# EL304. Commercial Dishwasher Detergents
[EL304-2000/6/2008-213]

## 1. Scope

The criteria shall apply to commercial dishwasher detergents.

## 2. Definition

2.1

“Functional unit” refers to the quantification of the same services (performances) provided by a product. In this standard, the lowest value (the maximum dilution ratio) of the amount of detergent (dilution ratio) indicated on the product’s packaging material is applied on the basis of the amount of detergent [g] to be used after being diluted in 100 L water.

Note) Functional unit [g] = the ratio of diluted detergent [weight %] × 1000

2.2

“Commercial dishwashers” refers to a type of dishwasher mainly used in large-sized food service locations and where dishes and eating utensils can be continuously loaded during every stage of use, including washing, rinsing, and drying.

2.3

“Total Chemical Substances” refers to the total sum [g/wash] of the amount used for all the structure materials except for moisture (including bound water) out of the function units.

2.4

“Aerobic Non-biodegradation Material” refers to the total sum [g/wash] of the amount used for all the structure materials to which biodegradation shall not be applied under an aerobic state out of function units.

2.5

“Anaerobic Non-biodegradation Material” refers to the total sum [g/wash] of the amount used for all the structure materials to which biodegradation shall not be applied under an anaerobic state out of function units.

2.6

“Critical Dilution Volume Toxicity (CDVtox)” refers to the total value [L/wash] obtained by

measuring in terms of the quantity of water capable of diluting toxicity contained in a relevant ingredient for each structure material out of function units up to an acceptable level in an environmental aspect.

## 3. Certification Criteria

### 3.1 Environmental Criteria

3.1.1

With respect to the use of chemical substances in the manufacturing steps, the product shall not contain the following substances.

3.1.1.1

Alkylphenol ethoxylates(APEOs) and alkyl phenol derivatives

3.1.1.2

Chemicals belonging to the following H code class according to the UN Globally Harmonized System of Classification and Labeling of Chemicals should not be used.

Note: EU Regulation (EC) No. 1272/2008 Annex VI Part 3, (Harmonized Classification and Labeling Tables) will be tentatively applied to the material list.

H 340 : may cause genetic defects
H 341 : suspected of causing genetic defects
H 350 : may cause cancer
H 351 : suspected of causing cancer
H 350i : may cause cancer by inhalation
H 360D : may damage the unborn child
H 361d : suspected of damaging the unborn child
H 360F : may damage fertility
H 360Fd : may damage fertility. Suspected of damaging the unborn child
H 361f : suspected of damaging fertility

3.1.1.3

Use of the material over the limiting concentration, which must display the H code on the product according to EU Directives 1999/45/EC and UN GHS (Globally Harmonized System).

| H Code | Description | Maximum Density [weight%] |
|---|---|---|
| H 400 | very toxic to aquatic life | 0.25 |

| | | |
|---|---|---|
| H 410 | very toxic to aquatic life with long-lasting effects | 0.25 |
| H 411 | toxic to aquatic life with long-lasting effects | 2.5 |
| H 412 | harmful to aquatic life with long-lasting effects | 25 |

Note) Product consisting of the chemical active contents, excluding moisture, is applied at concentration.

3.1.2

In the phase of use, in regard to emission of water pollution substances, the total sum and the value for each criteria item $X_n$ calculated according to an appendix should satisfy the following requirements.

<Table 1> Environmental Grade Calculation Table of Commercial Dishwasher Detergents

| Reference Item | | Critical Limits of $X_n$ | Grade Calculation System | |
|---|---|---|---|---|
| | | | Equation | Weights |
| Environmental Influence | 1. Total chemical substance | ≤ 35 | $-1.5\ X_1 + 57.3$ | 3.5 |
| | 2. Aerobic non-biodegradable substance | ≤ 10 | $-3.3\ X_2 + 34.6$ | 1.5 |
| | 3. Anaerobic non-biodegradable substance | ≤ 20 | $-1.5X_3 + 34$ | 3 |
| | 4. Critical dilution volume, toxicity (CDVtox) | ≤ 80 | $-0.12\ X_4 + 28.9$ | 7 |
| | Sum | ≥ 300 | | |

3.1.3

In regard to recycling at the stage of disposal, packing materials should satisfy the following requirements.

3.1.3.1

“Packing material evaluation index” of the primary packing material for each standard of the main container should be 15 or below 15.

Note1) The definition of “the primary packing material” should be fulfill the 「Regulation concerning criterion of package material and package method」 of 「Act on the Promotion of Saving and Recycling of Resources」.

Note2) Package material evaluation index [g/wash] =

$$\frac{\text{entire weight of packing material[g]} - \text{weight of use of recycling material[g]}}{\text{the number of function unit out of entire products}}$$

3.1.3.2

In a case where label and shrink film are used, the same or the same kind of materials as the body of a case should be used and metal coating should not be executed. However, an exception should be made in case of in-mold label (PP: white and transparent PE) inserted upon case molding.

3.1.3.3

There should be an indication of the recommendation for standard usage on the product.

### 3.2 Quality Criteria

3.2.1

The detergency of the product should be equivalent to the detergency of index detergent or more.

3.2.2

The product should be satisfied in accordance with the 「Voluntary Safety Confirmation Safety Criterion」 of 「Quality Management and Safety Control of Industrial Product Act」.

### 3.3 Consumer information

Indicate those items that contribute to the reasons for certification of the relevant product, (less water pollution, environmental friendly package materials)

## 4. Test Methods

| Certification Criteria | | Test method and verification method |
|---|---|---|
| Environmental Criteria | 3.1.1 | Verification of submitted documents |
| | 3.1.2 | Verification of submitted documents in accordance with Appendix |
| | 3.1.3 | Verification of submitted documents |
| Quality Criteria | 3.2.1 | Authorized test institution test reports in accordance with (1) and (2)' verification and test method[note)] |
| | 3.2.2 | Test reports of authorized institutions or certificates for the equivalent or higher criteria in accordance with 'Standards and Criteria for Sanitary Goods' |
| Consumer Information | | Verification of submitted documents |

Note) With regard to an assessment result report on detergency, either that conducted by an authorized test institution or one conducted by a laboratory independently managed by the applicant agency will be suitable.

**4.1 General Matters**

4.1.1

One test sample shall be required for each applied product. Only if more than one test sample is needed, the former requirement may not be met.

4.1.2

Test samples shall be collected at random by a certification institute from products in market or those in storage at the production site.

4.1.3

Test result shall be numerically set according to KS Q 5002 (Statistical interpretation method of the data – Part 1: Statistical description of the data).

4.2 Test method for determining the washability of commercial dishwasher detergents

Note) The test method has been standardized so that the washability of commercial dishwasher detergents can be assessed objectively. In addition to this test method, where a new method designed to assess the washability of commercial dishwasher detergents in consideration of the characteristics of large-sized food service venues in Korea is proposed, said corresponding test method may be applied. It should be noted that the composition and usage of the index detergent should conform to this standard.

4.2.1

Principle: The basis shall be the “amount of detergent to be used after diluted with 100 L water”. And i f the washability of the test detergent in accordance with B. Washability Test Method is at least equivalent to the washability of the index detergent, regard the indication that “the value where the minimum usage (the maximum dilution rate) is converted into the amount of detergent [g] to be used after being diluted with 100 L water” as being necessary to be indicated on the detergent packaging as a functional unit.

4.2.2

Test equipment and materials

4.2.2.1

Prepare the index detergent according to the following composition:

| CAS No. | Ingredients | Ratio [%] |
|---|---|---|
| 1310-58-3 | Potassium hydroxide | 15 |
| 10213-79-3 | Sodium metasilicate, pentahydrate | 7 |
| 64-02-8 | Tetrasodium ethylenediamine tetraacetate (EDTA-4Na) | 3 |

| | | |
|---|---|---|
| 9003-04-7 | Sodium polyacrylate | 3 |
| - | Deionized water | Balance |

Note) The index detergent should be used within six months of being manufactured.

4.2.2.2

In principle, the blue plates used for the test should be made of stainless steel, and be 400±20 mm in width and 295±15 mm in length. More than 120 pieces should be prepared. Except for the blue plates to which pollutant is adhered, using those containing other matter, such as melamine resin, may be accepted.

4.2.2.3

Prepare pollutants according to the following criteria and replace them for every test.

a) Grains of boiled rice

▪ Pour rice that has been polished using the pounding method in less than s ix months in sufficient water, quickly mix it, and then remove the water immediately. Rub it vigorously and rinse it 3-4 times until the water becomes clean.

▪ After soaking the rice in sufficient water for about 30 minutes during summer, or two hours during winter, pour it into a sieve basket to drain the water.

▪ Pour the rice and the water corresponding to about 1.1 times the amount of rice into a cooker and then cook by normal means. If an electric rice cooker is used, follow the user manual provided by the manufacturer.

▪ Ensure the boiled rice is not sp oiled or dried during cooking and then make it within eight hours of being cooked.

b) Egg yolk

▪ Use a fresh 50-6 5g egg (refer to the expiry date).

▪ Use at least three eggs. Separate the yolk from the white.

▪ Mix the separated yolk well and store it in a refrigerator prior to use.

c) Kimchi

▪ Use kimchi that conforms to the quality standards prescribed in K S H 2169 (Kimchi), which is properly mature kimchi with a head.

▪ Use powdered red pepper filtered with a standard sieve (with a mesh size of 1.7 mm) in accordance with KS A 5101-1 (Test Sieves – Part 1: Test Sieves of Metal W ire).

d) With regard to margarine, mayonnaise, and ketchup, each to be used for the test should meet corresponding Korean Industrial Standards and should be stored in a refrigerator prior to use.

| Section | Margarine | Mayonnaise | Ketchup |
|---|---|---|---|
| Corresponding Korean Industrial Standard | KS H 2002 (Margarine) | KS H 2109 (Mayonnaise ) | KS H 2144 (Tomato Ketchup) |

4.2.3 Test method

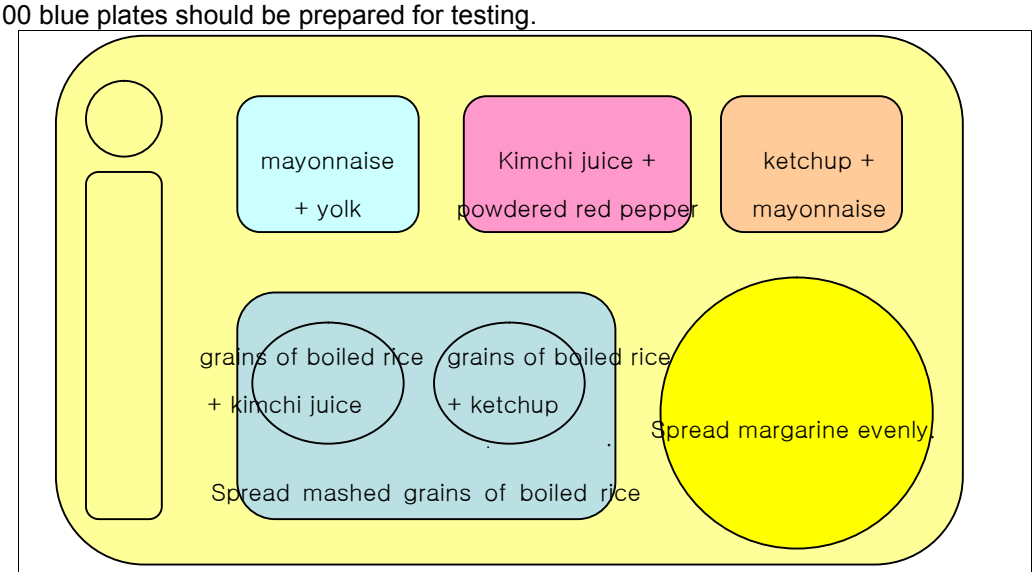
4.2.3.1 General

a) The washability test is expressed using the average of the values resulting from twice-repeated tests.

b) In principle, every test should be conducted in a stable state after the corresponding product is in its usual usage state.

4.2.3.2 Preparation of the blue plates to which pollutant s are to be adhered

a) The pollutants to be adhered to each part of a blue plate are as shown in the figure below. A t least 100 blue plates should be prepared for testing.




<Figure> How to adhere pollutant s to each part of a blue plate

b) Pollutant adherence shall be as follows:

▪ Adhesion of grains of boiled rice: After completely mashing about 3 g of the grains of boiled rice, adhere it to the corresponding part, (where boiled rice is normally placed), and then leave it at room temperature for more than 30 minutes.

▪ Adhesion of margarine: After leaving the margarine removed from a refrigerator at room temperature for about one hour, apply around 2 g evenly to the corresponding part of the blue

plat e, (where a soup bowl is normally placed). Then leave it at room temperature for more than 30 minutes.

▪ Adhesion of mayonnaise + egg yolk: After satisfactorily mixing the mayonnaise and egg yolk removed from a refrigerator at a proportion of 1 to 1, apply that pollutant of about 2 g evenly to the corresponding part of a blue plate, (where a side dish is normally placed; refer to the < figure > above), using a flat type brush (Type 28) as prescribed in KS G 2103 (Artists' Water Color B rushes). After adhesion, leave it at room temperature for more than 30 minutes.

▪ Adhesion of kimchi juice + powdered red pepper: After applying around 1 g of kimchi juice evenly to the corresponding part of a blue plate, (where a side dish is normally placed; refer to the < figure > above), using a flat type brush (Type 28) as prescribed in KS G 2103 (Artists' Water Color B rushes), sprinkle powdered red pepper evenly over the soiled part with around 0.1 g of kimchi juice. After adhesion, leave it at room temperature for more than 30 minutes.

▪ Adhesion of ketchup + mayonnaise: After satisfactorily mixing the ketchup and mayonnaise removed from a refrigerator at a proportion of 1 to 1, apply around 2 g of that pollutant evenly to the corresponding part of a blue plate, (where a side dish is normally placed; refer to the < figure > above), using a flat type brush (Type 28) as prescribed in KS G 2103 (Artists' Water Color B rushes). After adhesion, leave it at room temperature for more than 30 minutes.

▪ Adhesion of grains of boiled rice + kimchi juice: Apply around 0.5 g of kimchi juice evenly to a quarter of the part where grains of boiled rice (refer to 1) above) are adhered using a flat type brush (Type 28) as prescribed in KS G 2103 (Artists' Water Color B rushes). After adhesion, leave it at room temperature for more than 30 minutes.

▪ Adhesion of grains of boiled rice + ketchup + mayonnaise: Mix the ketchup and mayonnaise removed from a refrigerator satisfactorily at a proportion of 1 to 1. Apply around 1 g of that pollutant evenly to a quarter of the part where grains of boiled rice (refer to 1) above) are adhered, using a flat type brush (Type 28) as prescribed in KS G 2103 (Artists' Water Color B rushes). After adhesion, leave it at room temperature for more than 30 minutes.

4.2.3.3 Wash test

a) Installation of the dishwasher: Install and use the dishwasher according to the standard prescribed by the manufacturer. Use tap water for the water supply and set the water temperate at both wash and rinse stages according to the following table. If there are any differences, record them in a corresponding test result report.

| Section | Wash Stage | Rinse Stage |
|---|---|---|
| Water Temperature [ ℃ ] | 65±1.5 | 80±3 |

b) Operation of the dishwasher: With regard to the amount of detergent to be added, if the deter gent is for testing, add it based on the 'functional unit' standard. If it is index detergent, add it at 'a proportion of washing water of 1 L to detergent of 1 g'. Do not use a rinse agent separately. Operate the washer and load blue plates at a constant speed.

Note) Do not conduct rough washing on the blue plates where pollutant s are adhered before being loaded in the washer. For those to which pollutant s have been adhered for more than two hours, they can be

soaked in a water tank at temperatures of lower than 65ºC within 30 minutes before being loaded in the washer.

▪ In principle, the washer should be operated according to the washing program or method outlined by the manufacturer. Record the applied washing program or method in the corresponding test result report.

▪ Adjust the speed of loading the blue plates so that the smallest value in the wash capacity range outlined by the manufacturer can be applied.

▪ In principle, blue plates to be loaded should have pollutant s adhered. If soiled blue plates cannot be prepared satisfactorily, however, put the equivalent pollutant s in the washer periodically to make up for any lack of pollutant load.

Note) The amount of pollutant s to be adhered for each blue plate where there is no pollutant s previously adhered is as follows:

| Pollutant Type | Grains of Boiled Rice | Margarine | Yolk | Kimchi Juice | Mayonnaise | Ketchup |
|---|---|---|---|---|---|---|
| Loaded amount for each blue plate[g] | 3 | 2 | 1 | 1.5 | 2.5 | 1.5 |

▪ The prepared blue plates for the adhesion of pollutant s are loaded at half the amount after 10 minutes and then 40 minutes after the washer is operated. After being washed, they will be used for the assessment of washing property performance.

4.2.3.4

Assessment of washing performance

a) An assessment of washing performance should be conducted on a total of 100 blue plates as described below:

▪ 50 blue plates that were loaded 10 minutes after the washer was operated

▪ 50 blue plates that were loaded 40 minutes after the washer was operated

b) Washing performance shall be assessed 10 minutes after the last blue plate is removed from the washer. In principle, the assessment should be conducted by one inspector at a location where a lamp of 1,000-1,500 Lux is installed 1 m above the test plates. If it is difficult to conduct a visual check of the pollutant s on the blue plates, use the indicator regulated in the following table:

<Table> Detection Indicator by Pollutant Type

| Detection Indicator | Pollutant Type | Color generation in the presence of an pollutant | Remarks (name of the reaction) |
|---|---|---|---|
| Iodine – potassium iodide solution | Starch | Dark blue | Iodine reaction |
| 5% sodium hydroxide + 1% copper sulfate | Protein | Purple | Buret reaction |
| Sudan III solution | Fat | Scarlet | Sudan III reaction |

c) The assessment of washing performance is scored on each individual blue plate according to the following table. General washing performance is shown using a sum total of scores for the washing performance of each individual blue plate. If the general washing performance of the test detergent is higher than those of the index detergent, washing performance will be judged as being excellent.

<Table> Assessment of Washing performance of Blue Plates

| Evaluation | Score | Assessment Criteria | |
|---|---|---|---|
| | | No. of pollutants, n | Total soiled area, A [㎟] |
| Clean ( appropriate ) | 1 | ≤4 | ≤4 |
| Lightly soiled | 0 | 4 < n ≤ 10 | 4 < A ≤ 20 |
| Critically soiled | -1 | > 10 | > 20 |

4.2.4 The test report should include the following:

4.2.4.1 Test method and reference standards

4.2.4.2 Details of the material used in manufacturing the index detergent

4.2.4.3 Individual test data and standard deviation

## 5. Reason for Certification

“Less water pollution, Environmental friendly package materials”

## [Annex] Verification Methods of the Correlations with Water Pollution

### A. Purpose

This Annex is aimed to describe how to verify the correlations with water pollution.

### B. Definitions

(1) “AC (Active Contents)” refers to the total weight of chemical substances, excluding water, which composes a product.

(2) "Readily biodegradable” refers to the biodegradability for each test method conforming to the following in the general micro-organic degradability test which has a reduced opportunity for degradation compared to the practical environment, to examine whether chemicals are easily micro-organically degradable in the environment.

| Bio-degradability test method | Bio-degradability | Bio-degradability test method | Bio-degradability |
|---|---|---|---|
| OECD 301 A (DOC Die-away test) | ≥70 % | OECD 301 D (Closed bottle test) | ≥60 % |
| KS M ISO 7827 | | KS M ISO 10707 | |
| OECD 301 B ($CO_2$ Evolution test) | ≥60 % | OECD 301 E (Modified OECD screening test) | ≥70 % |
| KS M ISO 9439 | | KS M ISO 7827 | |
| OECD 301 C [Modified MITI test(Ⅰ)] | ≥60 % | OECD 301 F (Manometric respirometry test) | ≥60 % |
| KS M ISO 14851 | | KS M ISO 9408 | |

Note) Standard names

▪ KS M ISO 7827 (How to Evaluate the Final Aerobic Biodegradability in Water-Liquid Media-How to Analyze Dissolved Organic Carbon)

▪ KS M ISO 9439 (How to Evaluate the Final Aerobic Biodegradability in Water-Liquid Media-How to Test the Generation of Carbon Dioxide)

▪ KS M ISO 14851(Measurement of the Final Aerobic Biodegradability of Plastic Materials in the Water Liquid Media – Measurement of Oxygen Quantity Consumed by the Airtight Respiratory Organ)

▪ KS M ISO 10707 (How to Evaluate the “Final” Aerobic Biodegradability in Water-Liquid Media-How to Analyze Biochemical Oxygen Demand (BOD) (Airtight Bottle Test)

▪ KS M ISO 9408 (Water - Evaluation of the Aerobic Final Biodegradability of Organic Compounds in Liquefied Media by Measurement of the Biological Oxygen Demand (BOD) with an Airtight Breathalyzer)

(3) “Inherently biodegradable” refers to that the biodegradability for each test method conforming to the following in the general microorganism degradability test performed in the conditions, which has the reduced opportunity of degradation compared to the practical

environment, to examine whether chemicals are easily micro- organically degradable in the environment.

| Bio-degradability test method | Bio-degradability | Bio-degradability test method | Bio-degradability |
|---|---|---|---|
| OECD 302 A (Modified SCAS test) | ≥70 % | OECD 302 B (Zahn-Wellens/EMPA test) | ≥70 % |
| KS M 9138 | | | |
| OECD 302 C (Modified MITI test(Ⅱ)) | | KS M ISO 9888 | |

Note) Standard names

▪KS M 9138 (How to Evaluate the Aerobic Biological Oxygen Degradation (BOD) of Organic Compounds in Water [Semi-continuous Activated Sludge (SCAS) Process])

▪KS M ISO 9888 (How to Measure the Aerobic Degradability of Organic Compounds in the Water-Liquid Media (Static Method: Zahn-Wellens Method)

(4) “DF (Degradation factor)” “DF” refers to a coefficient for the biodegradability of each material, with the biodegradability divided into easily biodegradable, inherently biodegradable and not biodegradable.

(5) “TF (Toxicity factor)” “TF” refers to a coefficient standing for the toxicity of a substance as a value obtained by dividing acute toxicity data(LC50 and EC50) by uncertainty factor (SF).

(6) “The acute toxicity” refers to a toxicity that appears when a chemical substance is administered (processed) to a test animal once or a few times within 24, 72 and 96 hours, or when an inhalable substance is exposed to a test animal once during a limited time that does not exceed 24, 72 and 96 hours.

(7) “The chronic toxicity” refers to a general toxicity that occurs as a result of repeated administration or exposure during a considerable or whole period of the test animal’s life expectancy. However, it excludes reproductive toxicity, genetic toxicity and cancer-causing properties.

## C. Calculation Methods

(1) $X_n$ Calculation Methods

With regard to the emission of water pollutants in the use phase that applies to the detergents and cleaning agents (EL301 - EL309) under the middle classification of the「Environmental Mark Products and Certification Criteria」, calculate the value for each environmental influence item $X_n$ in accordance with Appendix Table 1 using the DID in Appendix Table 2 and based on the calculation methods presented in (A) to (D). Calculate the value of the constituent substances not included in DID after building the data in accordance with Appendix Table 3. Calculate the score for each item down to one decimal place.

(A) Total chemical substance($X_1$) [g/wash] : Adds the usage amount by functional unit [g/wash(i)] depending on the content [%] of all chemical substances excluding water (including bound water among component substances .

(B) Aerobic non-biodegradable substance($X_2$) [g/wash] : Add the usage amount [g/wash(i)] by functional unit in accordance with the content [%]of the substances conforming to aerobic non-biodegradable substances among DID list.

(C) Anaerobic non-biodegradable substance($X_3$) [g/wash] : Add the usage amount [g/wash(i)] by functional unit in accordance with the content [%]of the substances conforming to anaerobic non-biodegradable substances among DID list.

(D) Limit dilution amount($CDV_{tox}$,$X_4$ ) [L/wash] : Calculate $CDV_{tox}$(i) by each substance by applying TF value, DF value and usage amount by functional unit [g/wash(i)] depending on the content in $CDV_{tox}$ (i) = $\frac{\frac{g}{wash(i)} \times DF(i)}{TF(i)}$ and add them all.

(2) Calculation Methods of the Total Scores

(A) Multiply the results from “(1) $X_n$ Calculation Methods “by the added values for standard items and then total them.

(B) Calculation examples

1) Total = ($aX_1$+b×3.5) + ($cX_2$+d×1.5) + ($eX_3$+f×3) +($gX_3$+h×7)

## <Appendix Table 1> Document Form for Submission

## A. General matters

(1) The environmental labeling application products shall be distributed and sold in certain scopes or higher and equipped with the distribution and sales conditions as well as production processes.

(2) The submitted documents shall not be used for other purposes than as evidence to decide whether products conform to criteria.

## B. How to write the document forms for submission

(1) All the data of individual substance comprising the product shall be provided conforming to the following format and if substances not in DID are used, and formats for submitted documents shall be prepared and submitted based on the presented method in <Annex Table 3>.

(2) However, if a substance which is not included in DID list conforms to the following within the scope of 10% or under among all products, all chemical substance items can be applied without establishing separate data according to the presented method in <Annex Table 3>.

(A) Active Contents(AC) Natural extracts under 1%. However, substance in Food Code Asterisk 1 can be used limitlessly regardless of the content amount.

Note: Test result shall be numerically set according to KS Q 5002 (Statistical interpretation method of the data – Part 1: Statistical description of the data), when calculating the content.

(B) Active Contents(AC) Substances under 1%, and which don't fall under the following R number described in Addendum I of EU Guideline 67/548/EEC

R 40 : limited evidence of a carcinogenic effect

R 45 : may cause cancer

R 46 : may cause heritable genetic damage

R 49 : may cause cancer by inhalation

R 50 : very toxic to aquatic organisms

R 51 : toxic to aquatic organisms

R 52 : harmful to aquatic organisms

R 53 : may cause long-term adverse effects in the aquatic environment

R 60 : may impair fertility

R 61 : may cause harm to the unborn child

R 62 : possible risk of impaired fertility

R 63 : possible risk of harm to the unborn child

R 64 : may cause harm to breastfed babies

R 68 : possible risks of irreversible effects

(3) Fix the content of water based on the KS M 2709 (5.21.1 How to Heat and Add Weight), and record the value, inclusive of that of bound water, into the following table.

(4) It is a principle to write down all individual substance data that constitute the product.

(5) When writing down the contents, the water contained in individual constitution substances shall be excluded. (E.g.: In case of EDTA with the ratio of EDTA :Water = 50 : 50, only 50% of the contents are written down as EDTA contents)

## C. Documents to be Submitted

(1) Product Composition Data : Basic data to check the product composition

1) Technical description of each substance (Substance name, content, CAS No. INCI Name)

2) Function of each substance (E.g.: surfactant, preservative) description

3) MSDS included with supplier of each substance

4) Water content of all substances if water is included in the submitted content by substance

5) Composed substance fixed quantity result

a) In case of a fixed quantity test data for composed substance of chemical substance, test result of publicly authorized organization or the following internal test data used internally(within 3 months) shall be provided.

b) However, in case of the substance that cannot be verified with the company's internal test records, the data shall be verified by checking the input amount of used substances recorded on the IT management system or the production records through on-site due diligence.

(A) DID by product composition substance to judge on the water contamination effects

| DID No. | Use material name | Content [%][Note)] | TF | DF | Total chemical substance [g/wash] | Aerobic non-biodegradable substance [g/wash] | Anaerobic non-biodegradable substance [g/wash] | Critical dilution volume [L/wash] |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

(2) In case of data for the substance non in DID, the data for the substances not in DID shall be established in accordance with [Annex table3] as follows and submitted.

| Substances not in DID | | | | |
|---|---|---|---|---|
| Substance | CAS | Toxicity | DF | Bio-degradability |

| name | No. | Measured value [mg/L] | SF | TF | | Anaerobic non-biodegradable substance | Aerobic non-biodegradable substance |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |

## <Appendix Table 2> DID (detergent ingredients database)

## A. General matters

(1) This database is not a list of substances that are available for products, and may include a list of substances prohibited from use or detection in accordance with the certification criteria for environmental labeling products.

(2) In case of O(No test) regarding the biodegradable ability, biodegrade/ non-biodegrade can be applied depending on the test results when submitting the actual test data for the respective substances.

(3) Compounds and Mixture Application Method

(A) If an individually used substance exists in the final product

1) DID No. is applied based on the substance remaining in the final product. However, in case of an individual substance remaining after the chemical reaction DID No. is applied for the chemical substance before the compound by the remaining amount.

2) Application example : In case fatty acid used to make soap compounds, if 70% only is neutralized and 30% of the usage remains in the final product, 70% for soap(DID No.12) and 30% for fatty acid(DID No.123) are applied in calculation.

(B) Mixture

1) In case we can acquire appropriate toxic data for substances of 2 types or more among mixture, the toxicity addition value of such substances is calculated based on the constant formula as follows and this calculated value can be used.

2) In case of applying the following constant formula among mixture, the toxicity of mixture is calculated using the toxicity value of each substance for the same life type(That is, fish, water flea or green algae), the smallest toxicity value among the calculations (That is, the value acquired from the most sensitive type among 3 life types) is adopted.

| | |
|---|---|
| $\frac{\sum C_i}{L(E)C_{50m}} = \sum \frac{C_i}{L(E)C_{50i}}$ | $C_i$ = Concentration of substance I (Weight %)<br>$L(E)C_{50i}$ = $LC_{50}$ or $EC_{50}$ of substance i (mg / L)<br>N = Substance number (i has 1~ n value)<br>$L(E)C_{50m}$= $L(E)C_{50}$ in the part where the test data exist among mixtures |

A) Application Example (cetearyl alcohol)

Calculation and application by applying the calculated values of 0.287 if mixed by 5:5, and 0.37 if mixed by 2:8, using the toxic data of the same biospecies of Cetyl Alcohol and Stearyl Alcohol

| CAS NO | Substance Name | 96 hours $EC_{50}$ algae | SF(acute) | TF(acute) |
|---|---|---|---|---|
| 36653-82-4 | Cetyl Alcohol | 676 | 10000 | 0.0676 |

| | | | | |
|---|---|---|---|---|
| 112-92-5 | Stearyl Alcohol | 235 | 1000 | 0.235 |

## B. List

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| | Anionic surfactants | | | | | | | | | |
| 1 | Linear alkyl benzene sulphonates 11,5-11,8 (LAS) | 4.1 | 1000 | 0.0041 | 0.69 | 10 | 0.069 | 0.05 | R | N |
| 2 | LAS (C10-13 alkyl) triethanolamine salt | 4.2 | 1000 | 0.0042 | 3.4 | 100 | 0.034 | 0.05 | R | O |
| 3 | C 14/17 Alkyl sulphonate | 6.7 | 5000 | 0.00134 | 0.44 | 10 | 0.044 | 0.05 | R | N |
| 4 | C 8/10 Alkyl sulphate | 132 | 5000 | 0.0264 | | | 0.0264 | 0.05 | R | Y |
| 5 | C 12/14 Alkyl sulphate (AS) | 2.8 | 1000 | 0.0028 | 2 | 100 | 0.02 | 0.05 | R | Y |
| 6 | C 12/18 Alkyl sulphate (AS) (#) | | | 0.0149 | | | 0.027 | 0.05 | R | Y |
| 7 | C 16/18 Fatty alcohol sulphate (FAS) | 27 | 1000 | 0.027 | 1.7 | 50 | 0.034 | 0.05 | R | Y |
| 8 | C 12/15 A 1-3 EO sulphate | 4.6 | 1000 | 0.0046 | 0.1 | 10 | 0.01 | 0.05 | R | Y |
| 9 | C 16/18 A 3-4 EO sulphate | 0.57 | 10000 | 0.000057 | | | 0.000057 | 0.05 | R | Y |
| 10 | Dialkyl sulpho succinate | 15.7 | 1000 | 0.0157 | | | 0.0157 | 0.5 | I | N |
| 11 | C 12/14 Sulpho- fatty acid methylester | 9 | 10000 | 0.0009 | 0.23 | 50 | 0.0046 | 0.05 | R | N |
| 12 | C 16/18 Sulpho- fatty acid methylester | 0.51 | 5000 | 0.000102 | 0.2 | 50 | 0.004 | 0.05 | R | N |
| 13 | C 14/16 aDFa Olefin sulphonate | 3.3 | 10000 | 0.00033 | | | 0.00033 | 0.05 | R | N |
| 14 | C 14/18 aDFa Olefin sulphonate | 0.5 | 5000 | 0.0001 | | | 0.0001 | 0.05 | R | N |
| 15 | Soap C>12-22 | 22 | 1000 | 0.022 | 10 | 100 | 0.1 | 0.05 | R | Y |
| 16 | Lauroyl Sarcosinate | 56 | 10000 | 0.0056 | | | 0.0056 | 0.05 | R | Y |
| 17 | C9/11 2-10 EO Carboxymethylated, sodium salt or acid | 100 | 10000 | 0.01 | | | 0.01 | 0.05 | R | O |
| 18 | C12/18 2-10 EO Carboxymethylated, sodium salt or acid | 8.8 | 1000 | 0.0088 | 5 | 100 | 0.05 | 0.05 | R | O |
| 19 | C 12/18 Alkyl phosphate esters | 38 | 1000 | 0.038 | | | 0.038 | 0.05 | R | N |
| 54 | AES (C 15, 5 EO) | | | 0.016 | 1.6 | 100 | 0.016 | 0.05 | R | Y |
| | | | | | | | | | | |
| | Non-ionic surfactants | | | | | | | | | |
| 20 | C8 A 1-5 EO | 7.8 | 1000 | 0.0078 | | | 0.0078 | 0.05 | R | Y |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 21 | C 9/11 A, >3-6 EO predominantly linear | 5.6 | 1000 | 0.0056 | | | 0.0056 | 0.05 | R | Y |
| 22 | C 9/11 A, >6-10 EO predominantly linear | 5 | 1000 | 0.005 | | | 0.005 | 0.05 | R | Y |
| 23 | C 9/11 A, 5-11 EO multibranched | 1 | 1000 | 0.001 | | | 0.001 | 0.05 | R | O |
| 24 | C10 A, 5-11 EO multi br. (Trimer-propen-oxo-alcohol) | 10 | 1000 | 0.01 | | | 0.01 | 0.05 | R | Y |
| 25 | C 12/15 A, 2-6 EO predominantly linear | 0.43 | 1000 | 0.00043 | 0.18 | 50 | 0.0036 | 0.05 | R | Y |
| 26 | C12/14 5-8 EO 1 t-BuO (endcapped) | 0.23 | 1000 | 0.00023 | 0.18 | 100 | 0.0018 | 0.05 | R | O |
| 27 | C 12/15 A, 3-12 EO multibranched | 1 | 1000 | 0.001 | 3.2 | 100 | 0.032 | 0.05 | R | O |
| 28 | C 12/15 (mean value C<14) A, >6-9 EO | 0.63 | 1000 | 0.00063 | 0.24 | 10 | 0.024 | 0.05 | R | Y |
| 29 | C 12/15 (mean value C>14) A, >6-9 EO | 0.4 | 1000 | 0.0004 | 0.17 | 10 | 0.017 | 0.05 | R | Y |
| 30 | C 12/15 A, >9-12 EO | 1.1 | 1000 | 0.0011 | | | 0.017 | 0.05 | R | Y |
| 31 | C 12/15 A >12-20 EO | 0.7 | 1000 | 0.0007 | | | 0.0007 | 0.05 | R | O |
| 32 | C 12/15 A >20-30 EO | 13 | 1000 | 0.013 | 10 | 100 | 0.1 | 0.05 | R | O |
| 33 | C 12/15 A, >30 EO | 130 | 1000 | 0.13 | | | 0.13 | 0.5 | I | O |
| 34 | C 12/18 A, 0-3 EO | 0.3 | 1000 | 0.0003 | | | 0.0003 | 0.05 | R | Y |
| 35 | C 12/18 A, 5-10 EO | 1 | 1000 | 0.001 | 0.35 | 100 | 0.0035 | 0.05 | R | O |
| 36 | C 12/18 A, >10-20 EO | 1 | 1000 | 0.001 | | | 0.0035 | 0.05 | R | O |
| 37 | C 16/18 A, 2-8 EO | 3.2 | 1000 | 0.0032 | 0.4 | 100 | 0.004 | 0.05 | R | Y |
| 38 | C 16/18 A, >9-18 EO | 0.72 | 1000 | 0.00072 | 0.32 | 10 | 0.032 | 0.05 | R | Y |
| 39 | C 16/18 A, 20-30 EO | 4.1 | 1000 | 0.0041 | | | 0.0041 | 0.05 | R | Y |
| 40 | C 16/18 A, >30 EO | 30 | 1000 | 0.03 | | | 0.03 | 0.5 | I | Y |
| 41 | C12-15 A 2-6 EO 2-6 PO | 0.78 | 1000 | 0.00078 | 0.36 | 100 | 0.0036 | 0.05 | R | O |
| 42 | C10-16 A 0-3 PO 6-7 EO | 3.2 | 5000 | 0.00064 | 1 | 100 | 0.01 | 0.05 | R | O |
| 43 | Glycerin (1-5 EO) cocoate | 16 | 1000 | 0.016 | 6.3 | 100 | 0.063 | 0.05 | R | Y |
| 44 | Glycerin (6-17 EO) cocoate | 100 | 1000 | 0.1 | | | 0.1 | 0.05 | R | Y |
| 45 | C 12/14 Glucose amide | 13 | 1000 | 0.013 | 4.3 | 50 | 0.086 | 0.05 | R | Y |
| 46 | C 16/18 Glucose amide | 1 | 1000 | 0.001 | 0.33 | 50 | 0.0066 | 0.05 | R | Y |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 47 | C 8/10 Alkyl polyglycoside | 28 | 1000 | 0.028 | 5.7 | 100 | 0.057 | 0.05 | R | Y |
| 48 | C8/12 Alkyl polyglycoside, branched | 480 | 1000 | 0.48 | 100 | 100 | 1 | 0.05 | R | N |
| 49 | C 8/16 or C12-14 Alkyl polyglycoside | 5.3 | 1000 | 0.0053 | 1 | 10 | 0.1 | 0.05 | R | Y |
| 50 | Coconut fatty acid monoethanolamide | 9.5 | 1000 | 0.0095 | 1 | 100 | 0.01 | 0.05 | R | Y |
| 51 | Coconut fatty acid monoethanolamide 4-5 EO | 17 | 10000 | 0.0017 | | | 0.0017 | 0.05 | R | Y |
| 52 | Coconut fatty acid diethanolamide | 2 | 1000 | 0.002 | 0.3 | 100 | 0.003 | 0.05 | R | O |
| 53 | PEG-4 Rapeseed amide | 7 | 1000 | 0.007 | | | 0.007 | 0.05 | R | Y |
| 55 | AE (C 6~12, 10~15 EO 8~12 PO) | | | 0.02 | 1 | 50 | 0.02 | 1 | P | N |
| | | | | | | | | | | |
| | Amphoteric surfactants | | | | | | | | | |
| 60 | C12/15 Alkyl dimethylbetaine | 1.7 | 1000 | 0.0017 | 0.1 | 100 | 0.001 | 0.05 | R | O |
| 61 | alkyl C12/18 Amidopropylbetaine | 1.8 | 1000 | 0.0018 | 0.09 | 100 | 0.0009 | 0.05 | R | Y |
| 62 | C12/18 Alkyl amine oxide | 0.3 | 1000 | 0.0003 | | | 0.0003 | 0.05 | R | Y |
| | | | | | | | | | | |
| | Cationic surfactants | | | | | | | | | |
| 70 | Alkyl trimethyl ammonium salts | 0.1 | 1000 | 0.0001 | 0.046 | 100 | 0.00046 | 0.5 | I | O |
| 71 | Alkyl ester ammonium salts | 2.9 | 1000 | 0.0029 | 1 | 10 | 0.1 | 0.05 | R | Y |
| | | | | | | | | | | |
| | Preservatives | | | | | | | | | |
| 80 | 1,2-Benzisothiazol-3-one | 0.15 | 1000 | 0.00015 | | | 0.00015 | 0.5 | I | N |
| 81 | Benzyl alcohol | 360 | 1000 | 0.36 | | | 0.36 | 0.05 | R | Y |
| 82 | 5-bromo-5-nitro-1,3-dioxane | 0.4 | 5000 | 0.00008 | | | 0.00008 | 1 | P | O |
| 83 | 2-bromo-2-nitropropane-1,3-diol | 0.78 | 1000 | 0.00078 | 0.2 | 100 | 0.002 | 0.5 | I | O |
| 84 | Chloroacetamide | 55.6 | 10000 | 0.00556 | | | 0.00556 | 1 | O | O |
| 85 | Diazolinidylurea | 35 | 5000 | 0.007 | | | 0.007 | 1 | P | O |
| 86 | Formaldehyde | 2 | 1000 | 0.002 | | | 0.002 | 0.05 | R | O |
| 87 | Glutaraldehyde | 0.31 | 1000 | 0.00031 | | | 0.00031 | 0.05 | R | O |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 88 | Guanidine, hexamethylene-, homopolymer | 0.18 | 1000 | 0.00018 | 0.024 | 100 | 0.00024 | 1 | P | O |
| 89 | CMI + MIT in mixture 3:1 (§) | 0.0067 | 1000 | 0.0000067 | 0.0057 | 50 | 0.000114 | 0.5 | I | O |
| 90 | 2-Methyl-2H-isothiazol-3-one (MIT) | 0.06 | 1000 | 0.00006 | | | 0.00006 | 0.5 | I | O |
| 91 | Methyldibromoglutaronitrile | 0.15 | 1000 | 0.00015 | | | 0.00015 | 0.05 | R | O |
| 92 | e-phtaloimidoperoxyhexanoic acid | 0.59 | 5000 | 0.000118 | | | 0.000118 | 1 | P | O |
| 93 | Methyl-, Ethyl- and Propylparaben | 15.4 | 5000 | 0.00308 | | | 0.00308 | 0.05 | R | N |
| 94 | o-Phenylphenol | 0.92 | 1000 | 0.00092 | | | 0.00092 | 0.05 | R | O |
| 95 | Sodium benzoate | 128 | 1000 | 0.128 | | | 0.128 | 0.05 | R | Y |
| 96 | Sodium hydroxy methyl glycinate | 36.5 | 5000 | 0.0073 | | | 0.0073 | 1 | O | O |
| 97 | Sodium Nitrite | 87 | 10000 | 0.0087 | | | 0.0087 | 1 | NA | NA |
| 98 | Triclosan | 0.0014 | 1000 | 0.0000014 | 0.00069 | 10 | 0.000069 | 0.5 | I | O |
| 99 | Phenoxy-ethanol | 344 | 1000 | 0.344 | 200 | 100 | 2 | 0.05 | R | O |
| | Other ingredients | | | | | | | | | |
| 110 | Silicon | 250 | 1000 | 0.25 | | | 0.25 | 1 | P | N |
| 111 | Paraffin | 1000 | 10000 | 0.1 | | | 0.1 | 1 | P | O |
| 112 | Glycerol | 4400 | 5000 | 0.88 | | | 0.88 | 0.05 | R | Y |
| 113 | Phosphate, as STPP(sodium tripolyphosphate) | 1000 | 1000 | 1 | | | 1 | 0.15 | NA | NA |
| 114 | Zeolite (Insoluble Inorganic) | 1000 | 1000 | 1 | 175 | 50 | 3.5 | 1 | NA | NA |
| 115 | Citrate and citric acid | 825 | 1000 | 0.825 | 80 | 50 | 1.6 | 0.05 | R | Y |
| 116 | Polycarboxylates | 200 | 1000 | 0.2 | 106 | 10 | 10.6 | 1 | P | N |
| 117 | Nitrilotriacetat (NTA) | 494 | 1000 | 0.494 | 64 | 50 | 1.28 | 0.05 | R | O |
| 118 | Ethylenediaminetetraacetic acid (EDTA) | 121 | 1000 | 0.121 | 22 | 50 | 0.44 | 0.5 | I | N |
| 119 | Phosphonates | 650 | 1000 | 0.65 | 25 | 50 | 0.5 | 1 | P | N |
| 120 | ethylenediaminedisuccinate (EDDS) | 320 | 1000 | 0.32 | 32 | 50 | 0.64 | 0.05 | R | N |
| 121 | Clay (Insoluble Inorganic) | 1000 | 1000 | 1 | | | 1 | 1 | NA | NA |
| 122 | Carbonates | 250 | 1000 | 0.25 | | | 0.25 | 0.15 | NA | NA |
| 123 | Fatty acids C>=14 | 3.7 | 5000 | 0.00074 | | | 0.00074 | 0.05 | R | Y |
| 124 | Silicates | 250 | 1000 | 0.25 | | | 0.25 | 1 | NA | NA |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 125 | Polyasparaginic acid, Na-salt | 410 | 1000 | 0.41 | | | 0.41 | 0.05 | R | N |
| 126 | Perborates (as Boron) | 14 | 1000 | 0.014 | | | 0.014 | 1 | NA | NA |
| 127 | Percarbonate (See carbonate) | 250 | 1000 | 0.25 | | | 0.25 | 0,15 | NA | NA |
| 128 | Tetraacetylethylenediamine (TAED) | 250 | 1000 | 0.25 | 500 | 100 | 5 | 0.05 | R | O |
| 129 | C1-C4 alcohols | 1000 | 1000 | 1 | | | 1 | 0.05 | R | Y |
| 130 | Mono-, di- and triethanol amine | 90 | 1000 | 0.09 | 0.78 | 100 | 0.0078 | 0.05 | R | Y |
| 131 | Polyvinylpyrrolidon (PVP) | 1000 | 1000 | 1 | | | 1 | 0.5 | I | N |
| 132 | Carboxymethylcellulose (CMC) | 250 | 5000 | 0.05 | | | 0.05 | 0.5 | I | N |
| 133 | Sodium and magnesium sulphate | 1000 | 1000 | 1 | 100 | 100 | 1 | 1 | NA | NA |
| 134 | Calcium- and sodiumchloride | 1000 | 1000 | 1 | 100 | 100 | 1 | 1 | NA | NA |
| 135 | Urea | 1000 | 5000 | 0.2 | | | 0.2 | 1 | NA | NA |
| 136 | Silicon dioxide, quartz | 1000 | 1000 | 1 | | | 1 | 1 | NA | NA |
| 137 | Polyethylene glycol, MW>4000 | 1000 | 10000 | 0.1 | | | 0.1 | 1 | P | N |
| 138 | Polyethylene glycol, MW<4000 | 1000 | 10000 | 0.1 | | | 0.1 | 0.05 | R | O |
| 139 | Cumene sulphonates | 450 | 1000 | 0.45 | | | 0.45 | 0.5 | I | N |
| 140 | Na-/Mg-/KOH | 30 | 1000 | 0.03 | | | 0.03 | 0,05 | NA | NA |
| 141 | Enzymes/proteins | 25 | 5000 | 0.005 | | | 0.005 | 0.05 | R | Y |
| 142 | Perfume, if not other specified (**) | 2 | 1000 | 0.002 | | | 0.002 | 0.5 | I | N |
| 143 | Dyes, if not other specified (**) | 10 | 1000 | 0.01 | | | 0.01 | 1 | P | N |
| 144 | Starch | 100 | 1000 | 0.1 | | | 0.1 | 0.05 | R | Y |
| 145 | Anionic polyester | 655 | 1000 | 0.655 | | | 0.655 | 1 | P | N |
| 146 | poly-2-vinylpyridine-N-oxide (PVNO)<br>Povidone-iodine (PVPI) | 530 | 1000 | 0.53 | | | 0.53 | 1 | P | N |
| 147 | Zn Ftalocyanin sulphonate | 0.2 | 1000 | 0.0002 | 0.16 | 100 | 0.0016 | 1 | P | N |
| 148 | Iminodisuccinat | 81 | 1000 | 0.081 | 17 | 100 | 0.17 | 0.05 | R | N |
| 149 | FWA 1 | 11 | 1000 | 0.011 | 10 | 100 | 0.1 | 1 | P | N |
| 150 | FWA 5 | 10 | 1000 | 0.01 | 1 | 10 | 0.1 | 1 | P | N |
| 151 | 1-decanol | 2.3 | 5000 | 0.00046 | | | 0.00046 | 0.05 | R | O |
| 152 | Methyl laurate | 1360 | 10000 | 0.136 | | | 0.136 | 0.05 | R | O |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 153 | Formic acid (Ca salt) | 100 | 1000 | 0.1 | | | 0.1 | 0.05 | R | Y |
| 154 | Adipic acid | 31 | 1000 | 0.031 | | | 0.031 | 0.05 | R | O |
| 155 | Maleic acid | 106 | 1000 | 0.106 | | | 0.106 | 0.05 | R | Y |
| 156 | Malic acid | 106 | 1000 | 0.106 | | | 0.106 | 0.05 | R | O |
| 157 | Tartaric acid | 200 | 10000 | 0.02 | | | 0.02 | 0.05 | R | O |
| 158 | Phosphoric acid | 138 | 1000 | 0.138 | | | 0.138 | 0.15 | NA | NA |
| 159 | Oxalic acid | 128 | 5000 | 0.0256 | | | 0.0256 | 0.05 | R | O |
| 160 | Acetic acid | 30 | 1000 | 0.03 | | | 0.03 | 0.05 | R | Y |
| 161 | Lactic acid | 130 | 1000 | 0.13 | | | 0.13 | 0.05 | R | Y |
| 162 | Sulphamic acid | 75 | 1000 | 0.075 | | | 0.075 | 1 | NA | NA |
| 163 | Salicylic acid | 46 | 1000 | 0.046 | | | 0.046 | 0.15 | R | O |
| 164 | Glycollic acid | 141 | 5000 | 0.0282 | | | 0.0282 | 0.05 | R | O |
| 165 | Glutaric acid | 208 | 5000 | 0.0416 | | | 0.0416 | 0.05 | R | O |
| 166 | Malonic acid | 95 | 5000 | 0.019 | | | 0.019 | 0.05 | R | O |
| 167 | Ethylene glycol | 6500 | 1000 | 6.5 | | | 6.5 | 0.05 | R | Y |
| 168 | Ethylene glycol monobutyl ether | 747 | 5000 | 0.1494 | | | 0.1494 | 0.05 | R | O |
| 169 | Diethylene glycol | 4400 | 10000 | 0.44 | | | 0.44 | 0.05 | R | Y |
| 170 | Diethylene glycol monomethyl ether | 500 | 1000 | 0.5 | | | 0.5 | 0.15 | R | O |
| 171 | Diethylene glycol monoethyl ether | 3940 | 5000 | 0.788 | | | 0.788 | 0.05 | R | O |
| 172 | Diethylene glycol monobutyl ether | 1254 | 1000 | 1.254 | | | 1254 | 0.05 | R | O |
| 173 | Diethylene glycol dimethyl ether | 2000 | 10000 | 0.2 | | | 0.2 | 0.5 | I | O |
| 174 | Propylene glycol | 32000 | 1000 | 32 | | | 32 | 0.15 | R | Y |
| 175 | Propylene glycol monomethyl ether | 12700 | 5000 | 2.54 | | | 2.54 | 0.05 | R | O |
| 176 | Propylene glycol monobutyl ether | 748 | 5000 | 0.1496 | | | 0.1496 | 0.05 | R | O |
| 177 | Dipropylene glycol | 1625 | 10000 | 0.1625 | | | 0.1625 | 0.05 | R | O |
| 178 | Dipropylene glycol monomethyl ether | 1919 | 5000 | 0.3838 | | | 0.3838 | 0.05 | R | O |
| 179 | Dipropylene glycol monobutyl ether | 841 | 5000 | 0.1682 | | | 0.1682 | 0.05 | R | O |
| 180 | Dipropylene glycol dimethyl ether | 1000 | 5000 | 0.2 | | | 0.2 | 0.5 | I | O |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 181 | Triethylene glycol | 4400 | 1000 | 4.4 | | | 4.4 | 0.5 | I | O |
| 182 | Tall oil | 1.8 | 1000 | 0.0018 | | | 0.0018 | 0.5 | I | O |
| 183 | Ethylenebisstearamides | 140 | 5000 | 0.028 | | | 0.028 | 0.5 | I | O |
| 184 | Sodium gluconate | 10000 | 10000 | 1 | | | 1 | 0.05 | R | O |
| 185 | Glycol distearate | 100 | 5000 | 0.02 | | | 0.02 | 0.05 | R | Y |
| 186 | Hydroxyl ethyl cellulose | 209 | 5000 | 0.0418 | | | 0.0418 | 1 | P | O |
| 187 | Hydroxy propyl methyl cellulose | 188 | 5000 | 0.0376 | | | 0.0376 | 1 | P | O |
| 188 | 1-methyl-2-pyrrolidone | 500 | 1000 | 0.5 | | | 0.5 | 0.05 | R | O |
| 189 | Xanthan gum | 490 | 1000 | 0.49 | | | 0.49 | 0.05 | R | O |
| 190 | Trimethyl Pentanediol mono-isobutyrate | 18 | 1000 | 0.018 | 3.3 | 100 | 0.033 | 0.05 | R | O |
| 191 | Benzotriazole | 29 | 1000 | 0.029 | | | 0.029 | 1 | P | O |
| 192 | Piperidinol-propanetricarboxylate salt | 100 | 1000 | 0.1 | 120 | 100 | 1.2 | 0.5 | I | O |
| 193 | Diethylaminopropyl-DAS | 120 | 1000 | 0.12 | 120 | 100 | 1.2 | 1 | P | O |
| 194 | Methylbenzamide-DAS | 120 | 1000 | 0.12 | 120 | 100 | 1.2 | 0.5 | I | O |
| 195 | Pentaerythritol-tetrakis-phenol-propionate | | 1000 | 0.038 | | | 0.038 | 1 | P | O |
| 196 | Block polymers (***) | 100 | 5000 | 0.02 | | | 0.02 | 1 | P | N |
| 197 | Denatonium benzoate | 13 | 5000 | 0.0026 | | | 0.0026 | 1 | O | O |
| 198 | Succinate | 374 | 10000 | 0.0374 | | | 0.0374 | 0.05 | R | O |
| 199 | Polyaspartic acid | 528 | 1000 | 0.528 | | | 0.528 | 0.05 | R | N |
| 200 | Xylene Sulphonate | 230 | 1000 | 0.23 | 31 | 100 | 0.31 | 0.5 | I | N |
| 201 | Proteinhydrolizates, wheatgluten | 113 | 5000 | 0.023 | | | 0.023 | 0.05 | R | O |
| 202 | Fatty acid, C6-12 methyl ester | 21 | 10000 | 0.0021 | | | 0.0021 | 0.05 | R | O |
| 203 | Mn-Saltren (CAS 61007-89-4) | 39 | 1000 | 0.039 | 4.3 | 100 | 0.043 | 0.5 | I | O |
| 204 | Tri-Sodium methylglycine diacetat | 100 | 1000 | 0.1 | 16.7 | 50 | 0.334 | 0.05 | R | O |
| 205 | Disilicates | 1000 | 10 | 100 | | | | 0.05 | R | Y |
| 206 | Triethanolamine | | | 0.078 | 0.78 | 10 | 0.078 | 0.05 | R | Y |
| 207 | Calcium formiate | | | 10 | | | | 0.05 | R | Y |
| 208 | Silica | | | 10 | | | | 0.05 | R | Y |
| 209 | PEG, high MW (MW>4000) | | | 10 | | | | 1 | P | Y |
| 210 | PEG, low MW (MW<4000) | | | 10 | | | | 0.05 | R | Y |

| DID No. | Materials | Acute toxicity | | | Chronic toxicity | | | Biodegradability | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LC50/ EC50 | SF (Safety Factor) | TF (Toxicity Factor) | NOEC(*) | SF(*) (Safety Factor) | TF (Toxicity Factor) | DF (Degradation factor) | aerobic | anaerobic |
| 211 | Cumene sulfonate | 66 | 100 | 0.66 | | | | 0.05 | R | N |
| 212 | Toluene sulfonate | 66 | 100 | 0.66 | | | | 0.05 | R | N |
| 213 | Monosaccharides (mannitol, sorbitol) | 40000 | 5000 | 8 | | | | 0.05 | R | Y |
| 214 | Hydrogen peroxide | | | 0.016 | 1.6 | 100 | 0.016 | 0.05 | R | Y |
| 215 | Magnesium chloride | 32 | 5000 | 0.0064 | | | | 0.05 | R | Y |
| 216 | Ammonium chloride | 109 | 5000 | 0.0218 | | | | 0.05 | R | Y |
| 217 | Boric acid | | | 0.1 | 10 | 100 | 0.1 | 0.05 | R | Y |
| 218 | Butylene glycol | 1070 | 1000 | 1.07 | | | | 0.05 | R | Y |

Note)Abbreviation

<Insoluble inorganic substance> Inorganic substance have no or a very low possibility of solution.

(*) If there is no chronic data, leave this column blank. In this case, identify TF(chronic) value with TF(acute)

(**) According to the general approval rules, be sure to use the data in this DID list. However, exclude incense and dyes. If a certification applicant submits toxicity data values, the submitted data may be used to calculate TF values or decide degradability. Otherwise, use the values in the list.

(***) Apply the application data on the aerobic biodegradation of DID no196 block polymer after presenting a test report

(#) Calculate TF value as an average of C 12/14 Alkyl sulphate (AS) and C 16/18 Alkyl sulphate (AS) for the lack of toxicity results.

(§) Mix 5-Chloro-2-Methyl-4-isothiazolin-3-one with 2-Methyl-4-isothiazolin-3-one at a rate of 3:1.

NOEC : No observed effect concentration, concentration having no influence on dosage concentration

EO : ethylene oxide

PO : propylene oxide

FWA 1 : disodium 4,4'-bis(4-anilino-5-morpholino-1,3,5-triazin-2-yl) amino stilbene-2, 2'-disulfonate

FWA 5 : disodium 4,4'-bis(2-sulfostryryl) biphenyl

<Aerobic degradation>

R : Means being easily biodegradable pursuant to the OECD Directives

I : Means being inherently biodegradable pursuant to the OECD Directives

P : Not biodegradable Failure in the test of inherent biodegradation

O : Test not performed

NA : Not applicable

<Anaerobic degradation>

Y : Biodegradable under aerobic conditions

N : Not biodegradable under aerobic conditions

O : Test not performed

NA : Not applicable

## Appendix 3. Data on Construction Methods not Existing in DID [Related to 3. Certification Standard (1)]

### A. General Matters

(1) Data supporting documents for materials not existing in DID shall include authorized laboratory test reports, the company's internal experimental data, and LC50 and EC 50 data described in MSDS, risk assessment report, etc.

(2) However, in the event that a company's internal experiment data, experimental resources, and the data related to MSDS and risk assessment report are submitted, verification shall be conducted by the Eco-label certification review committee.

### B. Data Construction Method

#### (1) Toxic Factor (TF)

(a) TF value shall be constructed by dividing the median value of numerical multiple toxicity tests [mg/L] by the uncertainty factor (SF). Herein, for the purpose of constructing the eco-toxicological assessment data, the acute or chronic toxicity data affecting green algae, daphnia and fish shall be considered.

| Toxicity Data | Uncertainty Factor |
|---|---|
| Case in which NOEC data related to green algae, daphnia and fish exist | 10 |
| Case in which NOEC data exists for two of green algae, daphnia and fish | 50 |
| Case in which NOEC data exists for either green algae, daphnia or fish | 100 |
| Case in which L(E)C50 data related to green algae, daphnia and fish exist | 1000 |
| Case in which L(E)C50 data exist for two of green algae, daphnia and fish exist | 5000 |
| Case in which L(E)C50 data exist for either green algae, daphnia or fish | 10000 |

Note1) In regard to the testing method, the following test method or equivalent methods can be applicable to OECD 201 green algae toxicity tests, OECD 202 daphnia toxicity tests, OECD 203, 204 fish toxicity tests: Regulations regarding the designation of research institutes of hazardous of chemical substances, <Appendix 2> Chemical substances testing method, 2. Ecological effect test, 1. Algae growth inhibition test, 2. Daphnia acute toxicity test, and 3. Fish acute toxicity test.

Note 2) The data extracted from QSARs (Quantitative Structure Activity Relationship)-(referring

to the following 1) can be used. However, there shall be 1 or two L(E)C 50 fish toxicity (LC50), green algae, daphnia and fish toxicity (EC50) data. In addition, you shall prove that the substance having L (E) C50 data shows the lowest toxicity value using NOEC of other homologue substance-(referring to the following 2) through quantitative structure activity relationships with the species.

1) QSAR represents an attempt to statistically correlate a descriptor (hydrophobicity, shape, electronic properties and spatial layout of the atom) on the chemical structure and properties of the mixture and activity (including chemical measurement and biological analysis). The object of QSAR is to search for substances including potential toxicity in light of ecological and public health needs and limited testing resources. If the characteristics of a compound are known, it will be possible to easily find suitable candidate material for the purpose using the characteristics identified through QSAR.

2) This refers to a group of compounds differentiated by $CH_2$ in the composition of organic compounds. The homologue substances include the very similar chemical properties and show the same reaction depending on the common functional groups. In addition, the physical properties such as melting point and boiling point vary regularly according to the increase of the number of carbon atoms. For example, LAS refers to the LAS including a different carbon coefficient, and AE refers to the AE including different added moles.

## (2) Partition coefficient (DF)

### (A) General Matters

| Division | DF |
|---|---|
| Readily biodegradable - referring to note 1) | 0.05 |
| Readily biodegradable - referring to note 2)) | 0.15 |
| Inherently biodegradable | 0.5 |
| Non-biodegradable | 1 |

Note 1) In the following cases, although 10% or more of a 10-day window is non-biodegradable, it shall be considered as being readily biodegradable.

- Surfactant
- Substances composed of homologous substances and meeting the final biodegradation requirements (during 28 days, biodegradable of 60 to 70% or more)

Note 2) Case in which the final 28 days biodegradation is 60% or more, but non-biodegradation is 10% or more within 10 days.

### (B) Inorganic substances

| Division | DF |
|---|---|
| Biodegradable within 5 days | 0.05 |
| Biodegradable within 15 days | 0.15 |
| Biodegradable within 50 days | 0.5 |

(C) Aerobic biodegradation ability

| Division | Indication |
|---|---|
| Readily biodegradable | R |
| Inherently biodegradable, but not readily biodegradable | I |
| Persistent | P |
| Not tested for aerobic biodegradability | 0 |

(4) Anaerobic biodegradation ability

| Test or Non-test | Division | Indication |
|---|---|---|
| ○ | Not anaerobically biodegradable | N |
| | Anaerobically biodegradable | Y |
| X | There is no test result, but it will be verified by analogy.<br>(e.g: The result of biodegradation prediction program developed by EPA such as BIOWIN) | |
| | - | 0 |

Note 1) Name of Specifications

▪ KS M ISO 11734 [Water quality - Evaluation of the ultimate anaerobic biodegradability of organic compounds in digested sludge method by measurement of the biogas production]

▪ ECETOC Anaerobic biodegradation test (Technical Report No28, Evaluation of Anaerobic Biodegradation, 1988), or, OECD 311 (ready anaerobic biodegradability : gas production form diluted anaerobic sewage sludge)

Note 2) Explanation of Terms

▪ BIOWIN™: Estimates aerobic and anaerobic biodegradability of organic chemicals using 7 different models; two of these are the original Biodegradation Probability Program (BPP™). The seventh and newest model estimates anaerobic biodegradation potential.

## Common Criteria, Notice No. 2012-36, the Ministry of Environment

1. Eco-label products must follow the following provisions with regard to the proper treatment of environmental pollution substances, such as air and water wastes and noxious chemical substances emitted in the process of manufacturing or service operation.

A. When first applying for certification, the product manufacturer should observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located for a period of one year prior to the date of application. Any case of violation of the penalty clause will be verified by confirming documents involved during a period of one year to the date of application. Regarding any violation not related to the penalty clause, confirmation will be made on the completion of appropriate measures.

B. A person who has received a certification of eco-labeling shall observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located during the period of certification. However, regarding any violation besides a penalty, confirmation will be made on the completion of appropriate measures.

2. As a general rule, information for consumers shall be indicated on the surface of the product in such a way not to be easily erased. However, in case that indication on the surface of the product is impossible or undesirable, it can be indicated on the appropriate part such as product packaging, product guidebook and user's manual that consumers can recognize. However, the service information should be indicated inside and outside of the place of service operation. In case that indication inside and outside of the place of service operation is impossible or undesirable, it can be indicated on the appropriate part such as an agreement, letter of delivery, letter of guarantee, and PR materials that consumers can recognize.

3. In order to establish fair trade and to protect consumer, the applicant for eco-label and the holder of eco-label license shall observe the Act on the Fairness of

Indication and Advertisement with respect to the environmental aspects of the product.

4. For Various standards referred in the certification criteria by target product, the latest revised edition applies at the date of application, if not specified otherwise.

5. In applying the quality related criteria for each target product, if no standard is available that can be applied as the quality criteria, the president of Korea Environmental Industry & Technology Institute (KEITI) (hereafter referred to as "president of KEITI") may establish and operate the quality criteria for the product involved after review by a competent committee.