > 1.5
2 (Irritating to eyes)	Any substance, which ① is skin irritant substance, or ② has a basis that eye damage are fully reversed within an observation period of normally 21 days in existing human or animal experience, or ③ has similar structure-activity relationships to eye irritant substance, or ④ has positive response by means of valid and accepted <i>in vitro</i> test available to assess eye irritation, or ⑤ at least in 2 of 3 tested animals a positive response of corneal opacity/iritis ≥ 1 , or conjunctival redness/conjunctival oedema (chemosis) ≥ 2 , and which fully reverses within an observation period of normally 21 days

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its skin corrosivity or potential to cause serious eye damage or irritation, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its skin corrosivity or potential to cause serious eye damage or irritation, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.
 - a) The mixture will be classified according to the theory of additivity as below, such that each corrosive or irritant ingredient contributes to the overall irritant of corrosive properties of the mixture in proportion to its potency and concentration.

Category	Criteria
1 (Inversible effects on the eye)	Mixtures, ① Sum of concentration of serious eye damage (category 1) or skin corrosive (category 1) ingredients $\geq 3\%$ ② Sum of concentration of serious eye damage (category 1) and skin corrosive (category 1) ingredients $\geq 3\%$
2 (Irritating to eyes)	Mixtures, ① Sum of concentration of serious eye damage (category 1) or skin corrosive (category 1) ingredients $\geq 1\%$ but $< 3\%$, or ② Sum of concentration of category 2 ingredients $\geq 10\%$, or ③ (Sum of concentration of category 1 ingredients x 10) + Sum of concentration of category 2 ingredients $\geq 10\%$ ④ Sum of concentration of serious eye damage (category 1) and skin corrosive (category 1) ingredients $\geq 1\%$ but $< 3\%$, or ⑤ Sum of followings $\geq 10\%$ - (Sum of concentration of serious eye damage (category 1) and skin corrosive (category 1) ingredients) x 10 - Sum of concentration of category 2 ingredients

- b) The mixture will be classified according to the approach as below, when classifying certain types of chemicals such as acids and bases, inorganic salts, aldehydes, phenols, and surfactants that cannot be classified based on the additivity approach.

Category	Criteria
1 (Inversible effects on the eye)	Mixtures, ① Sum of concentration of acid with $\text{pH} \leq 2$ ingredients $\geq 1\%$ ② Sum of concentration of base with $\text{pH} \geq 11.5$ ingredients $\geq 1\%$ ③ Sum of concentration of other Category 1 ingredients for which additivity does not apply $\geq 1\%$
2 (Irritating to eyes)	Sum of concentration of other Category 2 ingredients for which additivity does not apply, including acids and bases $\geq 3\%$

3.4. Respiratory Sensitization

A. Definitions

Respiratory sensitizer is a substance that will lead to hypersensitivity of the airways following inhalation of the substance.

B. Classification criteria for substances

Category	Criteria
1	A substance is classified as a respiratory sensitizer ① if there is evidence in humans that the substance can lead to specific respiratory hypersensitivity, or ② if there are positive results from an appropriate animal test

1) The human evidence could be:

- a) clinical history and data from appropriate lung function tests related to exposure to the substance, confirmed by other supportive evidence which may include:
 - ① in vivo immunological test (e.g. skin prick test);
 - ② in vitro immunological test (e.g. serological analysis);
 - ③ studies that indicate other specific hypersensitivity reactions where immunological mechanisms of action have not been proven, e.g. repeated low-level irritation, pharmacologically mediated effects;
 - ④ a chemical structure related to substances known to cause respiratory hypersensitivity;
- b) data from one or more positive bronchial challenge tests with the substance conducted according to accepted guidelines for the determination of a specific hypersensitivity reaction.

2) Data from appropriate animal studies which may be indicative of the potential of a substance to cause sensitization by inhalation in humans may include:

- a) measurements of Immunoglobulin E (IgE) and other specific immunological parameters in mice;
- b) specific pulmonary responses in guinea pigs.

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its sensitizing properties, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its sensitizing properties, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.

Category	Criteria
1	Mixtures, which have ① ingredients classified as Respiratory sensitizer Category 1 \geq 0.2% (Gas) ② ingredients classified as Respiratory sensitizer Category 1 \geq 1.0% (Liquid)

3.5. Skin Sensitization

A. Definitions

Skin sensitizer is a substance that will lead to an allergic response following skin contact.

B. Classification criteria for substances

Category	Criteria
1	A substance is classified as a skin sensitizer ① if there is evidence in humans that the substance can lead to sensitization by skin contact in a substantial number of persons, or ② if there are positive results from an appropriate animal test

1) Human evidence can include:

- a) positive data from patch testing, normally obtained in more than one dermatology clinic;
- b) epidemiological studies showing allergic contact dermatitis caused by the substance; Situations in which a high proportion of those exposed exhibit characteristic symptoms are to be looked at with special concern, even if the number of cases is small;
- c) positive data from experimental studies on humans;
- d) well documented episodes of allergic contact dermatitis, normally obtained in more than one dermatology clinic.

2) Animal test results are considered as below:

- a) When an adjuvant type guinea pig test method for skin sensitization is used, a response of at least 30 % of the animals is considered as positive.
- b) For a non-adjuvant guinea pig test method a response of at least 15 % of the animals is considered positive.

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its sensitizing properties, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its sensitizing properties, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.

Category	Criteria
1	Ingredients classified as Skin sensitizer Category 1 \geq 1.0%

3.6. Germ cell Mutagenicity

A. Definitions

A mutation means a permanent change in the amount or structure of the genetic material in a cell. The term ‘mutation’ applies both to heritable genetic changes that may be manifested at the phenotypic level and to the underlying DNA modifications when known.

B. Classification criteria for substances

Category	Criteria
1A	Substances which have positive evidence from human epidemiological studies
1B	Substances which have <ol style="list-style-type: none">① positive result(s) from in vivo heritable germ cell mutagenicity tests in mammals; or② positive result(s) from in vivo somatic cell mutagenicity tests in mammals, in combination with some evidence that the substance has potential to cause mutations to germ cells; or③ positive results from tests showing mutagenic effects in the germ cells of humans, without demonstration of transmission to progeny; for example, an increase in the frequency of aneuploidy in sperm cells of exposed people.
2	Substances which cause concern for humans owing to the possibility that they may induce heritable mutations in the germ cells of humans based on <ol style="list-style-type: none">① positive evidence from somatic cell mutagenicity tests in vivo, in mammals; or② positive evidence from other in vivo somatic cell genotoxicity tests which are supported by positive results from in vitro mutagenicity assays; or③ positive evidence in in vitro mammalian mutagenicity assays, and which also show chemical structure activity relationship to known germ cell mutagens.

C. Classification criteria for mixtures

- 1) Classification of mixtures will be based on the available test data for the individual ingredients of the mixture using cut-off values/concentration limits for the ingredients classified as germ cell mutagens as below.

Category	Criteria
1A	Ingredients classified as Category 1A mutagen $\geq 0.1\%$
1B	Ingredients classified as Category 1B mutagen $\geq 0.1\%$
2	Ingredients classified as Category 2 mutagen $\geq 1.0\%$

- 2) The classification of mixture should be based on the total weight of evidence available, using expert judgement when data are available for the mixture itself or are applied in accordance with the bridging rules.
- a) When the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations, sensitivity and statistical analysis of germ cell mutagenicity test systems, the mixture will be classified using the criteria for substances.
- b) Where the mixture itself has not been tested to determine its germ cell mutagenicity hazard, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.

3.7. Carcinogenicity

A. Definitions

Carcinogen means a substance or a mixture which induces cancer or increases its incidence.

B. Classification criteria for substances

Category	Criteria
1A	Known to have carcinogenic potential for humans, classification is largely based on human evidence
1B	Presumed human carcinogenicity derived from studies showing limited evidence of carcinogenicity in humans together with limited evidence of carcinogenicity in experimental animals
2	Suspected human carcinogens on the basis of limited evidence obtained from human and/or animal studies, but which is not sufficiently convincing to place the substance in Category 1A or 1B

C. Classification criteria for mixtures

- 1) Classification of mixtures will be based on the available test data for the individual ingredients of the mixture using cut-off values/concentration limits for the ingredients classified as carcinogens as below.

Category	Criteria
1A	Ingredients classified as Category 1A carcinogen $\geq 0.1\%$
1B	Ingredients classified as Category 1B carcinogen $\geq 0.1\%$
2	Ingredients classified as Category 2 carcinogen $\geq 1.0\%$

- 2) The classification of mixture should be based on the total weight of evidence available, using expert judgement when data are available for the mixture itself or are applied in accordance with the bridging rules.

- a) When the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations, sensitivity and statistical analysis of carcinogenicity test systems, the mixture will be classified using the criteria for substances.
- b) Where the mixture itself has not been tested to determine its carcinogenic hazard, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.

3.8. Reproductive Toxicity

A. Definitions

Reproductive toxicity includes adverse effects on sexual function and fertility in adult males and females, as well as developmental toxicity in the offspring. Adverse effects on sexual function and fertility includes, but is not limited to, alterations to the female and male reproductive system, adverse effects on onset of puberty, gamete production and transport, reproductive cycle normality, sexual behaviour, fertility, parturition, pregnancy outcomes, premature reproductive senescence, or modifications in other functions that are dependent on the integrity of the reproductive systems. Adverse effects on development of the offspring includes, in its widest sense, any effect which interferes with normal development of the conceptus, either before or after birth, and resulting from exposure of either parent prior to conception, or exposure of the developing offspring during prenatal development, or postnatally, to the time of sexual maturation.

B. Classification criteria for substances

Category	Criteria
1A	Known human reproductive toxicant; largely based on evidence from humans known to have produced an adverse effect on sexual function and fertility of on development in humans
1B	Presumed human reproductive toxicant; largely based on evidence from experimental animals presumed to have produced an adverse effect on sexual function and fertility of on development in humans
2	Suspected human reproductive toxicant; largely based on evidence from human or experimental animals presumed to have produced an adverse effect on sexual function and fertility of on development in humans
Effects on or via lactation	Substances, which are classified on the basis of: <ul style="list-style-type: none">① absorption, metabolism, distribution and excretion studies that would indicate the likelihood the substance would be present in potentially toxic levels in breast milk, or② results of one or two generation studies in animals which provide clear evidence of adverse effect in the offspring due to transfer in the milk or adverse effect on the quality of the milk, or③ human evidence indicating a hazard to babies during the lactation period

C. Classification criteria for mixtures

- 1) Classification of mixtures will be based on the available test data for the individual ingredients of the mixture using cut-off values/concentration limits for the ingredients classified as reproductive toxicants as below.

Category	Criteria
1A	Ingredients classified as Category 1A reproductive toxicant $\geq 0.3\%$
1B	Ingredients classified as Category 1B reproductive toxicant $\geq 0.3\%$
2	Ingredients classified as Category 2 reproductive toxicant $\geq 3.0\%$
Additional category for effects on or via lactation	Ingredients classified as additional category for effects on or via lactation $\geq 3.0\%$

- 2) The classification of mixture should be based on the total weight of evidence available, using expert judgement when data are available for the mixture itself or are applied in accordance with the bridging rules.
- a) When the test results for the mixture as a whole must be shown to be conclusive taking into account dose and other factors such as duration, observations, sensitivity and statistical analysis of reproduction test systems, the mixture will be classified using the criteria for substances.
- b) Where the mixture itself has not been tested to determine its reproductive toxicity, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.

3.9. Specific Target Organ Toxicity - single exposure

A. Definitions

Specific target organ toxicity (single exposure) is defined as specific, non lethal target organ toxicity arising from a single exposure, which is not included from acute toxicity, skin corrosion/irritation, serious eye damage/eye irritation, respiratory or skin sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity, and aspiration toxicity.

B. Classification criteria for substances

Category	Criteria
1	Substances, which are classified on the basis of: ① reliable and good quality evidence that have produced significant toxicity in humans following single exposure from human cases or epidemiological studies ② observations from appropriate studies in experimental animals following single exposure in which significant and/or severe toxic effects of relevance to human health were produced at generally low exposure concentrations
2	Substances that, on the basis of significant toxic effects from studies in experimental animals can be presumed to have the potential to be harmful to human health following single exposure
3	Substances which adversely alter human function for a short duration after exposure and from which humans may recover in a reasonable period without leaving significant alteration of structure or function on the basis of: ① known to irritate respiratory tract in human transiently, or shown to have respiratory irritant effects in animal tests (respiratory tract irritation) ② known to have narcotic effects in humans or in animal studies (narcotic effects)

1) Classification using data from human incidents, or epidemiology

Weight of evidence of all data including human incidents, epidemiology is used to classify Category 1. In exceptional cases, based on expert judgement, it is appropriate to place certain substances with human evidence of target organ toxicity in Category 2, when the weight of human evidence is not sufficiently convincing to warrant Category 1 classification, and/or based on the nature and severity of effects.

2) Classification using data in experimental animals (for Category 1 and 2)

a) Examples of relevant toxic effects in humans and/or animals are provided below:

- ① Morbidity resulting from single exposure;
- ② Significant functional changes, more than transient in nature, in the respiratory system, central or peripheral nervous systems, other organs or other organ systems, including signs of central nervous system depression and effects on special senses (such as sight, hearing and sense of smell);
- ③ Any consistent and significant adverse change in clinical biochemistry, haematology, or urinalysis parameters;
- ④ Significant organ damage noted at necropsy and/or subsequently seen or confirmed at microscopic examination;
- ⑤ Multifocal or diffuse necrosis, fibrosis or granuloma formation in vital organs with regenerative capacity;
- ⑥ Morphological changes that are potentially reversible but provide clear evidence of marked organ dysfunction;
- ⑦ Evidence of appreciable cell death (including cell degeneration and reduced cell number) in vital organs incapable of regeneration.

b) Examples that would not justify classification in humans and/or animals are provided below:

- ① Clinical observations or small changes in bodyweight gain, food consumption or water intake that may have some toxicological importance but that do not, by themselves, indicate 'significant' toxicity;

- ② Small changes in clinical biochemistry, haematology or urinalysis parameters and/or transient effects, when such changes or effects are of doubtful or minimal toxicological importance;
 - ③ Changes in organ weights with no evidence of organ dysfunction;
 - ④ Adaptive responses that are not considered toxicologically relevant;
 - ⑤ Substance-induced species-specific mechanisms of toxicity, i.e. demonstrated with reasonable certainty to be not relevant for human health.
- c) The guidance value (C) ranges for single-dose exposure which has produced a significant non-lethal toxic effect are those applicable to acute toxicity testing, as below.

		Guidance value ranges for:	
Route of exposure	Units	Category 1	Category 2
Oral (rat)	mg/kg body weight	$C \leq 300$	$300 < C \leq 2000$
Dermal (rat or rabbit)	mg/kg body weight	$C \leq 1000$	$1000 < C \leq 2000$
Inhalation (rat) gas	ppm/4h	$C \leq 2500$	$2500 < C \leq 20000$
Inhalation (rat) vapour	mg/L/4h	$C \leq 10$	$10 < C \leq 20$
Inhalation (rat) dust/mist/fume	mg/L/4h	$C \leq 1.0$	$1.0 < C \leq 5.0$

3) Classification of Category 3

a) Respiratory tract irritation

- ① Respiratory irritant effects (characterized by localized redness, oedema, pruritis and/or pain) that impair function with symptoms such as cough, pain, choking, and breathing difficulties are included.
- ② Subjective human observations could be supported by objective measurements of clear respiratory tract irritation (RTI) (such as electrophysiological responses, biomarkers of inflammation in nasal or bronchoalveolar lavage fluids).
- ③ The symptoms observed in humans should also be typical of those that would

be produced in the exposed population rather than being an isolated idiosyncratic reaction or response triggered only in individuals with hypersensitive airways. Ambiguous reports simply of 'irritation' shall be excluded as this term is commonly used to describe a wide range of sensations including those such as smell, unpleasant taste, a tickling sensation, and dryness, which are outside the scope of classification for respiratory irritation.

- ④ There are currently no validated animal tests that deal specifically with RTI, however, useful information may be obtained from the single and repeated inhalation toxicity tests. Such animal studies can be used as part of weight of evidence evaluation.
- ⑤ This special classification would occur only when more severe organ effects including in the respiratory system are not observed.

b) Narcotic effects

- ① Central nervous system depression including narcotic effects in humans such as drowsiness, narcosis, reduced alertness, loss of reflexes, lack of coordination, and vertigo are included. These effects can also be manifested as severe headache or nausea, and can lead to reduced judgment, dizziness, irritability, fatigue, impaired memory function, deficits in perception and coordination, reaction time, or sleepiness.
- ② Narcotic effects observed in animal studies may include lethargy, lack of coordination righting reflex, narcosis, and ataxia. If these effects are not transient in nature, then they shall be considered to support classification for Category 1 or 2 specific target organ toxicity single exposure.

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration,

interpolation, substantially similar mixtures, or aerosols.

- 3) Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.

Category	Criteria
1	Ingredients classified as Category 1 Target organ toxicant $\geq 10\%$
2	Mixtures, which have ① Ingredients classified as Category 1 Target organ toxicant $\geq 1.0\%$, but $< 10\%$, or ② Ingredients classified as Category 2 Target organ toxicant $\geq 10\%$
3	Mixtures, which have ① Ingredients classified as Respiratory tract irritation $\geq 20\%$ ② Ingredients classified as Narcotic effects $\geq 20\%$

Note) A cut-off value/concentration limit of 20 % has been suggested; however, it should be recognized that this cut-off value/ concentration limit may be higher or less depending on the Category 3 ingredient(s) and that some effects such as respiratory tract irritation may not occur below a certain concentration while other effects such as narcotic effects may occur below this 20 % value. Expert judgement should be exercised.

3.10. Specific Target Organ Toxicity - repeated exposure

A. Definitions

Specific target organ toxicity (single exposure) is defined as specific, non lethal target organ toxicity arising from a repeated exposure, which is not included from acute toxicity, skin corrosion/irritation, serious eye damage/eye irritation, respiratory or skin sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity, and aspiration toxicity.

B. Classification criteria for substances

Category	Criteria
1	Substances, which are classified on the basis of: ① reliable and good quality evidence that have produced significant toxicity in humans following repeated exposure from human cases or epidemiological studies ② observations from appropriate studies in experimental animals following repeated exposure in which significant and/or severe toxic effects of relevance to human health were produced at generally low exposure concentrations
2	Substances that, on the basis of significant toxic effects from studies in experimental animals can be presumed to have the potential to be harmful to human health following repeated exposure

1) Examples of relevant toxic effects in humans and/or animals are provided below:

- a) Morbidity or death resulting from repeated or long-term exposure. Morbidity or death may result from repeated exposure, even to relatively low doses/concentrations, due to bioaccumulation of the substance or its metabolites, and/or due to the overwhelming of the de-toxification process by repeated exposure;
- b) Significant functional changes in the central or peripheral nervous systems or

other organ systems, including signs of central nervous system depression and effects on special senses (e.g. sight, hearing and sense of smell);

- c) Any consistent and significant adverse change in clinical biochemistry, haematology, or urinalysis parameters;
 - d) Significant organ damage noted at necropsy and/or subsequently seen or confirmed at microscopic examination;
 - e) Multifocal or diffuse necrosis, fibrosis or granuloma formation in vital organs with regenerative capacity;
 - f) Morphological changes that are potentially reversible but provide clear evidence of marked organ dysfunction (e.g., severe fatty change in the liver);
 - g) Evidence of appreciable cell death (including cell degeneration and reduced cell number) in vital organs incapable of regeneration.
- 2) Examples that would not justify classification in humans and/or animals are provided below:
- a) Clinical observations or small changes in bodyweight gain, food consumption or water intake that have toxicological importance but that do not, by themselves, indicate 'significant' toxicity;
 - b) Small changes in clinical biochemistry, haematology or urinalysis parameters and/or transient effects, when such changes or effects are of doubtful or minimal toxicological importance;
 - c) Changes in organ weights with no evidence of organ dysfunction;
 - d) Adaptive responses that are not considered toxicologically relevant;
 - e) Substance-induced species-specific mechanisms of toxicity, i.e. demonstrated with reasonable certainty to be not relevant for human health.
- 3) The guidance value (C) ranges which has produced a significant toxic effect are those applicable to standard 90-day repeated-dose toxicity study, as below. For a 28-day study the guidance values below would be increased by a factor of three.

		Guidance value ranges for:	
Route of exposure	Units	Category 1	Category 2
Oral (rat)	mg/kg body weight	$C \leq 10$	$10 < C \leq 100$
Dermal (rat or rabbit)	mg/kg body weight	$C \leq 20$	$20 < C \leq 200$
Inhalation (rat) gas	ppm/6h	$C \leq 50$	$50 < C \leq 250$
Inhalation (rat) vapour	mg/L/6h	$C \leq 0.2$	$0.2 < C \leq 1.0$
Inhalation (rat) dust/mist/fume	mg/L/6h	$C \leq 0.02$	$0.02 < C \leq 0.2$

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its specific target organ toxicity, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.

Category	Criteria
1	Ingredients classified as Category 1 Target organ toxicant $\geq 10\%$
2	Mixtures, which have ① Ingredients classified as Category 1 Target organ toxicant $\geq 1.0\%$, but $< 10\%$, or ② Ingredients classified as Category 2 Target organ toxicant $\geq 10\%$

3.11. Aspiration Hazard

A. Definitions

Aspiration means the entry of a liquid or solid substance or mixture directly through the oral or nasal cavity, or indirectly from vomiting, into the trachea and lower respiratory system. Aspiration toxicity includes severe acute effects such as chemical pneumonia, varying degrees of pulmonary injury or death following aspiration.

B. Classification criteria for substances

Category	Criteria
1	Substances, which are classified : ① based on reliable and good quality human evidence, or ② if it is a hydrocarbon and has a kinematic viscosity of 20.5 mm ² /s or less, measured at 40 °C
2	Substances, other than those classified in Category 1, which have a kinematic viscosity of 14 mm ² /s or less, measured at 40 °C

C. Classification criteria for mixtures

- 1) When data are available for the complete mixture, the mixture will be classified using the criteria for substances.
- 2) Where the mixture itself has not been tested to determine its aspiration toxicity, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- 3) Where the mixture itself has not been tested to determine its aspiration toxicity, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.

Category	Criteria
1	<p>Mixtures, which have</p> <p>① Ingredients classified as Category 1 Aspiration toxicant $\geq 10\%$, or</p> <p>② In the case of a mixture which separates into two or more distinct layers, one of which contains $\geq 10\%$ of an ingredient or ingredients classified in Category 1 and has a kinematic viscosity $\leq 20.5 \text{ mm}^2/\text{s}$, measured at 40°C</p>
2	<p>Mixtures, which have</p> <p>① Ingredients classified as Category 2 Aspiration toxicant $\geq 10\%$, or</p> <p>② In the case of a mixture which separates into two or more distinct layers, one of which contains $\geq 10\%$ of an ingredient or ingredients classified in Category 2 and has a kinematic viscosity $\leq 14 \text{ mm}^2/\text{s}$, measured at 40°C</p>

Part 4 Environmental Hazards

4.1. Hazardous to the Aquatic Environment

A. Definitions

Acute aquatic toxicity means the intrinsic property of a substance to be injurious to an organism in a short-term exposure to that substance. Chronic aquatic toxicity means the intrinsic property of a substance to cause adverse effects to aquatic organisms during exposures which are determined in relation to the life-cycle of the organism.

B. Classification criteria for substances

1) Acute (short-term) aquatic hazard

Category	Criteria
Acute 1	Acute aquatic toxicity: ① $LC_{50}(96hr) \leq 1$ (mg/L) : for fish ② $EC_{50}(48hr) \leq 1$ (mg/L) : for crustacea ③ $ErC_{50}(72 \text{ or } 96hr) \leq 1$ (mg/L) : for algae or other aquatic plants

2) Chronic (long-term) aquatic hazard

Category	Criteria
Chronic 1	Substance is not rapidly degradable and/or the experimentally determined $BCF \geq 500$ (or, if absent, the $\log K_{ow} \geq 4$), and Acute aquatic toxicity: ① $LC_{50}(96hr) \leq 1$ (mg/L) : for fish ② $EC_{50}(48hr) \leq 1$ (mg/L) : for crustacea ③ $ErC_{50}(72 \text{ or } 96hr) \leq 1$ (mg/L) : for algae or other aquatic plants

Chronic 2	<p>Substance is not rapidly degradable and/or the experimentally determined $BCF \geq 500$ (or, if absent, the $\log K_{ow} \geq 4$), unless the chronic toxicity NOECs are > 1 mg/l, and</p> <p>Acute aquatic toxicity:</p> <p>① $1 < LC_{50}(96hr) \leq 10$ (mg/L) : for fish</p> <p>② $1 < LC_{50}(48hr) \leq 10$ (mg/L) : for crustacea</p> <p>③ $1 < ErC_{50}(72 \text{ or } 96hr) \leq 10$ (mg/L) : for algae or other aquatic plants</p>
Chronic 3	<p>Substance is not rapidly degradable and/or the experimentally determined $BCF \geq 500$ (or, if absent, the $\log K_{ow} \geq 4$) unless the chronic toxicity NOECs are > 1 mg/l, and</p> <p>Acute aquatic toxicity:</p> <p>① $10 < LC_{50}(96hr) \leq 100$ (mg/L) : for fish</p> <p>② $10 < L(E)C_{50}(48hr) \leq 100$ (mg/L) : for crustacea</p> <p>③ $10 < ErC_{50}(72 \text{ or } 96hr) \leq 100$ (mg/L) : for algae or other aquatic plants</p>
Chronic 4	<p>Poorly soluble substances for which no acute toxicity is recorded at levels up to the water solubility, (unless other scientific evidence exists showing classification to be unnecessary. Such evidence would include an experimentally determined $BCF < 500$ or a chronic toxicity NOECs > 1 mg/l.)</p> <p>① which are not rapidly degradable</p> <p>② have a $\log K_{ow} \geq 4$</p>

C. Classification criteria for mixtures

- 1) When the mixture as a whole has been tested to determine its aquatic toxicity, this information can be used for classifying the mixture according to the criteria that have been agreed for substances. When adequate acute or chronic data for the mixture as a whole are lacking, summation method should be applied.

- 2) Where the mixture itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on the similar tested mixtures to adequately characterize the hazards of the mixture, these data will be used in accordance with the bridging rules; dilution, batching, concentration, interpolation, substantially similar mixtures, or aerosols.
- a) Dilution: if a mixture is formed by diluting another mixture or a substance classified for its aquatic environmental hazard with a diluent which has an equivalent or lower aquatic hazard classification than the least toxic original component and which is not expected to affect the aquatic hazards of other components, then the mixture may be classified as equivalent to the original mixture or substance. If a mixture is formed by diluting another classified mixture or substance with water or other totally nontoxic material, the toxicity of the mixture can be calculated from the original mixture or substance.
- b) Mixtures other than this can be classified by applying the bridging principles in accordance with Part 1.
- 3) Where the mixture itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on the individual ingredients to adequately characterize the hazards of the mixture, the mixture will be classified as below.
- a) Acute (short-term) aquatic hazard

Category	Criteria
Acute 1	Sum of concentration of ingredients classified as: $\text{Acute 1} \times M \geq 25\%$

- b) Chronic (long-term) aquatic hazard

Category	Criteria
Chronic 1	Sum of concentration of ingredients classified as: $\text{Chronic 1} \times M \geq 25\%$

Chronic 2	Sum of concentration of ingredients classified as followings $\geq 25\%$: ① M x 10 x Chronic 1 ② Chronic 2
Chronic 3	Sum of concentration of ingredients classified as followings $\geq 25\%$: ① M x 100 x Chronic 1 ② 10 x Chronic 2 ③ Chronic 3
Chronic 4	Sum of concentration of ingredients classified as followings $\geq 25\%$: ① Chronic 1 ② Chronic 2 ③ Chronic 3 ④ Chronic 4

- Mixtures with highly toxic ingredients may be classified by applying the appropriate multiplying factor.

Acute toxicity L(E)C ₅₀ value(mg/L)	M factor
$0.1 < L(E)C_{50} \leq 1$	1
$0.01 < L(E)C_{50} \leq 0.1$	10
$0.001 < L(E)C_{50} \leq 0.01$	100
$0.0001 < L(E)C_{50} \leq 0.001$	1000
$0.00001 < L(E)C_{50} \leq 0.0001$	10000
(continue in factor 10 intervals)	

- Mixture can be made of a combination of both ingredients that are classified (as Acute 1, and/or Chronic 1, 2, 3, 4) and those for which adequate toxicity test data is available. When adequate toxicity data are available for more than one ingredient in the mixture, the combined toxicity of those ingredients may

be calculated using the following additivity formulas, depending on the nature of the toxicity data.

$$\frac{\sum C_i}{L(E)C_{50m}} = \sum_n \frac{C_i}{L(E)C_{50i}}$$

where:

C_i = concentration of ingredient i (weight percentage)

$L(E)C_{50i}$ = LC50 or EC50 for component i, in (mg/l)

n = number of ingredients, and i is running from 1 to n;






$L(E)C_{50m}$ = L(E) C50 of the part of the mixture with test data

Elements of label(Refer to article 6)


Part 1 Label elements by hazard classification

1.1. Physical Hazards



1.1.1. Explosives

Category		Unstable Explosives	Division 1.1	Division 1.2	Division 1.3	Division 1.4	Division 1.5	Division 1.6
Symbol							1.5 on orange background	1.6 on orange background
Signal word		Danger	Danger	Danger	Danger	Warning	Danger	
Hazard statement		H200	H201	H202	H203	H204	H205	
Precautionary statements	Prevention	P201 P202 P281	P210 P230 P240 P250 P280	P210 P230 P240 P250 P280	P210 P230 P240 P250 P280	P210 P240 P250 P280	P210 P230 P240 P250 P280	
	Response	P372 P373 P380	P370 +P380 P372 P373	P370 +P380 P372 P373	P370 +P380 P372 P373	P370 +P380 P372 P373 P374	P370 +P380 P372 P373	
	Storage	P401	P401	P401	P401	P401	P401	
	Disposal	P501	P501	P501	P501	P501	P501	


1.1.2. Flammable Gases

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H220	H221
Precautionary statements	Prevention	P210	P210
	Response	P377	P377
		P381	P381
	Storage	P403	P403
	Disposal		





1.1.3. Flammable Aerosols

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H222	H223
Precautionary statements	Prevention	P210	P210
		P211	P211
		P251	P251
	Response		
	Storage	P410+P412	P410+P412
	Disposal		




1.1.4. Oxidizing Gases

Category		1
Symbol		
Signal word		Danger
Hazard statement		H270
Precautionary statements	Prevention	P220 P244
	Response	P370+P376
	Storage	P403
	Disposal	



1.1.5. Gases under pressure

Category		Compressed gas	Liquefied gas	Refrigerated liquefied gas	Dissolved gas
Symbol					
Signal word		Warning	Warning	Warning	Warning
Hazard statement		H280	H280	H281	H280
Precautionary statements	Prevention			P282	
	Response			P336 P315	
	Storage	P410+P403	P410+P403	P403	P410+P403
	Disposal				






1.1.6. Flammable Liquids

Category		1	2	3
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H224	H225	H226
Precautionary statements	Prevention	P210	P210	P210
		P233	P233	P233
		P240	P240	P240
		P241	P241	P241
		P242	P242	P242
		P243	P243	P243
		P280	P280	P280
	Response	P303+P361+P353 P370+P378	P303+P361+P353 P370+P378	P303+P361+P353 P370+P378
	Storage	P403+P235	P403+P235	P403+P235
	Disposal	P501	P501	P501


1.1.7. Flammable Solids

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H228	H228
Precautionary statements	Prevention	P210	P210
		P240	P240
		P241	P241
		P280	P280
	Response	P370+P378	P370+P378
	Storage		
	Disposal		


1.1.8. Self-reactive substances and mixtures

Category		Type A	Type B	Type C and D	Type E and F	Type G
Symbol			 			
Signal word		Danger	Danger	Danger	Warning	
Hazard statement		H240	H241	H242	H242	
Precautionary statements	Prevention	P210	P210	P210	P210	
		P220	P220	P220	P220	
		P234	P234	P234	P234	
		P280	P280	P280	P280	
	Response	P370+P378	P370+P378			
		P370+P380 +P375	P370+P380 +P375	P370+P378	P370+P378	
	Storage	P403+P235	P403+P235	P403+P235	P403+P235	
		P411 P420	P411 P420	P411 P420	P411 P420	
	Disposal	P501	P501	P501	P501	



1.1.9. Pyrophoric Liquids

Category		1
Symbol		
Signal word		Danger
Hazard statement		H250
Precautionary statements	Prevention	P210
		P222
		P280
	Response	P302+P334
		P370+P378
	Storage	P422
	Disposal	




1.1.10. Pyrophoric Solids

Category		1
Symbol		
Signal word		Danger
Hazard statement		H250
Precautionary statements	Prevention	P210 P222 P280
	Response	P335+P334 P370+P378
	Storage	P422
	Disposal	




1.1.11. Self-heating substances and mixtures

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H251	H252
Precautionary statements	Prevention	P235+P410 P280	P235+P410 P280
	Response		
	Storage	P407 P413 P420	P407 P413 P420
	Disposal		




1.1.12. Substances and mixtures which, in contact with water, emit flammable gases

Category		1	2	3
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H260	H261	H261
Precautionary statements	Prevention	P223 P231+P232 P280	P223 P231+P232 P280	P231+P232 P280
	Response	P335+P334 P370+P378	P335+P334 P370+P378	P370+P378
	Storage	P402+P404	P402+P404	P402+P404
	Disposal	P501	P501	P501






1.1.13. Oxidizing Liquids

Category		1	2	3
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H271	H272	H272
Precautionary statements	Prevention	P210 P220 P221 P280 P283	P210 P220 P221 P280	P210 P220 P221 P280
	Response	P306+P360 P371+P380+P375 P370+P378	P370+P378	P370+P378
	Storage			
	Disposal	P501	P501	P501


1.1.14. Oxidizing Solids

Category		1	2	3
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H271	H272	H272
Precautionary statements	Prevention	P210 P220 P221 P280 P283	P210 P220 P221 P280	P210 P220 P221 P280
	Response	P306+P360 P371+P380+P375 P370+P378	P370+P378	P370+P378
	Storage			
	Disposal	P501	P501	P501

1.1.15. Organic Peroxides





Category		Type A	Type B	Type C and D	Type E and F	Type G
Symbol			 			
Signal word		Danger	Danger	Danger	Warning	
Hazard statement		H240	H241	H242	H242	
Precautionary statements	Prevention	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	
	Response					
	Storage	P411+P235 P410 P420	P411+P235 P410 P420	P411+P235 P410 P420	P411+P235 P410 P420	
	Disposal	P501	P501	P501	P501	

1.1.16. Corrosive to metals



Category		1
Symbol		
Signal word		Warning
Hazard statement		H290
Precautionary statements	Prevention	P234
	Response	P390
	Storage	P406
	Disposal	

1.2. Health Hazards



1.2.1. Acute Toxicity

Category			1	2	3	4
Symbol						
Signal word			Danger	Danger	Danger	Warning
Oral	Hazard statement		H300	H300	H301	H302
	Precautionary statements	Prevention	P264 P270	P264 P270	P264 P270	P264 P270
		Response	P301+P310 P321 P330	P301+P310 P321 P330	P301+P310 P321 P330	P301+P312 P330
		Storage	P405	P405	P405	
		Disposal	P501	P501	P501	P501
Dermal	Hazard statement		H310	H310	H311	H312
	Precautionary statements	Prevention	P262 P264 P270 P280	P262 P264 P270 P280	P280	P280
		Response	P302+P350 P310 P322 P361 P363	P302+P350 P310 P322 P361 P363	P302+P352 P312 P322 P361 P363	P302+P352 P312 P322 P363
		Storage	P405	P405	P405	
		Disposal	P501	P501	P501	P501
Inhalation	Hazard statement		H330	H330	H331	H332
	Precautionary statements	Prevention	P260 P271 P284	P260 P271 P284	P261 P271	P261 P271
		Response	P304+P340 P310 P320	P304+P340 P310 P320	P304+P340 P311 P321	P304+P340 P312
		Storage	P403+P233 P405	P403+P233 P405	P403+P233 P405	
		Disposal	P501	P501	P501	


1.2.2. Skin Corrosion/Irritation

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H314	H315
Precautionary statements	Prevention	P260 P264 P280	P264 P280
	Response	P301+P330+P331 P303+P361+P353 P363 P304+P340 P310 P321 P305+P351+P338	P302+P352 P321 P332+P313 P362
	Storage	P405	
	Disposal	P501	


1.2.3. Serious eye damage/eye irritation

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H318	H319
Precautionary statements	Prevention	P280	P264 P280
	Response	P305+P351+P338 P310	P305+P351+P338 P337+P313
	Storage		
	Disposal		




1.2.4. Respiratory Sensitization

Category		1
Symbol		
Signal word		Danger
Hazard statement		H334
Precautionary statements	Prevention	P261 P285
	Response	P304+P341 P342+P311
	Storage	
	Disposal	P501




1.2.5. Skin Sensitization

Category		1
Symbol		
Signal word		Warning
Hazard statement		H317
Precautionary statements	Prevention	P261 P272 P280
	Response	P302+P352 P333+P313 P321 P363
	Storage	
	Disposal	P501




1.2.6. Germ cell Mutagenicity

Category		1A	1B	2
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H340	H340	H341
Precautionary statements	Prevention	P201 P202 P281	P201 P202 P281	P201 P202 P281
	Response	P308+P313	P308+P313	P308+P313
	Storage	P405	P405	P405
	Disposal	P501	P501	P501




1.2.7. Carcinogenicity

Category		1A	1B	2
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H350	H350	H351
Precautionary statements	Prevention	P201 P202 P281	P201 P202 P281	P201 P202 P281
	Response	P308+P313	P308+P313	P308+P313
	Storage	P405	P405	P405
	Disposal	P501	P501	P501



1.2.8. Reproductive Toxicity

Category		1A	1B	2	effects on or via lactation
Symbol					
Signal word		Danger	Danger	Warning	
Hazard statement		P360	P360	P361	P362
Precautionary statements	Prevention	P201	P201	P201	P201
		P202	P202	P202	P260
		P281	P281	P281	P263
					P264
	Response	P308+P313	P308+P313	P308+P313	P270
	Storage	P405	P405	P405	P308+P313
	Disposal	P501	P501	P501	



1.2.9. Specific Target Organ Toxicity - Single Exposure

Category		1	2	3
Symbol				
Signal word		Danger	Warning	Warning
Hazard statement		H370	H371	H335 (respiratory tract irritation) H336 (narcotic effects)
Precautionary statements	Prevention	P260	P260	P261
		P264	P264	P271
		P270	P270	
	Response	P307+P311 P321	P309+P311	P304+P340 P312
	Storage	P405	P405	P403+P233 P405
	Disposal	P501	P501	P501

1.2.10. Specific Target Organ Toxicity - Repeated Exposure




Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H372	H373
Precautionary statements	Prevention	P260 P264 P270	P260
	Response	P314	P314
	Storage		
	Disposal	P501	P501

1.2.11. Aspiration Hazard

Category		1	2
Symbol			
Signal word		Danger	Warning
Hazard statement		H304	H305
Precautionary statements	Prevention		
	Response	P301+P310 P331	P301+P310 P331
	Storage	P405	P405
	Disposal	P501	P501

1.3. Environmental Hazards

1.3.1. Hazardous to Aquatic Environment

Category		Acute 1	Chronic 1	Chronic 2	Chronic 3	Chronic 4
Symbol						
Signal word		Warning	Warning			
Hazard statement		H400	H410	H411	H412	H413
Precautionary statements	Prevention	P273	P273	P273	P273	P273
	Response	P391	P391	P391		
	Storage					
	Disposal	P501	P501	P501	P501	P501

Part 2 Codification of Statements

2.1. Hazard Statements

2.1.1. Physical Hazards

Code	Statements
H200	Unstable explosive
H201	Explosive; mass explosion hazard
H202	Explosive; severe projection hazard
H203	Explosive; fire, blast or projection hazard
H204	Fire or projection hazard
H205	May mass explode in fire
H220	Extremely flammable gas
H221	Flammable gas
H222	Extremely flammable aerosol
H223	Flammable aerosol
H224	Extremely flammable liquid and vapour
H225	Highly flammable liquid and vapour
H226	Flammable liquid and vapour
H228	Flammable solid
H240	Heating may cause an explosion
H241	Heating may cause a fire or explosion
H242	Heating may cause a fire
H250	Catches fire spontaneously if exposed to air
H251	Self-heating; may catch fire
H252	Self-heating in large quantities; may catch fire
H260	In contact with water releases flammable gases which may ignite spontaneously
H261	In contact with water releases flammable gas
H270	May cause or intensify fire; oxidizer
H271	May cause fire or explosion; strong oxidizer
H272	May intensify fire; oxidizer
H280	Contains gas under pressure; may explode if heated
H281	Contains refrigerated gas; may cause cryogenic burns or injury
H290	May be corrosive to metals

2.1.2. Health Hazards

Code	Statements
H300	Fatal if swallowed
H301	Toxic if swallowed
H302	Harmful if swallowed
H304	May be fatal if swallowed and enters airways
H305	May be harmful if swallowed and enters airways
H310	Fatal in contact with skin
H311	Toxic in contact with skin
H312	Harmful in contact with skin
H314	May be harmful in contact with skin
H315	Causes severe skin burns and eye damage
H317	Causes skin irritation
H318	May cause an allergic skin reaction
H319	Causes serious eye damage
H330	Causes serious eye irritation
H331	Toxic if inhaled
H332	Harmful if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H336	May cause drowsiness or dizziness
H340	May cause genetic defects
H341	Suspected of causing genetic defects
H350	May cause cancer
H351	Suspected of causing cancer
H360	May damage fertility or the unborn child
H361	Suspected of damaging fertility or the unborn child
H362	May cause harm to breast-fed children
H370	Causes damage to organs
H371	May cause damage to organs
H372	Causes damage to organs through prolonged or repeated exposure
H373	May cause damage to organs through prolonged or repeated exposure

2.1.3. Environmental Hazards

Code	Statements
H400	Very toxic to aquatic life
H410	Very toxic to aquatic life with long lasting effects
H411	Toxic to aquatic life with long lasting effects
H412	Harmful to aquatic life with long lasting effects
H413	May cause long lasting harmful effects to aquatic life

2.2. Precautionary statements

2.2.1. Prevention

Code	Precautionary statements
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P211	Do not spray on an open flame or other ignition source.
P220	Keep/Store away from clothing/.../combustible materials.
P221	Take any precaution to avoid mixing with combustibles/...
P222	Do not allow contact with air.
P223	Keep away from any possible contact with water, because of violent reaction and possible flash fire.
P230	Keep wetted with ...
P231	Handle under inert gas.
P232	Protect from moisture.
P233	Keep container tightly closed.
P234	Keep only in original container.
P235	Keep cool.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/lighting/.../equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P244	Keep reduction valves free from grease and oil.
P250	Do not subject to grinding/shock/.../friction.
P251	Pressurized container: Do not pierce or burn, even after use.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P262	Do not get in eyes, on skin, or on clothing.
P263	Avoid contact during pregnancy/while nursing.

P264	Wash ... thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P281	Use personal protective equipment as required.
P282	Wear cold insulating gloves/face shield/eye protection.
P283	Wear fire/flame resistant/retardant clothing.
P284	Wear respiratory protection.
P285	In case of inadequate ventilation wear respiratory protection.
P231+P232	Handle under inert gas. Protect from moisture.
P235+P410	Keep cool. Protect from sunlight.

2.2.2. Response

Code	Precautionary statements
P301	IF SWALLOWED:
P302	IF ON SKIN:
P303	IF ON SKIN (or hair):
P304	IF INHALED:
P305	IF IN EYES:
P306	IF ON CLOTHING:
P307	IF exposed:
P308	IF exposed or concerned:
P309	IF exposed or if you feel unwell:
P310	Immediately call a POISON CENTER or doctor/physician.
P311	Call a POISON CENTER or doctor/physician.
P312	Call a POISON CENTER or doctor/physician if you feel unwell.
P313	Get medical advice/attention.
P314	Get medical advice/attention if you feel unwell.
P315	Get immediate medical advice/attention.
P320	Specific treatment is urgent (see ...on this label).
P321	Specific treatment (see ... on this label).
P322	Specific measures (see ... on this label).
P330	Rinse mouth.

P331	Do NOT induce vomiting.
P332	If skin irritation occurs:
P333	If skin irritation or rash occurs:
P334	Immerse in cool water/wrap in wet bandages.
P335	Brush off loose particles from skin.
P336	Thaw frosted parts with lukewarm water. Do not rub affected area.
P337	If eye irritation persists:
P338	Remove contact lenses, if present and easy to do. Continue rinsing.
P340	Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P341	If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P342	If experiencing respiratory symptoms:
P350	Gently wash with plenty of soap and water.
P351	Rinse cautiously with water for several minutes.
P352	Wash with plenty of soap and water.
P353	Rinse skin with water/shower.
P360	Rinse immediately contaminated clothing and skin with plenty of water before removing clothes.
P361	Remove/Take off immediately all contaminated clothing.
P362	Take off contaminated clothing and wash before reuse.
P363	Wash contaminated clothing before reuse.
P370	In case of fire:

P371	In case of major fire and large quantities:
P372	Explosion risk in case of fire.
P373	DO NOT fight fire when fire reaches explosives.
P375	Fight fire remotely due to the risk of explosion.
P376	Stop leak if safe to do so.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P378	Use ... for extinction.
P380	Evacuate area.
P381	Eliminate all ignition sources if safe to do so.
P390	Absorb spillage to prevent material damage.
P391	Collect spillage.
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P302+P334	IF ON SKIN: Immerse in cool water/wrap in wet bandages.
P302+P350	IF ON SKIN: Gently wash with plenty of soap and water.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P312	IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P304+P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P306+P360	IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes.
P307+P311	IF exposed: Call a POISON CENTER or doctor/physician.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P309+P311	IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P335+P334	Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.
P337+P313	If eye irritation persists: Get medical advice/attention.
P342+P311	If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
P370+P376	In case of fire: Stop leak if safe to do so.
P370+P378	In case of fire: Use ... for extinction.
P370+P380	In case of fire: Evacuate area.
P370+P380+P375	In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.
P371+P380+P375	In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

2.2.3. Storage

Code	Precautionary statements
P401	Store ...
P402	Store in a dry place.
P403	Store in a well-ventilated place.
P404	Store in a closed container.
P405	Store locked up.
P406	Store in corrosive resistant/...container with a resistant inner liner.
P407	Maintain air gap between stacks/pallets.
P410	Protect from sunlight.
P411	Store at temperatures not exceeding ...°C.
P412	Do not expose to temperatures exceeding 50 °C.
P413	Store bulk masses greater than ...kg at temperatures not exceeding ...°C.
P420	Store away from other materials.
P422	Store contents under ...
P402+P404	Store in a dry place. Store in a closed container.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P403+P235	Store in a well-ventilated place. Keep cool.
P410+P403	Protect from sunlight. Store in a well-ventilated place.
P410+P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C.
P411+P235	Store at temperatures not exceeding ...°C. Keep cool.


2.2.4. Disposal

Code	Precautionary statements
P501	Dispose of contents/container to ...

<Appendix 3>

Format and Size of Label(Refer to article 7)

1. Format

(Product identifier)	
(example of symbol)	(signal word)
	Hazard statements :
	Precautionary statements :
Supplier identification :	

2. Size

A. Size of label(print or placard) per capacity of container or package

Capacity of container or package	Size of prints or placards
Capacity $\geq 500 \ell$	larger than or equal to 450cm^2
$200 \ell \leq \text{Capacity} < 500 \ell$	larger than or equal to 300cm^2
$50 \ell \leq \text{Capacity} < 200 \ell$	larger than or equal to 180cm^2
$5 \ell \leq \text{Capacity} < 50 \ell$	larger than or equal to 90cm^2
Capacity $< 5 \ell$	larger than or equal to 5% of whole surface area excluding both top and bottom areas

B. Dimensions of pictograms

- 1) Size of each pictogram shall be larger than or equal to 1/40 of label.
- 2) Size of each pictogram shall be larger than or equal to at least 0.5cm^2 .

Guidance on the preparation of Material Safety Data Sheet(MSDS)

(Refer to article 10, paragraph 1)

1. Product and company identification

- a) Product Name: (to indicate the same name or code as shown in label)
 - b) Recommended use of the chemical and restrictions on use:
 - c) Manufacturer/Supplier/Distributor Information
 - Name:
 - Address:
 - Emergency phone number:
-

2. Hazards identification

- a) Hazard-Risk Classification:
 - b) Label elements including precautionary statements
 - Symbol:
 - Signal Word:
 - Hazard-Risk Statement:
 - Precautionary Statement:
 - c) Other Hazard-Risk which are not included in the classification criteria (e.g. dust explosion hazard):
-

3. Composition/Information on ingredients

Chemical Name	Other name	CAS number or Other identification number	Content (%)
---------------	------------	---	-------------

4. First aid measures

- a) Eye contact:
 - b) Skin contact:
 - c) Inhalation:
 - d) Ingestion:
 - e) Indication of immediate medical attention and notes for physician:
-

5. Fire-Fighting measures

- a) Suitable (and unsuitable) extinguishing media:
 - b) Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products):
 - c) Special protective equipment and precautions for fire-fighters:
-

6. Accidental release measures

- a) Personal precautions, protective equipment and emergency procedures:
 - b) Environmental precautions and protective procedures:
 - c) Methods and materials for containment and cleaning up:
-

7. Handling and storage

- a) Precautions for safe handling:
 - b) Conditions for safe storage (including any incompatibilities):
-

8. Exposure controls & personal protection

- a) Control parameters (e.g. occupational exposure limit values, biological limit values):
 - b) Appropriate engineering controls:
 - c) Personal protective equipment
 - Respiratory protection:
 - Eye protection:
 - Hands protection:
 - Body protection:
-

9. Physical and chemical properties

- a) Appearance (physical state, color etc):
 - b) Odour:
 - c) Odour threshold:
 - d) pH:
 - e) Melting point/freezing point:
 - f) Initial boiling point and boiling range:
 - g) Flash point :
 - h) Evaporation rate:
 - i) Flammability (solid, gas):
 - j) Upper/lower flammability or explosive limits:
 - k) Vapor pressure:
 - l) Solubility:
-

-
- m) Vapor density:
 - n) Relative density:
 - o) Partition coefficient: n-octanol/water:
 - p) Auto-ignition temperature:
 - q) Decomposition temperature:
 - r) Viscosity:
 - s) Molecular mass:
-

10. Stability and reactivity

- a) Chemical stability and possibility of hazardous reactions:
 - b) Conditions to avoid (e.g. static discharge, shock or vibration, etc):
 - c) Incompatible materials:
 - d) Hazardous decomposition products:
-

11. Toxicological information

- a) Information on the likely routes of exposure:
 - b) Health hazards information
 - Acute toxic:
 - Skin corrosive/irritant:
 - Serious eye damage/eye irritation:
 - Respiratory sensitization:
 - Skin sensitization:
 - Carcinogenicity:
 - Germ Cell Mutagenicity :
 - Reproductive toxicity:
 - Specific target organ toxicity (single exposure):
 - Specific target organ toxicity (repeated exposure):
 - Aspiration hazard:
-

12. Ecological information

- a) Aquatic and terrestrial ecotoxicity:
 - b) Persistence and degradability:
 - c) Bioaccumulative potential:
 - d) Mobility in soil:
 - e) Other adverse effects:
-

13. Disposal considerations

- a) Disposal method:
 - b) Disposal precaution (including the disposal method of contaminated container and packaging):
-

14. Transport information

- a) UN number:
 - b) UN proper shipping name:
 - c) Transport hazard class:
 - d) Packing group (if applicable):
 - e) Marine pollution (yes/no):
 - f) Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises:
-

15. Regulatory information

- a) Industrial Safety and Health Act:
 - b) Toxic Chemical Control Act:
 - c) Dangerous Material Safety Control Act:
 - d) Wastes Management Act:
 - e) Other requirements in domestic and other countries:
-

16. Other information

- a) Information source and references:
 - b) Issuing date:
 - c) Revision number and date:
 - d) others:
-