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

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(Unofficial translation)

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 preparation, and training of workers, etc. for which the employer shall provide as prescribed in Article 39 Paragraph 1, Article 41 of Industrial Safety & Hygiene Act, Article 32-2 of Enforcement Decree of the Law, Article 81 Paragraph 1, Article 92-2 through Article 92-9, Annex 11-2 of Enforcement Regulation of the Law.

Article 2 (Definition) Terms used in this notice shall be defined as follows.
1. "Chemical substance" means a substance formed by chemical reaction of element and element.
2. "Preparation containing chemical substances" means a product manufactured by adding excipients, solvents, stabilizers, etc. to an active ingredient.
3. "Mixture" means a mixture of two or more components without chemical reaction.
4. "Manufacturer" means a person who is producing, processing, blending or re-packing chemical substances or formulations within the country for sale or self-consumption.
5. "Importer" means a person who brings in chemical substances from abroad into the country for sale or self-consumption.
6. "Container" means the things made of synthetic steel, plastics, storage tanks, glass, vinyl bags, paper bags, etc. which hold solid, liquid or gas type chemical substances or preparations. But cement mixers and cargo containers shall not be deemed as a container.
7. "Package" shall mean in which a container containing chemical substances or preparations is put.
8. "Semi-finished product container" shall mean the container which contains a chemical substance temporarily for transferring it from one process to another within the same workplace.

Article 3 (Scope of Application and exemption) ① Chemical substance or preparation

containing chemical substances which are required for the classification, labeling of chemical substance and Material Safety Data Sheet (hereinafter referred to as “MSDS”) preparation in Article 39 Paragraph 1 and Article 41 of Industrial Safety & Hygiene Act(hereinafter referred to as “Law”) shall be the substances prescribed in below (hereinafter referred to as “Chemical Substance”).

1. Physical hazards
   a. Explosives
   b. Flammable gases
   c. Flammable aerosols
   d. Oxidizing gases
   e. Gases under pressure
   f. Flammable liquids
   g. Flammable solids
   h. Self-reactive substances and mixtures
   i. Pyrophoric liquids
   j. Pyrophoric solids
   k. Self-heating substances and mixtures
   l. Substances and mixtures which, in contact with water, emit flammable gases
   m. Oxidizing liquids
   n. Oxidizing solids
   o. Organic peroxides
   p. Corrosive to metals

2. Health hazards
   a. Acute toxicity
   b. Skin corrosion/irritation
   c. Serious eye damage/ eye irritation
   d. Respiratory sensitization
   e. Skin sensitization
   f. Germ cell mutagenicity
   g. Carcinogenicity
   h. Reproductive toxicity
   i. Specific target organ systemic toxicity (single exposure)
   j. Specific target organ systemic toxicity (repeated exposure)
   k. Aspiration hazard

3. Environmental hazards
   a. Hazardous to the aquatic environment

② “Others published by the Minister of Labor as having less risk of toxicity, explosiveness, etc” in Article 32 Paragraph 2 Item 12 of the Enforcement Decree of Industrial Safety & Hygiene Act (hereinafter referred to as “Enforcement Decree”) shall mean the following:

1. A substance which does not fall under the criteria in Appendix 1. Provided that a preparation containing less than 1% of substances defined in Article 3 Paragraph 1 Item 1 shall be included.
2. A preparation as a finished product in solid form which has no risk of worker’s exposure to a product or a specific chemical substance contained in a product while being handled.

(provided that a product containing a carcinogenic substance is excluded.)

CHAPTER 2 CLASSIFICATION AND LABELING OF CHEMICAL SUBSTANCES

Article 4 (Classification and Labeling of Chemical Substances, etc) ① Specific requirement are in Annex 1 as per the provisions in Article 81 and Annex 11-2 Item 1 of Enforcement Regulation of Industrial Safety & Hygiene Act (hereinafter referred to as "Enforcement Regulation") regarding chemical classification & its criteria.

② Follow the guideline of 「Globally Harmonized System of Classification and Labeling of Chemicals (GHS)」 by the UN for the specific requirement on the test which is required for classification of a chemical substance.

Article 5 (Responsibilities of label attachment) ① Manufacturer or importer of a specific chemical substance shall attach or print a warning label in the Korean language clearly showing hazard information (this includes where a foreign language and Korean language are written together in the same label) on its container and package. However, it is not required to attach the Korean label for a reagent which is used solely for test and research in a Lab provided that it is labeled in a foreign language, or for a finished product which is in storage or in transit for export.

② In spite of the provisions in Paragraph 1, in the case of a hazardous substance under the 「Recommendations on the Transportation of Dangerous Goods Model Regulations」 of the UN, it can be labeled on the package as per 「Recommendations on the Transportation of Dangerous Goods Model Regulations」.

③ For a single container such as an unpackaged drum, if it is labeled in compliance with the 「Recommendations on the Transportation of Dangerous Goods Model Regulations」 of the United Nations, it is possible not to include the related pictogram in the label.

④ In the case where it is not applicable to attach or print labels on the container and package, it may have a printed tag or label.

⑤ Employer who wishes to use, transport or store a chemical substance shall ensure the substance is labeled, and shall attach a label if not labeled.

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

Article 6 (Preparation Method for Warning Label) ① Pictogram, Signal words, Hazard statements, Precautionary statements according to Article 92-4 of the Enforcement Regulation are described in Annex 2.

② If the size of the container or package containing a specific chemical substance is equal to or less than 100㎖, it is possible to display only Name, Pictogram and Signal words in the warning label and display as 'Refer to MSDS for the other information'. If the supplier information is not

displayed on the container or package, the supplier information should be included on the warning label.

③ When labeled for a semi-finished product container that contained a specific chemical substance for self-use within the concerned business place, it may indicate only the signal word "Danger" or " Warning" as per the degree of its hazard. Provided that it is attached to a label in a place where workers at the storage site can easily see or find a Material Safety Data Sheet.

Article 6 -2 (Preparation Method for the Display Elements) ① For Name, describe the Product Name in the MSDS according to Article 10 Paragraph 1 Item 1.

② All concerned pictograms classified in accordance with relevant criteria set in Annex 2 shall be indicated, provided that it falls under the following.

1. Indicate "skull and crossbones" only if it is classified as both "skull and crossbones" and "exclamation (!)"
2. Indicate a pictogram of corrosive only if it is classified for both corrosive and irritant.
3. Indicate a pictogram of respiratory sensitization only if it is classified for both respiratory and skin sensitization.
4. May indicate up to 4 pictograms only, in the case it is classified for 5 or more pictograms.

③ Indicate relevant signal word "Danger" or "Warning" as per Annex 2. Provided that the specific chemical substance is subject to both "Danger" and "Warning", it may indicate "Danger" only.

④ Indicate all relevant Hazard statements according to Annex 2. However, you may remove the duplicates or combine similar Hazard statements.

⑤ Indicate all relevant Precautionary statements according to Annex 2. Provided that it falls under the following.

1. May remove the duplicates and combine similar Precautionary statements.
2. In the case that 7 or more Precautionary statements are related, only 6 Precautionary statements including at least one statement from Prevention, Response, Storage and Disposal (exclude if no statement is assigned) may be displayed. In this case, remarks should refer to the MSDS for the Precautionary statements which are not displayed.

Article 7 (Format and Size of Label) The format and size of warning labels are as shown in Annex 3.

Article 8 (Color and Location of Label) ① Labels shall be framed in a black color on a white background with wording in a black color.

② Despite paragraph 1, if it is not applicable to have a background of white color due to the type of package such as a vinyl cloth sack, etc., the surface of the package may be used as a background color. Provided that packages in black or similar color shall be framed and written in a contrasting color.

③ A pictogram shall consist of pictogram of relevant hazard and frame, the pictogram of the hazard shall be in black color, and the frame of the pictogram shall be basically in red color but may be in black color when it is not possible, and the background of pictogram shall be in white color. But when it is necessary to print warning label directly on the surface for small container or package with a volume less than 1 liter, the background color of hazard symbol may be the

same color used for container or package (except black color), provided they are of two colors or less.

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

CHAPTER 3 PREPARATION OF MSDS, ETC.

Article 9 (Responsibilities of preparation) ① An employer who wishes to manufacture, import, use, transport or store specific chemical substances of Article 3 Paragraph 1 shall prepare an MSDS pursuant to Article 41 Paragraph 1 of the Law. But an employer who wishes to use, transport or store shall be deemed to have prepared an MSDS in the case where an employer obtains an MSDS from the manufacture or importer.

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

Article 10 (Contents of MSDS) ① The contents of an MSDS and its sequence shall be as follows:

1. Product & 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 and 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 section referred to in Paragraph 1 above shall be as laid out in Annex 4. But a person who prepares MSDS may add further detailed information if it is deemed necessary to improve the safety and hygiene of workers.

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

② Despite the provisions of Paragraph 1, it is not necessary to translate into Korean in the case the MSDS is for a reagent which is used solely for test and research in laboratories.

③ In the case where you wish to indicate a test result for the preparation pursuant to Article 10

Paragraph 1, the test data conducted in compliance with Good Laboratory Practice (GLP) shall take precedence.

④ When translating the MSDS which is written in a foreign language, it shall list the issuing date and the name of the entity who initially prepared the MSDS for its reliability, and in the case when preparing MSDSs, by using other types of reference material, the sources of such references shall be indicated.

⑤ The Korean Occupational Safety & Health Agency may decide terminology and technical guideline necessary for the preparation of MSDS.

⑥ The units in the MSDS shall comply with the provisions of the "Measuring & Weighing Regulation."

⑦ The MSDS shall provide the information in each section to the extent possible. But in the case where the information cannot be inevitably obtained it shall indicate "No data", and in the case where it is not possible to apply or not applicable it shall state "Not applicable".

⑧ The contents of the ingredients may be indicated pursuant to Article 10 Paragraph 1 Item 3, as a range (giving lower and upper limit) within ±5% of the actual contents. In this case, if the content is less than 5%, it shall indicate lower limit as ≥1% [0.1% for carcinogens and germ cell mutagens, 0.2% for respiratory sensitizers (gases only) and
0.3% for reproductive toxicants].

⑨ An employer shall prepare MSDSs in good faith in conformity with the purpose of safety and health of workers.

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

1. The hazards of a mixture shall be determined in accordance with Annex 1.
2. If a mixture was not tested as a whole for physical hazards, the physical hazard of the mixture shall be evaluated from the information on individual constituting components.

② If products composed of mixtures fulfill the following conditions, a representative MSDS may cover all those products:

1. The products composed of mixtures have the same ingredients
2. The content of each ingredient shall have less than 10% variation
3. Shall have similar hazard properties

Article 13 (Transfer & Supply of MSDS) ① An employer shall provide an MSDS when he/she sells or transfers the specific chemical substances to another employer.

② In the case where the same specific chemical substance is transferred or supplied to the same employer more than 2 times continuously, it is not necessary to re-provide the MSDS ,provided there are no changes in the MSDS of the specific chemical substance.

③ When manufacturers or importers transfer or supply chemical substances or preparations which do not fall under any item of Article 3 Paragraph 1, the manufacturers or importers shall notify in writing that the chemical does not fall under any item of Article 3 Paragraph 1.

④ The importer or manufacturer pursuant to Paragraph 3 and any person who receives a written notice from the importer or manufacturer that the chemical substances or preparations containing chemical substances do not fall under a hazardous chemical substance, shall keep

the concerned documents at the workplace.

Article 14 (Application of New Information) In the case where an employer obtains new information regarding a specific chemical substance he/she shall include the following information in the MSDS within 3 months.

1. Hazards
2. Protective measures against hazards
3. Revisions of regulatory information
4. Other major changes in existing MSDS

Article 15 (Posting & Placement) ① The employer shall keep MSDS for all specific chemical substance used at a place of business in one or more of the following locations where workers can easily see, and shall inspect and maintain such MSDS regularly or on occasion.

1. Place for operational process where the specific chemical substances are in use.
2. Potential places of safety accident or occupational disease
3. The most easily visible place for workers at the workplace

② If the employer complies with all the following items, he/she shall be considered as furnishing an MSDS pursuant to Paragraph 1.

1. To install and operate the computer equipment which keeps the MSDSs exclusively where workers can easily access and check them while working.
2. To train workers handling chemicals (including workers who can be exposed to chemicals) how to operate the MSDS computer program, to input product names and to check MSDS, etc.
3. To post health hazards of chemical substances, including how to search MSDS according to management measures pursuant to Article 41 Paragraph 6 of the Law and Article 92-7 Paragraph 1 of the Enforcement regulation.

CHAPTER 4 TRAINING FOR WORKERS AND INDICATIONS OF IDENTIFICATION INFORMATION

Article 16 < DELETED>

Article 17 (Confirming Training Content) An employer shall check whether workers are capable of checking MSDS through the equipment, in those cases where computer equipment is installed to keep the MSDS pursuant to Article 15 Paragraph 2.

Article 18 < DELETED>

Article 19 (Indication of Identification Information) "Chemical substance and its preparation which is potentially cause significant health hazard to workers as defined by the Minister of Labor " prescribed in Article 41 Paragraph 2 of the Law shall mean the substance falls under any of followings:

1. Prohibited hazardous substances from manufacturing, etc as per Article 37 of the Law.
2. Hazardous substance subject to approval for manufacturing, etc as per Article 38 of the Law.
3. Controlled hazardous substances as per Article 166 of Industrial Hygiene Standard Regulation.

4. Toxic chemicals defined by the Toxic Chemical Control Act.

ADDENDA ('06.12.12)

Article 1 (Enforcement Date) This Notice shall be effective from the date of publication.
Article 2 (Interim measures for Warning Labels, etc) The classification, labeling and standard for MSDS preparation Articles as per Article 3, Article 5 through Article 7, Article 12, Article 14, Article 15 of the previous notice before the enforcement of this regulation shall be used with Article 3, Article 4, Article 6 through Article 8, Article 10 through Article 12 until June 30th 2010 (June 30th 2013 for those preparations containing 2 or more chemical substances).

ADDENDA ('08.1.10)

Article 1 (Enforcement Date) This Notice shall be effective from the date of notice.
Article 2 (Interim measures for Warning Label and Material Safety & Health Act, etc)
The criteria for classification, labeling and MSDS laid in Article 3, Annex 1, Annex 2, Annex 4 in the previous Notice may be used or applicable with the classification, labeling and MSDS criteria laid out in the revised regulation until June 30th 2010.(June 30th 2013 for those preparations containing 2 or more chemical substances)

ADDENDA ('08.6.27)

Article 1 (Enforcement Date) This Notice shall be effective from the date of publication.

ADDENDA ('09.10.26)

Article 1 (Enforcement Date) This Notice shall be effective from the date of publication.

<ANNEX 1>

Classification of Chemical Substances etc. (Article 4 related)

Chapter 1 General rules on Classification

1.1. Hazard Classification

Classify Physical hazards, Health and Environmental hazards of chemical substances through the available hazard and risk assessment data as follows.

A. Classify using test results of hazard and risk assessment.

B. Classify considering the human epidemiology or experience data.

C. If many types of data are available for one hazard evaluation, classify by expert judgment considering the following.

1) If more than one data on human or animal exists and their results are different, evaluate the quality and reliability and apply the data with high reliability preferentially.

2) If it is obvious that it will not cause a hazard to humans by the study results of exposure route, mechanism of action or metabolism, it is possible not to classify as a hazardous substance.

3) If both positive and negative results exist, combine both results and classify per the significance of evidence.

1.2. Classification for mixtures

A. Health and Environment Hazards

1) Where the mixture itself has been tested to determine its hazard classification, the mixture can be classified in accordance with the test results or data. The data of carcinogenicity, germ cell mutagenicity and toxicity to reproduction including dose, period, observations and analysis should be sufficient to determine the classification.

2) Where the mixture itself has not been tested, but there are data on similar tested mixtures to adequately characterize the hazards of the mixture, classify using a bridging rule such as dilution, batch, concentration, interpolation, substantially similar mixtures and aerosols.

a) Dilution: If a mixture is diluted with a substance that has an equivalent or lower toxicity classification than the least toxic original ingredient, and which is not expected to affect the toxicity of other ingredients, then the new mixture may be classified as equivalent to the original mixture.

b) Batch: The toxicity 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 manufacturer, unless there is reason to believe there is significant variation such that the toxicity of the batch has changed. If the latter occurs, a new classification is needed.

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 A, B, C with identical ingredients, where A and B are in the same toxicity category and mixture C has the same toxicologically active ingredients with concentrations intermediate to the concentration of those ingredients in mixtures A and B, then mixture C is assumed to be the same toxicity category as A and B.

e) Substantially similar mixture: Given the two mixtures consist of A, B and B, C, the

concentration of B is essentially the same in both mixtures, concentration of A equals C, and the toxicity for A and C are equivalent and do not affect the toxicity of B, then the two mixtures can be assigned the same hazard category.
f) Aerosols: An aerosol form of a mixture may be classified in the hazard category as the tested, non-aerosolized form of the mixture for oral and dermal toxicity provided the added propellant does not affect the toxicity of the sprayed mixture. Classification of aerosolized mixtures for inhalation toxicity should be considered separately

3) Where no data exists for the mixture itself to determine its toxicity, but there are evaluation data on the individual ingredients, follow the classification method for a mixture per hazard in Chapter 3 and 4. The cut-off concentrations which should be considered are as follows.

Hazard Class	Cut-off concentration (%)
Acute toxicity: - Category 1 to Category 3 - Category 4	 0.1 1
Skin corrosion/Irritation	1
Serious damage to eyes/eye irritation	1
Hazardous to the aquatic environment: - Acute Category 1 - Chronic Category 1 - Chronic Category 2 to Category 4	 0.1 0.1 1

Chapter 2 Physical Hazards

2.1. Explosives

A. Definition

An explosive substance 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

Hazard category	Criteria
Unstable Danger explosives	Unstable explosives are those which are thermally unstable and/or too sensitive for normal handling, transport and use.
Division 1.1	Substances, mixtures which have a mass explosion hazard
Division 1.2	Substances, mixtures which have a projection hazard but not a mass explosion hazard.
Division 1.3	Substances, mixtures 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 minor projection
Division 1.4	Substances, mixtures which present no significant hazard but 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	Explosive 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 and which demonstrate a negligible probability of accidental initiation or propagation

1) A substance or mixture is not classified as explosive if it belongs to following.
   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(OB, Oxygen Balance) is less than -200

< Oxygen balance calculation formula >
$C_xH_yO_z + [x + (y/4) -(z/2)]O_2 \rightarrow xCO_2 +(y/2)H_2O$ and
Oxygen balance = -1600[2x+(y/2) -z]/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 ºC.
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 Category 1 or 2;
- less than 30 %, by mass, if the oxidizing substance is assigned to Category 3

2.2. Flammable gases

A. Definition
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

Category	Criteria
1	Gases, which at 20 °C and a standard pressure of 101.3 kPa and belong to one of the following: 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. Definition
It means aerosols(exclude pyrophoric, self-heating or water-reactive substance) contain a flammable component which includes flammable gas, flammable liquid and flammable solid. “Aerosols(or Aerosol dispenser)” 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

Category	Criteria
1	Aerosol contains more than 1% flammable components or it has a heat of combustion equal to or greater than 20 kJ/g and belong to one of the following ① Contains equal to or greater than 85% flammable component and has a heat of combustion equal to or greater than 30kJ/g ② Spray aerosol - Ignites in a distance equal to or greater than 75cm ③ Foam aerosol - In the foam test, flame height is equal to or greater than 20cm and flame duration is equal to or greater than 2 seconds; or flame height is equal to or greater than 4cm and flame duration is equal to or greater than 7 seconds
2	Aerosol which is not classified as Category 1 and belong to one of the following ① Spray aerosol - has a heat of combustion equal to or greater than 20kJ/g - has a heat of combustion less than 20kJ/g and belongs to one of the following · In the ignition distance test, ignition occur at a distance equal to or greater than 15cm · In the enclosed space ignition test, time equivalent is equal to or less than 300 seconds/㎥ or deflagration density is equal to or less than 300g/㎥ ② Foam aerosol - In the foam test, the flame height is equal to or greater than 4cm and flame duration is equal to or greater than 2 seconds

2.4. Oxidizing gases

A. Definition

An 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

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

2.5. Gases under pressure

A. Definition

Gases under pressure are gases which are contained in a receptacle at a pressure equal to or greater than 200kPa at 20 °C or as a liquefied or a refrigerated liquid.

B. Classification

Category	Criteria
Compressed gas	A gas which when packaged under pressure is entirely gaseous at -50 °C (including all gases with a critical temperature equal to or less than -50 °C)
Liquefied gas	A gas which when packaged under pressure is partially liquid at temperatures above -50 °C. ① High pressure liquefied gas: a gas with a critical temperature between -50°C and +65°C 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. Definition

A flammable liquid means a liquid having a flash point of equal to or less than 60°C at a standard pressure (101.3kPa).

B. Classification

Category	Criteria
1	Liquid with flash point less than 23 °C and initial boiling point equal to or less than 35 °C
2	Liquid with flash point less than 23 °C and initial boiling point more than 35 °C
3	Liquid with flash point equal to or greater than 23 °C and not over 60 °C

2.7. Flammable solids

A. Definition

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

B. Classification

Category	Criteria
1	Substances or mixtures show one of the following result in burning rate test ①Substances or mixtures Other than metal powders: wetted zone does not stop fire and burning time < 45 s or burning rate > 2.2 mm/s ② Metal powders: burning time equal to or less than 5 min.
2	Substances or mixtures show one of the following result in burning rate test ①Substances or mixtures Other than metal powders: wetted zone stops the fire for at least 4 min and burning time < 45 s or burning rate > 2.2 mm/s ② Metal powders: burning time more than 5 min and equal to or less than 10 min.

2.8. Self-reactive substances and mixtures

A. Definition

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.

B. Classification

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 show one of the following properties or conditions ① detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement ② does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement 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 (self accelerating decomposition temperature 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) If it belongs to one of the followings, exclude from the classification.
   a) Explosives or gun powders
   b) Organic peroxides
   c) Their heat of decomposition is less than 300J/g
   d) Their self-accelerating decomposition temperature (SADT) is greater than 75 °C for a 50 kg package
   e) Mixtures of oxidizing substances, meeting the criteria for classification as oxidizing substances, which contain 5% or more of combustible organic substances and which do not meet the criteria mentioned in a) ~ 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 is greater than 75 °C or the exothermic decomposition energy is less than 300 J/g

2.9. Pyrophoric Liquids

A. Definition

A 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

Category	Criteria
1	A pyrophoric liquid belongs to one of the following ① The liquid ignites within 5 min when added to an inert carrier and exposed to air ② The liquid added filter ignites or chars on contact with air within 5 min

1) The classification need not be applied without additional test when experience shows that it does not ignite spontaneously on coming into contact with air at normal temperatures.

2.10. Pyrophoric solids

A. Definition

A 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

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

1) The classification need not be applied without additional test when experience 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. Definition

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

B. Classification

Category	Criteria
1	A positive result is obtained in a test using a 25 mm sample cube at 140 °C

2	The substance or mixture which is belongs to one of the following 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 25 mm cube sample at 140 °C and the substance or mixture is to be packed in packages with a volume of more than 3 m^3 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 cube sample at 140 °C, a positive result is obtained in a test using a 100 mm cube sample at 120 °C and the substance or mixture is to be packed in packages with a volume of more than 450 L 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 cube sample at 140 °C and a positive result is obtained in a test using a 100 mm cube sample at 100 °C.

1) Substances and mixtures with a temperature of spontaneous combustion higher than 50°C for a volume of 27 m^3 should not be assigned to a self-heating substance or mixture.
2) Substances and mixtures with a spontaneous ignition temperature higher than 50°C for a volume of 450 liters should not be assigned to hazard Category 1 of this hazard 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. Water reactive substances and mixtures

A. Definition

A solid or liquid substance or mixture which emits flammable gas or spontaneously combusts by interaction with water.

B. Classification

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. 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 liters 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 liters 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 liter 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:
   a) The chemical structure does not contain metals or metalloids
   b) Experience in production or handling shows that the substance or mixture does not react with water
   c) The substance or mixture is known to be soluble in water to form a stable mixture

2.13. Oxidizing Liquids

A. Definition

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

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 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 nitric acid and cellulose; and the criteria for Categories 1 and 2 are not met.

1) The classification need not be applied if it belongs to one of the following:

   a) Organic substances or mixtures does not contain oxygen, fluorine or chlorine
   b) Organic substances or mixtures contains oxygen, fluorine or chlorine and these elements are chemically bonded only to carbon or hydrogen
   c) Inorganic substances or mixtures do not contain oxygen or halogen atoms.

2.14. Oxidizing solids

A. Definition

An 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

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 it belongs to one of the following:

a) Organic substance or mixture does not contain oxygen, fluorine or chlorine

b) Organic substance or mixture contains oxygen, fluorine or chlorine and these elements are chemically bonded only to carbon or hydrogen

c) Inorganic substance or mixtures do not contain oxygen or halogen atoms

2.15. Organic peroxides

A. Definition

Organic peroxides are liquid or solid organic substances which contain the bivalent -0-0- 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

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 shows one of the following condition in laboratory testing ① detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement ② does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement 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 (self-accelerating decomposition temperature 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 desensitization, it shall be defined as organic peroxide TYPE F

1) Classification is excluded if it belongs to one of the followings:
   a) Not more than 1.0% available oxygen from the organic peroxides when containing not more than 1.0% hydrogen peroxide
   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.

Available oxygen content (%) = 16 x ($n_i x c_i / m_i$)
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 component.

2.16. Corrosive to metals

A. Definition

A substance or a mixture that is corrosive or causes damage to metal by chemical action**.**

Classification

Category	Criteria
1	A substance or mixture that when tested on both steel or aluminum surfaces has a corrosion rate exceeding 6.25 mm per year at a test temperature of 55 °C on at least one of them.

1) If the tested substance or mixture is found as corrosive in the initial test on steel or aluminum, classify it as corrosive without additional tests on the other metals.

Chapter 3 Health Hazards

3.1. Acute Toxicity

A. Definition

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

B. Classification criteria for substances

Category	Criteria
1	Substance has one of the following acute toxicity estimate (ATE) ① Oral : ATE ≤5 (mg/kg) ② Dermal : ATE ≤50 (mg/kg) ③ Inhalation · Gas : ATE ≤100 (ppm) · Vapor : ATE ≤ 0.5 (mg/L) · Dust or Mist : ATE≤0.05 (mg/L)
2	Substance has one of the following acute toxicity estimate (ATE) ① Oral : 5 < ATE ≤ 50 (mg/kg) ② Dermal : 50 < ATE ≤200 (mg/kg) ③ Inhalation ·Gas : 100 < ATE ≤ 500 (ppm) ·Vapor **:** 0.5 < ATE ≤ 2.0 (mg/L) ·Dust or Mist : 0.05 < ATE ≤0.5 (mg/L)
3	Substance has one of the following acute toxicity estimate (ATE) ① Oral : 50 < ATE ≤300 (mg/kg) ② Dermal : 200 < ATE ≤ 1,000 (mg/kg) ③ Inhalation · Gas : 500 < ATE ≤ 2,500 (ppm) · Vapor : 2.0 < ATE ≤ 10 (mg/L) · Dust or Mist : 0.5 < ATE ≤1.0 (mg/L)
4	Substance has one of the following acute toxicity estimate (ATE) ① Oral : 300 < ATE ≤ 2,000 (mg/kg) ② Dermal : 1,000 < ATE ≤ 2,000 (mg/kg) ③ Inhalation · Gas : 2,500 < ATE ≤ 20,000 (ppm) · Vapor : 10 < ATE ≤ 20 (mg/L) · Dust or Mist : 1.0 < ATE ≤ 5 (mg/L)

1) The acute toxicity estimate (ATE) means the estimate value of half the lethal dose and is derived from one of the following methods:

a) the LD_{50}/LC_{50} where available,

b) the appropriate conversion value from the table below from the results of a range test

c) the appropriate conversion value from the table below if the classification category is known

Exposure routes	Classification category or experimentally obtained acute toxicity range estimate	Converted Acute Toxicity Estimate

Oral (mg/kg bodyweight)		0 5 50 300	< Category 1 ≤ 5 < Category 2 ≤ 50 < Category 3 ≤ 300 < Category 4 ≤ 2000	0.5 5 100 500
Dermal (mg/kg bodyweight)		0 50 200 1000	< Category 1 ≤ 50 < Category 2 ≤ 200 < Category 3 ≤ 1000 < Category 4 ≤ 2000	5 50 300 1100
Inhalation	Gas (ppmV)	0 100 500 2500	< Category 1 ≤ 100 < Category 2 ≤ 500 < Category 3 ≤ 2500 < Category 4 ≤ 20,000	10 100 700 4500
Inhalation	Vapor (mg/L)	0 0.5 2.0 10.0	< Category 1 ≤ 0.5 < Category 2 ≤ 2.0 < Category 3 ≤ 10.0 < Category 4 ≤ 20.0	0.05 0.5 3 11
Inhalation	Dust/Mist (mg/L)	0 0.05 0.5 1.0	< Category 1 ≤ 0.05 < Category 2 ≤ 0.5 < Category 3 ≤ 1.0 < Category 4 ≤ 5.0	0.005 0.05 0.5 1.5

2) Interpretation of inhalation toxicity test

a) Inhalation cut-off values are based on 4 hour testing exposures. Conversion of existing inhalation toxicity data which has been generated according to 1 hour exposures should be divided by a factor of 2 for gases and vapors 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 ppm. Acknowledging the difficulties in testing vapors, some of which consist of mixtures of liquid and vapor phases provides values in units of mg/L. However, for those vapors which are near the gaseous phase, follow the classification criteria for gas.

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 evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, calculate the acute toxicity estimate according to the methods below and apply the classification criteria for the single substance.

a) Data available or can be estimated for all ingredients

[formula 1]

where Ci = concentration of ingredient i (%)

ATEi = ATE of ingredient i

b) Data available or can be estimated for some of ingredients

① If the total concentration of the ingredient(s) with unknown acute toxicity is equal to or less than 10% then formula 1 should be used.

② If the total concentration of the ingredient(s) with unknown acute toxicity is more than 10% then formula 2 should be used. However, indicate separately the concentration of the ingredients with unknown acute toxicity.

$$\frac{100-(\sum C_{unknown} \text{ if } >10\%)}{ATEmix} = \sum_{n} \frac{Ci}{ATE_i}$$

[formula 2]

where Ci = concentration of ingredient i (%)
ATEi = ATE of ingredient i

3.2. Skin corrosion/irritation

A. Definition

Skin corrosion is the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis (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 corrosion)	Substance belong to one of the following① Has evidence to cause irreversible damage to the skin from human or animal experience. However, if there is evidence that it is not a corrosive material from human or animal experience, this doesn't classify it as skin corrosion without additional testing. ② Structure/activity relationship to a substance already classified as corrosive. ③ Strong acid with pH equal to or less than 2 or strong alkali with ph equal to or greater than 11.5 ④ Positive results in a valid and accepted in vitro skin corrosion test ⑤ In animal test, it causes irreversible damage to the skin on more than one animal out of three following exposure of up to 4 hours.

2 (Skin Irritation)	Substance belongs to one of the following① Has evidence to cause reversible damage to the skin from human or animal experience. However,if there is evidence that it is not an irritant material from human or animal experience, this doesn't classify it as skin irritation without additional testing. ② Structure/activity relationship to a substance already classified as an irritant. ③ Positive results in a valid and accepted in vitro skin irritation test ④ In a skin irritation test, it causes the following reversible damage to the skin following exposure of up to 4 hours - mean value of erythema/eschar is equal to or greater than 2.3 and equal to or less than 4.0, or - Inflammation persists to the end of the observation period, in 2 of 3 tested animals.

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 is sufficient evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

a) Concentration of ingredients of a mixture classified as skin corrosive or irritant that would trigger classification of the mixture as hazardous to skin corrosive/irritation, classify as the following criteria (additivity approach)

Category	Criteria
1 (Skin corrosion)	Mixture with total content of ingredients classified as Category 1 is equal to or more than 5%
2 (Skin Irritation)	Mixture belongs to one of the following ① Total content of ingredients classified as Category 1 is equal to or more than 1% and less than 5 % ② Total content of ingredients classified as Category 2 is equal to or more than 10% ③ The sum of content of ingredients classified as Category 1 multiplied by 10 and the content of ingredients classified as Category 2 is equal to or more than 10%

b) If the mixture contains ingredients which are strong acids or bases, other inorganic salts, aldehydes, phenols, surfactants or other substance having similar properties and for which the additivity principle may not apply, classify according to the following.

Category	Criteria
1 (Skin corrosion)	Mixture belongs to one of the following ① Total content of ingredients with pH equal to or less than 2 is equal to or more than 1% ② Total content of ingredients with pH equal to or greater than 11.5 is equal to or greater than 1% ③ Total content of other Category 1 ingredients which additive principle may not apply is equal to or more than 1%
2 (Skin Irritation)	Mixture contains equal to or more than 3% of an ingredient which is an irritant and for which the additivity principle may not apply, including acids and bases

3.3. Serious sys damage/eye irritation

A. Definition

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 (Serious eye damage)	Substance belongs to one of the following ① Classification as corrosive to skin ② Human experience or data showing damage to the eye which is not fully reversible within 21 days ③ Structure/activity or structure property relationship to a substance or mixture already classified as corrosive ④ pH extremes of strong acids < 2 and strong bases > 11.5 including buffering capacity ⑤ Positive results in a valid and accepted *in vitro* test to assess serious damage to eyes ⑥ Animal test data shows one of the following results - in at least one animal, effects on the cornea, iris or conjunctiva that are not expected to reverse or have not reversed during 21 days observational period - in at least 2 of 3 tested animals shows average score equal to or greater than 3 (corneal opacity), or more than 1.5 (irises)

2 **(eye irritation)**	Substance belongs to one of the following ① Classification as skin irritant ② Human experience or data showing production of changes in the eye which are fully reversible within 21 days ③ Structure/activity or structure property relationship to a substance or mixture already classified as an eye irritant ④ Positive results in a valid and accepted *in vitro* eye irritation test ⑤ Animal test data indicate that a positive response in at least 2 of 3 tested animals of: average score (corneal opacity or irises) is equal to or more than 1, or equal to or more than 2 (conjunctival edema or chemosis) and recovered within 21 days.

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 is sufficient evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

a) Concentration of ingredients of a mixture classified as serious eye damage or eye irritation that would trigger classification of the mixture as corrosive/irritation, classify as the following criteria (additivity approach).

Category	Criteria
1 **(Serious eye damage)**	Mixture belongs to one of the following ① Total content of ingredients classified as serous eye damage(Category 1) or skin corrosion(Category 1) is equal to or more than 3% ② The sum of content of ingredients classified as serous eye damage(Category 1) and skin corrosion(Category 1) is equal to or more than 3%

2 **(eye irritation)**	Mixture belongs to one of the following① Total content of ingredients classified as serous eye damage (Category 1) or skin corrosion(Category 1) is equal to or more than 1% and less than 3% ② Total content of ingredients classified as Category 2 is equal to or more than 10% ③ The sum of content of ingredients classified Category 1 multiplied by 10 and Category 2 is equal to or more than 10% ④ The sum of content of ingredients classified as serous eye damage (Category 1) and skin corrosion(Category 1) is equal to or more than 1% and less than 3% ⑤ The sum of the following is equal to or more than 10% - The sum of content of ingredients classified as severe eye damage (Category 1) and skin corrosion(Category 1) and multiply 10 to the sum. - Total content of ingredients classified as Category 2

b) If the mixture contains ingredients which is a strong acid or base, other inorganic salts, aldehydes, phenols, surfactants or other substance having similar properties and for which a) the additivity principle may not apply, classify according to the following.

Category	**Criteria**
1 **(Serious eye damage)**	Mixture belongs to one of the following ① Total content of ingredients with pH equal to or less than 2 is equal to or more than 1% ② Total content of ingredients with pH equal to or greater than 11.5 is equal to or more than 1% ③ Total content of other Category 1 ingredients which additive principle may not apply is equal to or more than 1%
2 **(eye irritation)**	Mixture contains equal to or more than 3% of an ingredient classified as other Category 2 for which additivity principle may not apply, including acids and bases

3.4. Respiratory sensitization

A. Definition

A respiratory sensitizer is a substance that will induce hypersensitivity of the airways following inhalation of the substance.

B. Classification criteria for substances

Category	Criteria
1	Substances belong to one of the following ① If there is human evidence that the substance induces specific respiratory hypersensitivity ② Where there are positive results from an appropriate animal test

1) The human evidence is as below.

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 may 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) Positive results from bronchial challenge tests with the substancewhich are conducted according to accepted guidelines for the determination of a specific hypersensitivity reaction

2) Appropriate animal test as below.

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) 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 is sufficient evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

Category	Criteria
1	Substance belongs to one of the following ① The content of ingredients with Category 1 is equal to or more than 0.2% (Gas) ② The content of ingredients with Category 1 is equal to or more than 1.0% (Liquid)

3.5. Skin sensitization

A. Definition

A skin sensitizer is a substance that will induce an allergic response following skin contact.

B. Classification criteria for substances

Category	Criteria
1	Substances belong to one of the following ① If there is evidence in humans that the substance can induce sensitization by skin contact in a substantial number of persons ② If there are positive results from an appropriate animal test

1) The human evidence is as below.

a) Positive results 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 in humans

d) Well documented episodes of allergic contact dermatitis, normally obtained in more than one dermatology clinic

2) Appropriate animal test is as below.

a) When an adjuvant type 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 test method a response of at least 15% of the animals is considered positive.

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 is sufficient evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

Category	Criteria
1	Mixture with the content of ingredients in Category 1 is equal to or more than 1.0%

3.6. Germ cell mutagenicity

A. Definition

It means the characteristic that may cause permanent change in the amount or structure of the germ cells of humans that can be transmitted to the progeny. It includes heritable genetic changes that may be manifested at the phenotypic level and to the underlying DNA modifications.

B. Classification criteria for substances

Category	Criteria

1A	Positive evidence from human epidemiological studies
1B	Substance belongs to one of the following① Positive result(s) from *in vivo* heritable germ cell mutagenicity tests in mammals ② 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. ③ Positive results from tests showing mutagenic effects in the germ cells of humans, for example, an increase in the frequency of aneuploidy in sperm cells of exposed people
2	Substance has potential to induce heritable mutations in the germ cells as belong to one of the following. ① Positive results fromSomatic cell mutagenicity tests *in vivo*, in mammals ② Other *in vivo* somatic cell genotoxicity tests which are supported by positive results from *in vitro* mutagenicity assays ③ Positive in mammals mutagenicity assays, and which also show a 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	Mixture with the content of ingredients in Category 1A is equal to or more than 0.1%
1B	Mixture with the content of ingredients in Category 1B is equal to or more than 0.1%
2	Mixture with the content of ingredients in Category 2 is equal to or more than 1.0%

2) Even though the data on the individual ingredients is available, if the mixture itself has been tested or the bridging principle can be applied, the following classification method can be applied according to the expert judgment.

a) If it is appropriate to classify as germ cell mutagenicity based on the relevance, sensitivity of test such as duration, observations, statistical analysis and test sensitivity on the test for the mixture, classify based on the test data on the mixture.

b) There is sufficient evidence to classify by the classification data on similar mixtures, classify it applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3.7. Carcinogenicity

A. Definition

It means the characteristic that induce cancer or increase its incidence.

B. Classification criteria for substances

Category	Criteria
1A	Substance with sufficient evidence of carcinogenicity to humans
1B	Substance with sufficient evidence of carcinogenicity to animal or limited evidence of carcinogenicity to humans and animals
2	Substance with limited evidence for humans or animals but not sufficient to classify as Category 1

C. Classification criteria for mixtures

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

Category	Criteria
1A	Mixture with the content of ingredients in Category 1A is equal to or more than 0.1%
1B	Mixture with the content of ingredients in Category 1B is equal to or more than 0.1%
2	Mixture with the content of ingredients in Category 2 is equal to or more than 1.0%

2) Even though the data on the individual ingredients is available, if the mixture itself has been tested or bridging principle can be applied, the following classification method can be applied according to the expert judgment.

a) If it is appropriate to classify carcinogenicity based on the relevance, sensitivity of test such as duration, observations, statistical analysis and test sensitivity on the test for the mixture, classify based on the test data on the mixture.

b) There is sufficient evidence to classify by the classification data on similar mixtures,

classify it applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3.8. Reproductive toxicity

A. Definition

It means the characteristics that induce adverse effects on sexual function and fertility in adults, as well as developmental toxicity in the offspring. Adverse effects on sexual function and fertility means all effects on sexual function and fertility and include, but not limited to, alterations to the female and male reproductive system, adverse effects to onset of puberty, gamete production and transport, reproductive cycle normality, sexual behavior, fertility, parturition, pregnancy outcomes, premature reproductive senescence, or modifications in other functions that are dependent on the integrity of the reproductive systems. Developmental toxicity includes 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 postnatal, to the time of sexual maturation.

B. Classification criteria for substances

Category	Criteria
1A	Substance with sufficient evidence on humans to induce adverse effects on sexual function and fertility, developmental toxicity in the offspring.
1B	Substance with data from animal studies should provide clear evidence of an adverse effect on sexual function and fertility or on development to humans
2	Substance with data on humans or from animal studies provide suspect of an adverse effect on sexual function and fertility or on development to humans
Effects on or via lactation	Substance belongs to one of the following ① Absorption, metabolism, distribution and excretion studies that would indicate the likelihood the substance would be present in potentially toxic levels in breast milk ② 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 ③ 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 reproductive toxic data of the

individual ingredients of the mixture using cut-off concentration limits as below.

Category	Criteria
1A	Mixture with the content of ingredients with Category 1A is equal to or more than 0.3%
1B	Mixture with the content of ingredients with Category 1B is equal to or more than 0.3%
2	Mixture with the content of ingredients with Category 2 is equal to or more than 3.0%
Effects on or via lactation	Mixture with the content of ingredients with category for effects on or via lactation is equal to or more than 0.3%

2) Even though the data on the individual ingredients is available, if the mixture itself has been tested or the bridging principle can be applied, the following classification method can be applied according to expert judgment.

a) If it is appropriate to classify as reproductive toxicity based on the relevance, sensitivity of tests such as duration, observations, statistical analysis and test sensitivity on the test for the mixture; classify based on the test data on the mixture.

b) There is sufficient evidence to classify by the classification data on similar mixtures, classify it by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

I have to review equal to above from here<<

3.9. Specific Target Organ Systemic Toxicity – Single Exposure

A. Definition

It means the characteristic that produce specific, non lethal target organ toxicity arising from a single exposure other than acute toxicity, skin corrosivity/irritation, serious damage to eyes/irritation, respiratory sensitization, skin sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity, aspiration toxicity.

B. Classification criteria for substances

Category	Criteria

1	Substancesbelong to one of the following ① reliable and good quality evidence from human cases or epidemiological studies that it causes significant toxicity in humans from a single exposure ② Based on the observations from studies in experimental animals in which significant and severe toxic effects from a single exposure and low concentration, it is presumed that it causes significant toxicity in humans from a single exposure.
2	Based on the observations from studies in experimental animals in which significant and severe toxic effects from a single exposure and moderate concentration, it is presumed that it causes harmful effects in humans from a single exposure.
3	These are effects 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. Substance belongs to one of the following. ① It is found to cause transient irritant effects on respiratory tract in humans or it is found to irritate respiratory from animal test result. (Respiratory irritation) ② It is found to cause narcotic effects in humans or it is found to cause narcotic effects from animal test result. (Narcotic effects)

1) Classification from human cases or epidemiological studies

If data from human cases or epidemiological studies exist, classify it as Category 1. In exceptional cases, if the weight of evidence on humans is not certain to classify as Category 1 or the effect or significance is moderate, classify as Category 2.

2) Classification from studies in experimental animal (For Category 1 and 2 only)

a) Examples of toxic effects which will be applied for classification 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 (e.g. sight, hearing and sense of smell)

③ Any consistent and significant adverse change in clinical biochemistry, hematology, or urinalysis parameters

④ Significant organ damage that may be 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 of effects which will not be applied for classification 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, hematology or urinalysis parameters, 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 which is not relevant for human health

c) If the classification is based on the result from an animal test, it can be classified using the guidance value ranges below for single-dose exposure which has produced a significant non-lethal toxic effect.

		Guidance value ranges	
Route of exposure	**Units**	**Category 1**	**Category 2**
Oral (white rat)	mg/kg body weight	Capacity ≤ 300	300 < Capacity ≤2000
Dermal (white rat or rabbit)	mg/kg body weight	Capacity ≤ 1000	1000 < Capacity ≤2000
Inhalation (white rat) gas	ppm/4h	Concentration ≤ 2500	2500 < Concentration ≤20000
Inhalation (white rat) vapor	mg/L/4h	Concentration ≤10	10 < Concentration ≤20
Inhalation (white rat) dust/mist/fume	mg/L/4h	Concentration ≤1.0	1.0 < Concentration ≤ 5.0

3) Classification for Category 3

a) Respiratory tract irritation

① Respiratory irritant effects (characterized by localized redness, edema, pruritus and/or pain) that impairs function with symptoms such as cough, pain, choking, and breathing difficulties

② Subjective human observations could be supported by objective measurements of clear respiratory tract irritation (RTI) (e.g. 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 which is triggered only in individuals with hypersensitive airways. Ambiguous reports simply of "irritation" should 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 this classification endpoint

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/systemic effects included 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 should be considered for classification as Category 1 or 2.

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 is sufficient evidence to classify by the classification data on similar mixtures, classify by applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

Category	Criteria
1	Mixture with the content of ingredients in Category 1 is equal to or more than 10%
2	Mixture belong to the one of following ① The content of ingredients in Category 1 is equal to or more than 1.0% and less than 10% ② The content of ingredients in Category 2 is equal to or more than 10%
3	Mixture belong to the one of following ① The content of ingredients with respiratory track irritation is equal to or more than 20% ② The content of ingredients with narcotic effects is equal to or more than 20%

Note) A cut off value concentration limit of 20% has been suggested for Category 3; however, this cut-off value concentration limit may be higher or lower depending on the ingredients. In this case it can be classified by expert judgment.

3.10. Specific Target Organ Systemic Toxicity – Repeated exposure

A. Definition

It means the characteristic that produces specific, non lethal target organ toxicity arising from repeated exposure other than acute toxicity, skin corrosivity/irritation, serious damage to eyes/irritation, respiratory sensitization, skin sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity, aspiration toxicity.

B. Classification criteria for substances

Category	Criteria

1	Substance belongs to one of the following ① reliable and good quality evidence from human cases or epidemiological studies that it causes significant toxicity in humans from repeated exposure ② Based on the observations from studies in experimental animals in which significant and severe toxic effects from repeated exposure and low concentration, it is presumed that it causes significant toxicity in humans from repeated exposure.
2	Based on the observations from studies in experimental animals in which significant and severe toxic effects from repeated exposure and moderate concentration, it is presumed that it causes harmful effects in humans from repeated exposure.

1) Examples of toxic effects which will be applied for classification are provided below.
   a) Morbidity or death resulting from repeated or long-term exposure. Morbidity or death may result from repeated exposure, even with relatively low doses/concentrations, due to bioaccumulation of the substance or its metabolites, or due to the overwhelming effect 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, hematology, or urinalysis parameters
   d) Significant organ damage that may be 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 of effects which will not be applied for classification are provided below.
   a) 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
   b) Small changes in clinical biochemistry, hematology 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, which is not relevant for human health
3) If the classification is based on the result from animal tests, it can be classified using the guidance value ranges below proposed for 90 days repeated exposure, which has produced a

significant toxic effect. Apply 28 days toxicity data with multiplying 3.

		Guidance value ranges	
Route of exposure	**Units**	**Category 1**	**Category 2**
Oral (white rat)	mg/kg body weight	Capacity ≤ 10	10 < Capacity ≤ 100
Dermal (white rat or rabbit)	mg/kg body weight	Capacity ≤20	20 < Capacity ≤200
Inhalation (white rat) gas	ppm/6h	Concentration ≤50	50 < Concentration ≤250
Inhalation (white rat) vapor	mg/L/6h	Concentration≤0.2	0.2 < Concentration≤1.0
Inhalation (white rat) dust/mist/fume	mg/L/6h	Concentration ≤ 0.02	0.02 < Concentration ≤0.2

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 is sufficient evidence to classify by the classification data on similar mixtures, classify it applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

Category	Criteria
1	Mixture with the content of ingredients with Category 1 is equal to or more than 10%
2	Mixture belong to the one of following ① The content of ingredients in Category 1 is equal to or more than 1.0% and less than 10% ② The content of ingredients in Category 2 is equal to or more than 10%

3.11. Aspiration Hazard

A. Definition

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

B. Classification criteria for substances

Category	Criteria

1	Substance belongs to one of the following ① Reliable result has been published that it causes aspiration hazard in humans ② Hydrocarbon has a kinematic viscosity of equal to or less than 20.5mm^2/s , measured at 40℃
2	Substance is not classified as Category 1 and has a kinematic viscosity of equal to or less than 14mm^2/s , measured at 40℃

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 thereis sufficient evidence to classify by the classification data on similar mixtures, classify it applying the bridging rules such as dilution, batch, concentration, interpolation or aerosol.

3) Where the mixture itself has not been tested to determine its acute toxicity, but there are data on the individual ingredients, classify as below.

Category	Criteria
1	Mixture belongs to the one of following ① The content of ingredients in Category 1 is equal to or more than 10% ② Mixtures which separate into two or more distinct layers, one of which contains 10 % or more of a substance or substances classified in Category 1 and has a kinematic viscosity of 20.5 mm^2/s or less, measured at 40 ° C.
2	Mixture belongs to the one of following ① The content of ingredients in Category 2 is equal to or more than 10% ② Mixtures which separate into two or more distinct layers, one of which contains 10% or more of a substance or substances classified in Category 2 and has a kinematic viscosity of 14 mm^2/s or less, measured at 40 °C.

Chapter 4 Environmental Hazards

4.1. Hazardous to the Aquatic Environment
A. Definition

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 potential or actual properties 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 hazards to the aquatic environment

Category	Criteria
Acute 1	Substance has one of the following acute aquatic toxicity value ① LC_{50}(96hour) ≤ 1 (mg/L) : fish ② EC_{50}(48hour) ≤1 (mg/L) : crustacean ③ ErC_{50}(72 or 96hour) ≤1 (mg/L) : aquatic plant

Category	Criteria
Chronic 1	Substance is not rapidly degradable and/or the octanol water coefficient (log Kow) ≥ 4, and has one of the following acute aquatic toxicity value (unless the experimentally determined Bioconcentration factor(BCF) <500). ① LC_{50}(96hour) ≤ 1 (mg/L) : fish ② EC_{50}(48hour) ≤1 (mg/L) : crustacean ③ ErC_{50}(72 or 96hour) ≤1 (mg/L) : aquatic plant
Chronic 2	Substance is not rapidly degradable and/or the octanol water coefficient (log Kow) ≥ 4 (unless the experimentally determined Bioconcentration factor (BCF) <500), unless the chronic toxicity No Observed Effect Concentration(NOEC) are > 1 mg/l. ① 1 < LC_{50}(96시간) ≤ 10 (mg/L) : fish ② 1 < LC_{50}(48시간) ≤10 (mg/L) : crustacean ③ 1 < ErC_{50}(72 또는 96시간) ≤10 (mg/L) : aquatic plant

Chronic 3	Substance is not rapidly degradable and/or the octanol water coefficient (log Kow) ≥ 4 (unless the experimentally determined Bioconcentration factor (BCF) <500), unless the chronic toxicity No Observed Effect Concentration(NOEC) are > 1 mg/l. ① 10 < LC_{50}(96 hours ≤ 100 (mg/L) : fish ② 10 < L(E)C_{50}(48 hours) ≤ 100 (mg/L) : crustacean ③ 10 < ErC_{50}(72 or 96 hours) ≤ 100 (mg/L) : aquatic plant
Chronic 4	Poorly soluble substances for which no acute toxicity is recorded at levels up to the water solubility, and which belongs to one of the following. It excludes an experimentally determined Bioconcentration factor(BCF) < 500, or a chronic toxicity No Observed Effect Concentration(NOEC) > 1 mg/l ① Not rapidly degradable ② The octanol water coefficient (log Kow) ≥ 4

2) Chronic hazards to the aquatic environment

C. Classification criteria for mixtures

1) When the mixture as a whole has been tested to determine its aquatic toxicity, it can be classified according to the criteria that hasbeen agreed for substances. When there is acute toxicity test data available for the mixture as a whole, and the data for chronic toxicity is only available for the component, evaluate acute toxicity for the whole mixture and classify chronic toxicity applying summation of component.

2) Where the mixture itself has not been tested, but there is data on similar tested mixtures to adequate characterize the hazards of the mixture, classify using bridging rule such as dilution, batch, concentration, interpolation, substantially similar mixture and aerosols.

a) Dilution: If a mixture is formed by diluting another classified mixture or a substance (classified as hazardous to aquatic environment) 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 a substance with water or other totally non-toxic material, the toxicity of the mixture can be calculated from the original mixture or substance.

b) Other than this, classify using the bridging rules in Chapter 1.

3) 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.

a) Acute hazard to the aquatic environment

Category	Criteria
Acute 1	Mixture with the value of the content of component classified as Acute 1 multiplied by Multiplying factor is equal to or more than 25%

b) Chronic hazard to the aquatic environment

Category	Criteria
Chronic 1	Mixture with the value of the content of Chronic 1 components multiplied by Multiplying factor is equal to or more than 25%
Chronic 2	Mixture with the following summation is equal to or more than 25% ① Multiply weight factor 10 to the summation of the content of Chronic 1 multiplied by Multiplying factor ② Total content of Chronic 2 components
Chronic 3	Mixture with the following summation is equal to or more than 25% ① Multiply weight factor 100 to the summation of the content of Chronic 1 multiplied by Multiplying factor ② Multiply weight factor 10 to the summation of total content of Chronic 2 component ③ Total content of Chronic 2 components
Chronic 4	Mixture with the following summation is equal to or more than 25% ① Total content of Chronic 1 components ② Total content of Chronic 2 components ③ Total content of Chronic 3 components ④ Total content of Chronic 4 components

- Classify the mixture with highly toxic component applying the following Multiplying factor M.

Acute aquatic toxicity value (mg/L)	Multiplying factor M
$0.1 < L(E)C_{50} \leq 1$	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)	

- If mixture contains two or more ingredients with the appropriate test data toxicity class (Acute 1, Chronic 1, 2, 3, 4), calculate the toxicity value by the following formula and apply it for calculation.

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

where:

Ci = concentration of component i (weight percentage)

$L(E)C_{50}i$ = (mg/L) LC_{50} or EC_{50} for component i

n = number of components (i will have the value from 1 to n)

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

<ANNEX 2>

Listing section for Hazardous label (Refer Article 6)

Chapter 1 Listing section for hazardous label according to the classification

1.1. Physical Hazards

1.1.1. Explosives

Hazard Category		**Unstable Danger explosive**	**Division 1.1**	**Division 1.2**	**Division 1.3**	**Division 1.4**	**Division 1.5**	**Division 1.6**
Symbol							Number 1.5 in orange background	Number 1.6 in orange background
Signal word		Danger	Danger	Danger	Danger	Warning	Danger	
Hazard statement		H200	H201	H202	H203	H204	H205	
Precautionary statement	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	
Precautionary statement	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	
Precautionary statement	Storage	P401	P401	P401	P401	P401	P401	
Precautionary statement	Disposal	P501	P501	P501	P501	P501	P501	

1.1.2. Flammable gases

Hazard category	**1**	**2**
Symbol		

Signal word		Danger	Warning
Hazard statement		H220	H221
Precautionary statement	Prevention	P210	P210
Precautionary statement	Response	P377 P381	P377 P381
Precautionary statement	Storage	P403	P403
Precautionary statement	Disposal		

1.1.3. Flammable aerosols

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

1.1.4. Oxidizing gases

Hazard category	**1**
Symbol	
Signal word	Danger
Hazard statement	H270

Precautionary statement	Prevention	P220 P244
Precautionary statement	Response	P370+P376
Precautionary statement	Storage	P403
Precautionary statement	Disposal	

1.1.5. Gases under pressure

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

1.1.6. Flammable Liquids

Hazard category		**1**	**2**	**3**
Symbol				
Signal word		Danger	Danger	Warning
Hazard statement		H224	H225	H226
Precautionary statement	Prevention	P210 P233 P240 P241 P242 P243 P280	P210 P233 P240 P241 P242 P243 P280	P210 P233 P240 P241 P242 P243 P280

Precautionary statement	Response	P303+P361+P353 P370+P378	P303+P361+P353 P370+P378	P303+P361+P353 P370+P378
Precautionary statement	Storage	P403+P235	P403+P235	P403+P235
Precautionary statement	Disposal	P501	P501	P501

1.1.7. Flammable solids

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

1.1.8. Self-reactive substances and mixtures

Hazard 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 statement	Prevention	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	
Precautionary statement	Response	P370+P378 P370+P380 +P375	P370+P378 P370+P380 +P375	P370+P378	P370+P378	
Precautionary statement	Storage	P403+P235 P411 P420	P403+P235 P411 P420	P403+P235 P411 P420	P403+P235 P411 P420	

Precautionary statement	Disposal	P501	P501	P501	P501	

1.1.9. Pyrophoric Liquids

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

1.1.10. Pyrophoric solids

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

1.1.11. Self-heating substances and mixtures

Hazard category	**1**	**2**

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

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

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

1.1.13. Oxidizing Liquids

Hazard category	1	2	3
Symbol			
Signal word	Danger	Danger	Warning

Hazard statement		H271	H272	H272
Precautionary statement	Prevention	P210 P220 P221 P280 P283	P210 P220 P221 P280	P210 P220 P221 P280
Precautionary statement	Response	P306+P360 P371+P380+P375 P370+P378	P370+P378	P370+P378
Precautionary statement	Storage			
Precautionary statement	Disposal	P501	P501	P501

1.1.14. Oxidizing solids

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

1.1.15. Organic peroxides

Hazard 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 statement	Prevention	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	P210 P220 P234 P280	
Precautionary statement	Response					
Precautionary statement	Storage	P411+P235 P410 P420	P411+P235 P410 P420	P411+P235 P410 P420	P411+P235 P410 P420	
Precautionary statement	Disposal	P501	P501	P501	P501	

1.1.16. Corrosive to metals

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

1.2. Health Hazards

1.2.1. Acute Toxicity

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

1.2.2. Skin corrosion/Skin irritation

Hazard category	1	2

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

1.2.3. Serious sys damage/eye irritation

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

1.2.4. Respiratory sensitization

Hazard category	1
Symbol	
Signal word	Danger

Hazard statement		H334
Precautionary statement	Prevention	P261 P285
Precautionary statement	Response	P304+P341 P342+P311
Precautionary statement	Storage	
Precautionary statement	Disposal	P501

1.2.5. Skin sensitization

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

1.2.6. Germ cell mutagenicity

Hazard category	**1A**	**1B**	**2**
Symbol			
Signal word	Danger	Danger	Warning
Hazard statement	H340	H340	H341

Precautionary statement	Prevention	P201 P202 P281	P201 P202 P281	P201 P202 P281
Precautionary statement	Response	P308+P313	P308+P313	P308+P313
Precautionary statement	Storage	P405	P405	P405
Precautionary statement	Disposal	P501	P501	P501

1.2.7. Carcinogenicity

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

1.2.8. Reproductive toxicity

Hazard category		1A	1B	2	Effects on or via lactation
Symbol					
Signal word		Danger	Danger	Warning	
Hazard statement		P360	P360	P361	P362
Precautionary statement	Prevention	P201 P202 P281	P201 P202 P281	P201 P202 P281	P201 P260 P263 P264 P270
Precautionary statement	Response	P308+P313	P308+P313	P308+P313	P308+P313

Precautionary statement	Storage	P405	P405	P405	
Precautionary statement	Disposal	P501	P501	P501	

1.2.9. Specific Target Organ Systemic Toxicity – Single Exposure

Hazard category		1	2	3
Symbol				
Signal word		Danger	Warning	Warning
Hazard statement		H370	H371	H335 (For Respiratory Irritation) H336 (For Narcotic effects)
Precautionary statement	Prevention	P260 P264 P270	P260 P264 P270	P261 P271
Precautionary statement	Response	P307+P311 P321	P309+P311	P304+P340 P312
Precautionary statement	Storage	P405	P405	P403+P233 P405
Precautionary statement	Disposal	P501	P501	P501

1.2.10. Specific Target Organ Systemic Toxicity – Repeated exposure

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

1.2.11. Aspiration Hazard

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

1.3. Environmental Hazards

1.3.1. Hazardous to the Aquatic Environment

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

Chapter 2 Phrases for codes

2.1. Hazard statement

2.1.1. Physical Hazards

Code	Phrase
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 vapor
H225	Highly flammable liquid and vapor
H226	Flammable liquid and vapor
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 cause 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 gases
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	Phrase
H300	Fatal if swallowed
H301	Toxic if swallowed
H302	Harmful if swallowed
H304	May be fatal if swallowed and enters airway
H305	May be harmful if swallowed and enters airway
H310	Fatal in contact with skin
H311	Toxic in contact with skin
H312	Harmful in contact with skin
H314	Causes severe skin burns and eye damage
H315	Causes skin irritation
H317	May cause allergic skin reaction
H318	Causes serious eye damage
H319	Causes serious eye irritation
H330	Fatal if inhaled
H331	Toxic if inhaled
H332	Harmful if inhaled
H334	May cause allergic 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 (specific target organs)
H371	May cause damage to (specific target organs)
H372	Through prolonged or repeated exposure, causes damage to (specific target organs)
H373	Through prolonged or repeated exposure, may cause damage to (specific target organs)

2.1.3. Environmental hazards

Code	Phrase
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

Code	Precautionary statement
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·stored 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·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·vapors·(…)·spray.
P261	Avoid breathing dust·fume·gas·mist·vapors·(…)·spray.
P262	Do not get in eyes, on skin, or on clothing.
P263	Avoid contact during pregnancy;·while nursing.
P264	Wash hands 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·(…)·protective equipment.
P283	Wear fire resistant·flame 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.

2.2.1. Prevention

Code	Precautionary statement
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 (doctor).
P311	Call a POISON CENTER (doctor).
P312	Call a POISON CENTER (doctor) 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 (…).
P321	Specific treatment (…).
P322	Specific measures (…).
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 or wrap in wet bandages.
P335	Brush off loose particles from skin.
P336	Thaw frosted areas 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 contaminated clothing and skin immediately with plenty of water before removing clothes.
P361	Remove or take off all contaminated clothing immediately.
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 (doctor).
P301+P312	IF SWALLOWED, call a POISON CENTER (doctor) 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), immediately take off all contaminated clothing. Rinse skin with water/shower.
P304+P312	IF INHALED, call a POISON CENTER (doctor) 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 andeasily removed Continue rinsing.
P306+P360	IF ON CLOTHING, immediately rinse contaminated clothing and skin with plenty of water before removing clothes.
P307+P311	IF exposed, call a POISON CENTER (doctor).
P308+P313	IF exposed or concerned, get medical advice·attention.
P309+P311	IF exposed or if you feel unwell, call a POISON CENTER (doctor).
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 or wrap in wet bandages.
P337+P313	If eye irritation persists, get medical advice·attention.
P342+P311	If experiencing respiratory symptoms, call a POISON CENTER (doctor).
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.

2.2.2. Response

2.2.3. Storage

Code	Precautionary statement
P401	Store properly (according to the description in the related regulation).
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 (decided by the manufacturer or authority) container, as this is a metal corrosive material.
P407	Maintain air gap between stacks.
P410	Protect from sunlight.
P411	Store at temperatures not exceeding (…°C) as it is highly reactive material.
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 (… condition) as it is self-heating.
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) as it is highly reactive material. Keep cool.

2.2.4. Disposal

Code	Precautionary statement
P501	Dispose of contents/container (according to the description in the related regulation).

<ANNEX 3>

Format and Size of Warning Label (Refer to Article 7)

1. Format

(Name)

(Symbol example)

(Signal word)

Hazard Statements :

Precautionary Statements :

Supplier Information :

2. Size

A. Label size per capacity of container or package

Capacity of container or package	Size of printing or label
Capacity≥500 l	Equal to or more than 450㎠
200l≤ Capacity <500 l	Equal to or more than 300㎠
50l≤Capacity <200 l	Equal to or more than 180㎠
5l≤Capacity <50 l	Equal to or more than 90㎠
Capacity <5 l	5% or more of surface excluding top and bottom area of package

B. Size of pictogram

1) Size of each pictogram should be at least one-fortieth of the label.

2) The minimum size of pictogram shall not be less than 0.5㎠.

<ANNEX 4>

Material Safety Data Sheet format and the information required (Refer to Article 10 Paragraph 1)

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1. Product and company identification

A. Product Name (Indicate the same name which is used in the label or classification code) :
B. Recommended use of the chemical and restrictions on use :
C. Manufacturer/Importer/Distributor Information (Describe the information of the company who supplies the product and responsible for the MSDS preparation regardless of manufacturer, importer, distributor) :
- ○ Company Name
- ○ Address
- ○ Emergency phone number

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2. Hazard identification

A. Hazard classification
B. Label elements, including precautionary statements
- ○ Pictogram
- ○ Signal word
- ○ Hazard statements
- ○ Precautionary statements

C. Other hazards which do not result in classification (e.g. dust explosion hazard) :

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3. Composition/information on ingredients

Chemical Name Common or other name CAS number or identification number Content(%)

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4. First-aid measures

A. Eye contact:
B. Skin contact:
C. Inhalation:
D. Ingestion:
E. Other remarks for doctors:

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5. Fire-fighting measures

A. Suitable (and unsuitable) extinguishing media :
B. Specific hazards arising from the chemical (e.g. hazard combustion products) :
C. Specific 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 or 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 such as occupational exposure limit, biological limit etc.:
B. Appropriate engineering controls :
C. Personal protective equipment
- ○ Respiratory protection:
- ○ Eye protection:
- ○ Hand protection:
- ○ Body protection:

9. Physical and chemical properties

A. Appearance (physical state, color etc):
B. Odor:
C. Odor 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. Specific gravity:
O. Partition coefficient: n-octanol/water:
P. Auto-ignition temperature:
Q. Decomposition temperature:
R. Viscosity:
S. Molecular weight:

10. Stability and reactivity

A. Chemical stability and possibility of hazardous reaction :
B. Conditions to avoid (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 hazard information
○ Acute toxicity (describe for all possible exposure routes) :
○ Skin corrosion/irritation :
○ Serious eye damage/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 :

※ It is possible to describe the exposure routes and health hazard together combining A. and B. paragraph.

12. Ecological information

A. Ecotoxicity:
B. Persistence and degradability :
C. Bioaccumulation:
D. Mobility in soil:
E. Other adverse effects :

13. Disposal considerations

A. Disposal method :
B. Disposal precautions (including the disposal method of contaminated containers and packaging) :

14. Transport information

A. UN number :
B. UN proper shipping name :
C. Transport hazard class :
D. Packing group (if applicable) :
E. Marine pollutant (indicate Yes or No) :
F. Special precaution which a user needs to be aware of or needs in connection with transport or conveyance method :

15. Regulatory information

A. Industrial Safety and Hygiene Act:
B. Toxic Chemical Control Act:
C. Hazardous Material Safe Management Act:
D. Waste Management Act:
E. Other requirements in domestic and other countries:

16. Other information

A. Information source:
B. First issuing date :
C. Revision number and the latest version date :
D. Others :