

EL306. Fabric softeners

[EL306-2008/2/2008-213]



1. Scope

The criteria shall apply to fabric softeners used to soften fabric in the final phase of rinse and to prevent the generation of static electricity when fabric products, such as clothes are washed at general households.

2. Definitions

2.1

“The functional unit” refers to the quantification of the same service (performance) a product provides. Under these criteria, in the products for agitator type washing machines, it means the quantity [g/wash] of a fabric softening agent used for 100 L water used at the time of washing; in the products for cylinder style washing machines, it means the quantity [g/wash] of a fabric softening agent used for 10 kg washing materials in a washing machine of 10 kg or above 10 kg.

2.2

“Agitator Type Washing Machine” refers to a washing machine in which a mixing blade is mounted on the bottom surface and the washing operation is executed according to its agitation movement.

2.3

“Cylinder Type Washing Machine” refers to a washing machine that executes washing by dropping the laundry according to the rotary movement of the horizontal axis of a drum in which condition the laundry is partially submerged under the washing water within the horizontal drum.

2.4

“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.

2.5

“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.

2.6

“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.

2.7

“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.

2.8

“Primary irritation index (PII)” refers to an index created in accordance with the extent of local irritation caused on the skin or mucosa by a test material pursuant to “the Toxicity Test Criteria of Medicines etc” announced by the Korea Food & Drug Administration (KFDA)."

2.9

“The main container” refers to packing material in the form of a container, not film.

3. Certification Criteria

3.1 Environmental Criteria

3.1.1

When a product is being manufactured, in regard to the use of chemical substances, the following materials should not be used for constituent ingredients of the product.

3.1.1.1

Alkylphenol Ethoxylates (APEOs) and Alkylphenol Derivative.

3.1.1.2

Dialkyl dimethyl ammonium chlorides (DDAC)

3.1.1.3

0.1% or above 0.1% of its weight under H334(may cause allergy or asthma symptoms or breathing difficulties if inhaled), H317(May cause allergic skin reaction) in accordance with the UN GHS(Globally Harmonized System of Classification and Labelling of Chemicals)

3.1.1.4

Spices shall conform to the IFRA (International Fragrance Association) Standards.

3.1.2

With regard to harmfulness to the human body in the phase of use, fabric softeners shall conform to the following criteria:

3.1.2.1

The first irritation index of a product shall be 0.5 or below 0.5.

3.1.2.2

Harmful substances contained by a product shall conform to the following criteria:

a) The formaldehyde contained by a product shall be 25 mg/kg or below 25 mg/kg.

b) The antiseptic agents contained by a product shall conform to the following criteria:

| CAS No. | Substance name | Criterion |
|-------------|------------------------------|--|
| 8001-54-5 | BKC (benzal konium chloride) | Undetectable (Threshold density of 7.5 mg/kg or below 7.5 mg/kg) |
| 73728-40-2 | benzoic acid | Undetectable (Threshold density of 20 mg/kg or below 20 mg/kg) |
| 185532-71-2 | benzyle alcohol | |
| 99-76-3 | methyl paraben | Undetectable (Threshold density 5 mg/kg or below 5 mg/kg) |
| 120-47-8 | ethyl paraben | |
| 94-13-3 | propyl paraben | |
| 3380-34-5 | Triclosan | |
| 2682-20-4 | Methylisothiazolinone | |
| 122-99-6 | phenoxy ethanol | Undetectable (Threshold density of 15 mg/kg or below 15 mg/kg) |
| 60-12-8 | phenethyl alcohol | Undetectable (Threshold density of 10 mg/kg or below 10 mg/kg) |
| 26172-55-4 | chloromethylisothiazolinone | |

3.1.3

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 Fabric softeners

| Reference Item | | Critical Limits of X_n | Grade Calculation System | |
|-------------------------------|--|--------------------------|-----------------------------------|---------|
| | | | Equation | Weights |
| Agitator type washing machine | 1. Total chemical substance | ≤ 10 | $-2.39 X_1 + 23.4$ | 3.5 |
| | 2. Aerobic non-biodegradable substance | ≤ 1.2 | $-14.18 X_2 + 13.4$ | 1.5 |
| | 3. Anaerobic non-biodegradable substance | ≤ 2 | $-3.47 X_3 + 12$ | 3 |
| | 4. Critical dilution volume, toxicity (CDVtox) | ≤ 250 | $-(9.05 \times 10^{-2}) X_4 + 22$ | 7 |
| | Sum | | ≥ 110 | |
| Cylinder Type Washing Machine | 1. Total chemical substance | ≤ 14 | $-0.83 X_1 + 13.2$ | 3.5 |
| | 2. Aerobic non- | ≤ 5 | $-2.3 X_2 + 5.8$ | 1.5 |

| | | | | |
|--|--|------|--|---|
| | biodegradable substance | | | |
| | 3. Anaerobic non-biodegradable substance | ≤2.5 | -2 X ₃ +6.4 | 3 |
| | 4. Critical dilution volume, toxicity (CDVtox) | ≤350 | -(2.53×10 ⁻²) X ₄ +11.2 | 7 |
| | Sum | ≥50 | | |

3.1.4

When the product is being manufactured and when the product is being used, in regard to recycling in terms of resources consumption and at the stage of disposal, packing materials should satisfy the following requirements.

3.1.4.1

“Packing material evaluation index” of the primary packing material for each standard of the main container should be 5 or below 5.

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」. However, vinyl packages, etc. in which products and others are directly used are not calculated as the number of packages.

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

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

3.1.4.2

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.

3.1.4.3




In case of the main container, a measuring cup should be sold with it attached indicating the standard amount for use on its cover.

3.1.4.4

In regard to the legibility of the indication of the standard amount for use, the following requirement should be satisfied.

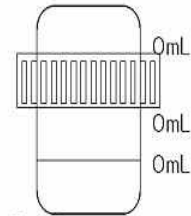
a) In regard to the standard amount for use, the following types of information including “table indicating standard use”, “a measuring cup indicating a capacity (case cover)” and “recommendations standard usage” should be prescribed.

"Please keep the standard amount of use"

| The Laundry Weight [kg] Or water quantity used [L] | The amount used [mL] | Case[on a basis of a measuring cup] |
|---|----------------------|---|
| ≥ 0 | 0 |  |
| 0 ~ 0 | 0 |  |
| ≤ 0 | 0 |  |

"Please keep the standard amount of use"

| The Laundry Weight [kg] Or water quantity used [L] | The amount Used [mL] |
|---|-------------------------|
| ≥ 0 | 0 |
| 0 ~ 0 | 0 |
| ≤ 0 | 0 |



* Case Cover:
a scale mark is approximately
0 mL.

b) Any indication recommending more than the standard usage should be avoided.

3.1.4.5

The sum of a lead (Pb), a cadmium (Cd), a mercury (Hg) and a hexavalent chromium (Cr⁶⁺), contained in a package material, should be 100 mg/kg or below 100 mg/kg.

3.2 Quality Criteria

3.2.1

The quality of a product shall conform to the following criteria:

3.2.1.1

The flexibility of a product shall be the same as or higher than that of the index fabric softener.

3.2.1.2

The absorbability of a product shall be 90 % or higher than that of the index fabric softener.

3.2.1.3

The friction to voltage of a friction shall be the same as or lower than that of an index fabric softener.

3.2.2

If Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality or performance criteria of the standard in question. However, items related to "3.1 Environmental Criteria" are excluded.

3.2.3

If no Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality and performance criteria according to the following sequence. However, the items related to "3.1 Environmental Criteria" are excluded. Also, if the E-Mark Certification Criteria Setting Committee determines that the applying criteria are not reasonable considering the characteristic of the product, it should satisfy the standards that were modified by the committee (test item, test method, standards, etc.).

3.2.3.1

National standards other than Korean Industrial Standards.

3.2.3.2

Overseas national standards or international standards regarding the product quality in question.

3.2.3.3

Standards of the organizations at home and abroad that are referred by the current E-mark target product and certification standard.

3.2.3.4

A private standard that is recognized as higher than the national standard in the industry of the product in question.

3.2.4

Where Korean Industrial Standards are not available for application to a product, the said product shall satisfy the quality requirements in accordance with the KS applicable to a product with the same or similar functionality, or in accordance with the standards established for a product subject to preferential purchasing according to the 「Enforcement Decree of the Act on Contracts to Which the State is a Party」 .

3.3 Consumer information

Indicate those items that contribute to the reasons for certification of the relevant product, (reduction of harmful effects on the human body, reduction of water pollution and environmental friendly package materials).

4. Test Methods

| Certification Criteria | | Test method and confirmation method | | |
|------------------------|-------|-------------------------------------|---|--|
| Environmental criteria | 3.1.1 | | Verification of submitted documents | |
| | 3.1.2 | 3.1.2.1 | Authorized institution test reports pursuant to attached table 8 of the “Local Toxicity Test” of the 「Toxicity Test Criteria of Medicines, etc.」 announced by the Korea Food and Drug Administration (KFDA) | |
| | | 3.1.2.2 | a) | Authorized test institution test reports pursuant to (1) and (2) confirmation and test methods |
| | | | b) | Authorized test institution test reports pursuant to (1) and (3)~(5) confirmation and test methods |
| | 3.1.3 | | Verification of submitted documents in accordance with Appendix | |
| | 3.1.4 | 3.1.4.1~ 3.1.4.4 | Verification of submitted documents | |
| | | 3.1.4.5 | The authorized institution test reports pursuant to the Notice No. 2006-143 (Notice on the Recommended Criteria, Test Methods, etc for the Heavy Metal | |

| | | | |
|----------------------|-------------|---------------------|--|
| | | | Contents of Packing Materials) |
| Quality criteria | 3.2.1 | 3.2.1.1 | Authorized test institution test reports pursuant to (1) and (6) confirmation and test methods |
| | | 3.2.1.2~ 3.2.1.3 | Authorized test institution test reports pursuant to (1) and (7) confirmation and test methods |
| | 3.2.2 | | Authorized test institution test reports pursuant to the corresponding voluntary Safety Confirmation Safety Criterion or certificates for the same or higher criteria. |
| | 3.2.3~3.2.4 | | Test report conducted by an authorized test institution or certificates for the same or higher criteria |
| Consumer information | | | Verification of submitted documents |

Note) The testing sample shall dilute water according to standard usage, and use it as 0.5ml.

4.1 General Matters

4.1.1

Make it a principle to take one test sample per product under application. However, where more than one test is required, additional products shall be provided for testing.

4.1.2

Environmental labeling certification institutions shall conduct random sampling of test samples among the products commercially available or kept in production locations.

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 Formaldehyde

Note) Items that are not presented below shall follow the KS M 0033 (general rules on the Analysis Methods of High-Speed Liquid Chromatograph).

4.2.1

Test Equipment and Materials

4.2.1.1

High performance liquid chromatography (HPLC)

4.2.1.2

25mL, 100mL V-flask

4.2.1.3

10mL Vial

4.2.1.4

0.1 M phosphate buffer solution

4.2.1.5

2, 4 DNPH solution

4.2.1.6

Response reagent

a) 0.1 % of 2, 4-DNPH (Dinitrophenyl hydrazine) solution: Put 2,4-DNPH 0.25 g and HCl 10 mL into the 25 mL V-flask, melt and make a water solution

b) 0.1 M phosphate buffer solution: Put 1.4196 g Na_2HPO_4 and 1.36 g KH_2PO_4 into the 100 mL V-flask and make a water solution.

c) 1 M NaOH solution: Put 4 g NaOH into the 100 mL V-flask and make a water solution.

4.2.2 Test methods

4.2.2.1

Put the samples (fabric softeners – See Pictures 1 and 2) of 1 mL into the 10 mL Vial.

4.2.2.2

Put 0.1 % of 2,4-DNPH solution of 0.4 mL into the vial, shake the vial for one minute, and then leave it at room temperature for 10 minutes.

4.2.2.3

Put 0.1 M Phosphate buffer solution of 0.4 mL and 1 M NaOH solution of 1.3 mL into the vial and then leave it at room temperature for 30 minutes.

4.2.2.4

After filtering the solution whose response has been finished, perform an instrumental analysis under the following conditions.

a) Column: C18, 5 μm , 250 mm \times 4.6 mm

b) Detector: UV / DAD (345 nm)

c) Injection Volume: 20 μL

d) Column Temperature: 30 $^{\circ}\text{C}$

e) Eluent: DW: Acetonitrile (50 : 50)

4.3 Isothiazolins, Methyl paraben, Ethyl paraben, Propyl paraben, Phenoxy ethanol, Triclosan, Methyl Isothiazolin, and 5-chloro methyl isothiazolin content

Note) Items that are not presented below shall follow the KS M 0031 (general rules on the Analysis of Gas Chromatography), the KS M 0027 (general rules on How to Perform a Gas Chromatograph Substance Analysis), and the KS M 0033 (general rules on How to Perform a High-Speed Liquid Chromatograph Analysis).

4.3.1 Test Equipment:

4.3.1.1

High performance liquid chromatography (HPLC)

4.3.1.2

GC-MSD or LC-MSD

4.3.1.3

20mL V-flask

4.3.2 Test Methods

4.3.2.1

Put a sample of 4 g into the 20 mL flask, add methanol to it, agitate to ensure that the sample is completely dissolved and then fill the flask with methanol.

4.3.2.2

Filter by using the membrane filter and perform an instrumental analysis of the filtrate aliquot. However, record concentrations below detection limits (Methyl Isothiazolin 5 mg/kg, 5-chloro methyl isothiazolin 15 mg/kg, paraben (Methyl paraben, Ethyl paraben, Propyl paraben) 5 mg/kg, Phenoxy ethanol 15 mg/kg, and Triclosan 5 mg/kg) as “undetectable”. Confirm the detected peak as GC-MSD or LC-MSD.

4.3.2.3

Use the following analysis conditions for reference;

a) Column: C18, 5 μm , 250 mm \times 4.6 mm

b) Detector: UV / DAD (255, 270, 284 nm)

c) Injection Volume: 20 μL

d) Column Temperature: 30 $^{\circ}\text{C}$

e) Eluent

| min | DW | MeOH | Flow rate |
|-----|----|------|------------|
| 0~5 | 70 | 30 | 0.7 mL/min |
| 30 | 5 | 95 | |
| 35 | 5 | 95 | |
| 40 | 70 | 30 | |

4.3.3

Information that should be contained in the test report

4.3.3.1 Analysis conditions (Column types etc)

4.3.3.2

All non-ideal features that are revealed in the set quantity or do not meet the criteria of reproducibility and repetition.

4.4 Benzal konium chloride (BKC) content

Note) Items that are not presented below shall follow the KS M 0031 (general rules on the Analysis of Gas Chromatography), the KS M 0027 (general rules on How to Perform a Gas Chromatograph Substance Analysis), and the KS M 0033 (general rules on How to Perform a High-Speed Liquid Chromatograph Analysis).

4.4.1 Test Equipment:

4.4.1.1

High performance liquid chromatography (HPLC)

4.4.1.2

GC-MSD or LC-MSD

4.4.1.3

20 mL flask

4.4.2 Test Methods

4.4.2.1

Put a sample of 4 g into the 20 mL flask, add methanol to it, agitate to ensure the sample is completely dissolved and then fill the flask with methanol.

4.4.2.2

Filter them by using a membrane filter and then perform an instrumental analysis of the filtrate aliquot. However, record the concentration of detection limits below 7.5 mg/kg as “undetectable” and confirm the detected peak as GC-MSD or LC-MSD.

4.4.2.3

It is possible to use the following analysis conditions for reference.

- a) Column: C18, 5 μ m, 250 mm \times 4.6 mm
- b) Detector: UV / DAD (220, 260, 280 nm)
- c) Injection Volume: 20 μ L
- d) Column Temperature: 30 $^{\circ}$ C
- e) Eluent

| min | DW | MeOH | Flow rate |
|-----|----|------|-----------|
| 0 | 35 | 65 | 0.7mL/min |
| 20 | 5 | 95 | |

| | | | |
|----|----|----|--|
| 25 | 5 | 95 | |
| 30 | 35 | 65 | |

4.4.3 Information that should be contained in the test report

4.4.3.1

Analysis conditions (Column types etc)

4.4.3.2

All non-ideal features that are revealed in the set quantity or do not meet the criteria of reproducibility and repetition.

4.5 Benzoic acid and Benzyl alcohol content

Note) Items that are not presented below shall follow the KS M 0027 (general rules on How to Perform a Gas Chromatograph Substance Analysis), and the KS M 0033 (general rules on How to Perform a High-Speed Liquid Chromatograph Analysis).

4.5.1 Test Equipment:

4.5.1.1

GC/MSD or High performance liquid chromatography (HPLC)

4.5.1.2

20 mL flask

4.5.2 Test Methods

4.5.2.1

Put a sample of 4 g into the 20 mL flask, add methanol to it, agitate to ensure that the sample is completely dissolved and then fill the flask with methanol.

4.5.2.2

Filter them by using a membrane filter and then perform an instrumental analysis of the filtrate aliquot. However, concentration under detection limits record (Benzoic acid 20 mg/kg, benzyl alcohol 20 mg/kg) as "undetectable".

4.5.2.3

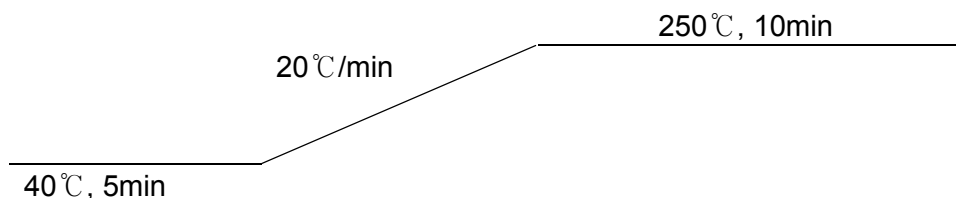
It is possible to use the following analysis conditions for reference.

- a) Column: DB-WAX, (30m × 0.25mm×0.25 μm)
- b) Flow: 0.6 mL/min
- c) Detector: MSD
- d) Injection Volume: 1 μL

e) Injector Temp.: 230 °C

f) Split ratio: 30 : 1

g) Oven condition:



4.5.3 Information that must be contained in the test report

4.5.3.1

Analysis conditions (Column types etc)

4.5.3.2

All non-ideal features that are revealed in the set quantity or do not meet the criteria of reproducibility and repetition.

4.6 Test Methods of Softness

4.6.1

Principle: This washing process is a method of evaluating the softening effects of fabric softeners used in the final rinsing under real use conditions by means of the trained pane's use sensitivity (sense).

4.6.2 Test Equipment and materials

4.6.2.1

Washing machines

a) Agitator type washing machine: The B type washing machine pursuant to the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test) 5.12 – An agitator type washing machine into which one can put laundry.

- A machine with a basket-form drum of 50±5 cm diameter and 30±5 cm depth
- Examples of selectable washing conditions

| Washing machine cycle | Washing temperature (°C) |
|------------------------------------|--------------------------|
| 1) Normal or cotton / thick fabric | II 27±3 |
| 2) Weak | III 41±3 |
| 3) Durable press | IV 49±3 |
| | V 60±3 |
| | VI 70±3 |

- Examples of equipment conditions without load

| Cycle | Normal | Weak | Durable press |
|-----------------|------------------------------|------------------------------|------------------------------|
| Agitation speed | (2.983±0.033)s ⁻¹ | (1.983±0.033)s ⁻¹ | (2.983±0.033)s ⁻¹ |

| | | | |
|----------------------|---|---|---|
| | $[(179\pm 2)\text{rpm}]$ | $[(119\pm 2)\text{rpm}]$ | $[(179\pm 2)\text{rpm}]$ |
| Washing time | $(12\pm 1)\text{min}$ | $(8\pm 1)\text{min}$ | $(10\pm 1)\text{min}$ |
| Rotation speed | $(10.75\pm 0.25)\text{s}^{-1}$ $[(654\pm 15)\text{rpm}]$ | $(7.167\pm 0.25)\text{s}^{-1}$ $[(430\pm 15)\text{rpm}]$ | $(7.167\pm 0.25)\text{s}^{-1}$ $[(430\pm 15)\text{rpm}]$ |
| Final rotation speed | $(6\pm 1)\text{min}$ | $(6\pm 1)\text{min}$ | $(4\pm 1)\text{min}$ |

b) Cylinder Type Washing Machine: Standard washing machine stipulated in the KS C IEC 60456 (Measurement Methods of the Performance of Home Electric Washing machines)

| Classification | Item | Criteria | |
|--|---|---|----------------------|
| Inner drum (whose center is the same as that of the outer drum) | Diameter | 515 mm | |
| | Volume | 651(net) | |
| | Attached rotation wing | Wings | 3 |
| | | Height | 53 mm |
| | | Tip radius | 17 mm |
| | | Basic width | 65 mm |
| | Hole (Cone hole) | Diameter | 5 mm |
| | | Cone hole depth | 2.5 mm |
| | | Total hole area | 520 cm^2 |
| | | Material | 18/8 stainless steel |
| Outer drum | Diameter | 575 mm | |
| | Oil tank | (325 ± 25) mL | |
| | Material | 18/8 stainless steel | |
| Drum speed | Cleaning (Including 5 kg test load and 52L water) | 52 ± 1 rev/min | |
| | Rotation | 500 ± 20 rev/min | |
| Reverse rotation cycle | Normal | Operation | 12 ± 0.1 s |
| | | Stop | 3 ± 0.1 s |
| | Softly | Operation | 12 ± 0.1 s |
| | | Stop | 3 ± 0.1 s |
| Water height | Various repetition | $2\text{mm}\pm 5\text{mm}$ At every phase | |
| Automatic temperature control device | Successive change | Independent control during every successive washing | |
| | Accuracy of the switch-off temperature | ± 1 °C | |
| | Switch-on temperature | ≤ 4 °C under the switch-off temperature | |
| | Drainage | Drainage valve | |
| | Accuracy of water height | Fastening in the height of ± 5 mm ± 1 L | |
| | Input power of a heater water inlet | 5.4 kW ± 2 % Coldly | |

Note) The appropriate characteristics of machines are Wascator FOM and FOM 71 MP/Lab. The Latter may attain from Electrolux-Wascator AB, Ljungby, Sweden. Other machines with the equal characteristics should be performed correlation test by the described machines above.

4.6.2.2

Index fabric softeners

a) Composition

| CAS No. | Constituents | Remark | Percentage [%] |
|------------|----------------------|--------|----------------|
| 91995-81-5 | TEA Ester Quaternary | 85% | 5.9 |

| | | | |
|------------|---|---|---------|
| | (INCI Name: dihydrogenated palmolethyl hydroxyethylmonium methosulfate) | Saturation / Instauration = 5/5, C18 20%, C16 40%, C18-1 40% | |
| 10043-52-4 | calcium chloride(CaCl ₂) | Softening aid agent | 0.02 |
| 64148-62-9 | polydimethylsiloxane | Defoaming agent | 0.03 |
| - | deionized water | | balance |

Note) Keep it in a waterproof bag in a dry and cool place, and disuse it after using it for the test involved after manufacturing.

b) Manufacture Methods

- ① Heat D.I Water at 65°C and agitate it.
- ② Input CaCl₂ in D.I Water and dissolve it.
- ③ Input slowly the dissolving EQ under the agitation conditions (rpm 900 -1,000) and emulsify for 10minutes.
- ④ Cool and then use it as a test sample.

4.6.2.3 Testing fabric

a) Types and quantity: 15 terry towels

b) Size: (40±2 × 80±2)cm, 100% cotton, carded yarn, 170±3g

4.6.2.4 Fabric for weight compensation

a) Fabric softeners for an agitator type washing machine: Weight compensating fabric for a B type washing machine pursuant to the KS K ISO 6330 (Home washing and drying process for fabric test) 5.3

b) Fabric softeners for a cylinder type washing machine: Weight compensating fabric for an A type washing machine pursuant to the KS K ISO 6330 (Home washing and drying process for fabric test) 5.3

4.6.2.5 Standard detergents

a) Fabric softeners for an agitator type washing machine: Standard detergent <AATCC 1993 standard detergent WOB (without fluorescent whitening agent) pursuant to the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test) 4.1.1

| Constituents | [%] |
|---|-------|
| Linear alkylbenzenesulfonate, and sodium salt (1) | 18.00 |
| Solid sodium aluminosilicate | 25.00 |
| Sodium carbonate | 18.00 |
| Solid sodium silicate (2) | 0.50 |
| Sodium sulfide | 22.13 |

| | |
|---|--------|
| Polyethylene glycol (3) | 2.76 |
| Sodium polyacrylate | 3.50 |
| Silicon and antifoaming agent | 0.04 |
| Water | 10.00 |
| Miscellaneous (non-reactants to raw materials of surface active agents) | 0.07 |
| sum | 100.00 |

Note1) C11.8LAS known as Calsoft L-50-12 of Stephan

Note2) SiO₂/Na₂O = 1.6

Note 3) Fill 2 % and 0.76 % with basic granules and antifoaming mixtures, respectively.

b) Fabric softeners for a cylinder style washing machine: Non-phosphate IEC standard detergent A stipulated in the KS C IEC 60456 (Measurement Methods of the Performance of Home Electric Washing machines)

| Constituents | [%] |
|---|-------|
| Linear alkylbenzenesulfonate sodium(refers to the average length of alkane main chain C ₁₁₋₅) | 7.5 |
| Expoxidation fat alcohol C ₁₂₋₁₈ (7EO) | 4.0 |
| Sodium soap (main chain length C ₁₂₋₁₇ : 46% ; C ₁₈₋₂₀ : 54%) | 2.8 |
| Antifoaming agents accounting for 8 % of an inorganic carrier | 5.0 |
| Aluminum sodium silicate (zeolite 4A) | 25.0 |
| Sodium carbonate | 9.1 |
| Sodium salt of copolymer of maleic acid and acrylic acid | 4.0 |
| Sodium silicate (SiO ₂ : Na ₂ O = 3,3 : 1) | 2.6 |
| Carboxymethyl cellulose | 1.0 |
| Diethylene-triamine penta (Methylene phosphoric acid) | 0.6 |
| Fluorescent dye for cotton fabric (stilbene type) | 0.2 |
| Sodium sulfide (Additive) | 5.8 |
| Water | 9.4 |
| Sodium perforate 4 hydrate | 20.0 |
| Tetra acetyl ethylene diamine | 3.0 |
| sum | 100.0 |

4.6.3 Preprocessing for test piece

4.6.3.1

Fabric softeners for an agitator type washing machine:

a) Select the following washing process in Table 2 of the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test. At the time, set rinsing at twice.

| Agitation when rinsing, washing materials | Total load (Drying weight) [kg] | Washing | | | Water level for rinsing (1) | Dehydration |
|---|---------------------------------|------------------|-------------|--------------------------|-----------------------------|-------------|
| | | Temperature [°C] | Water level | Washing cycle time [min] | | |
| | | | | | | |

| | | | | | | |
|--------------|-------|------|------------------|----|------------------|-----------------|
| Normal setup | 2±0.1 | 25±3 | Full water level | 12 | Full water level | Normal rotation |
|--------------|-------|------|------------------|----|------------------|-----------------|

Note1) Supply cool water during the rotation of rinsing

Note2) However, temperature was changed to the level commonly used by consumers.

b) Fill the washing machine with the selected water before putting the test pieces for washing (towel or polyester cloth stipulated in the KS K 0905, and cotton cloth) and the fabrics for weight supplementation into the machine and input the (66±1)g 1993 AATCC standard detergent.

c) After dehydration is finished in this process of laundry, remove test pieces and flat dry them at room temperature without stretching or creasing.

4.6.3.2

Fabric softeners for a cylinder style washing machine:

a) Select the following washing process in Table 1 of the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test). At this time, set rinsing at three times.

| Agitation when heating, washing, and rinsing | Total load (Drying weight) [kg] | Washing | | | | Cooling ⁵⁾ | |
|--|------------------------------------|--------------------------------|------------------------------------|--------------------------------------|--------------------------------|------------------------------------|--------------------------------------|
| | | Temperature ¹⁾ [°C] | Water level ^{2,3)} c[m] | Washing time ⁴⁾ [min] | | | |
| Normal | 2±0.1 | 40±3 | 10 | 15 | no | | |
| Rinsing 1 | | Rinsing 2 | | | Rinsing 3 | | |
| Water level ²⁾ [cm] | Rinsing time ^{4,6)} [min] | Water level ²⁾ [cm] | Rinsing time ^{4,6)} [min] | Dehydration time ⁴⁾ [min] | Water level ³⁾ [cm] | Rinsing time ^{4,6)} [min] | Dehydration time ⁴⁾ [min] |
| 13 | 3 | 13 | 2 | - | 13 | 2 | 2 |

Note1) Set the supply water temperature for laundry and rinsing at 20±3 °C.

Note2) Measure water level from the bottom of a washing tank after operating the washing machine for one minute and stopping it for 30 seconds.

Note3) Measure the water quantity for water level using the flow meter separated from the machine.

Note4) Each time shall have a permissible error of ±20 seconds.

Note5) Cooling: Process of agitating for two minutes after cold water is filled to the height of 13 cm.

Note6) The rinsing time shall be measured when the designated water level is reached.

b) Put the test pieces for laundry (towel or polyester cloth stipulated in the KS K 0905, and cotton cloth) into the washing machine and sufficient fabrics for weight supplementation to create the total air drying weight presented in the set procedure of laundry.

c) Put 1 g/L detergent less soap foam should exceed (3±0.5) cm in the final phase of laundry.

d) After dehydration is finished, remove the test pieces and flat dry them at room temperature without stretching or creasing.

4.6.4 Test Methods

4.6.4.1

Put 15 towels, washed and dried in accordance with the laundry pretreatment method in 4.6.3, per sample in the washing machine and sufficient fabrics for weight supplementation to create the total air drying weight presented in the designated laundry procedure.

4.6.4.2

Select one rinsing and one dehydration cycle in the washing machine.

4.6.4.3

Set the water levels and times for rinsing and dehydration as per the final rinsing conditions in the pretreatment process, and add a fabric softener with the quantity calculated as follows based on the use quantity labeled on the product, and put 0.67 mL/L surface fabric softener for an agitator washing machine and 15 mL/kg surface fabric softener for a cylinder style washing machine into the automatic input device so that they can be used for rinsing.

a) Fabric softeners for an agitator type washing machine:

| |
|---|
| Standard use quantity for quality test [mL] = Standard use quantity [mL/L] ^{Note)} × Use quantity [L] = () |
|---|

Note) Apply the standard use quantity used per the laundry quantity [L] labeled on packing. However, apply the standard use quantity used for 60 – 70L to the seat style.

b) Fabric softeners for a cylinder style washing machine:

| |
|--|
| Standard use quantity for quality test [mL] = Standard use quantity ^{Note)} / 10 kg × 2 kg = () |
|--|

Note) Apply the standard use quantity used for the maximum laundry quantity [kg] labeled on packing. However, apply the standard use quantity for the washing machines of 10 kg or more to the products whose standard use quantities are labeled per the washing machine capacity.

c) If rinsing and dehydration are finished, dry the laundry for 24 hours in the ISO 139 (Standard State for Fabric Conditioning and Test).

4.6.5 Evaluation Methods

4.6.5.1

Let each of three evaluators evaluate 15 terry towels.

4.6.5.2 Judgment

| Criteria | Judgment |
|--|----------|
| Excellent compared to surface detergents | 2 |
| Good compared to surface detergents | 1 |
| Same compared to surface detergents | 0 |
| A little inferior compared to surface detergents | -1 |
| Inferior compared to surface detergents | -2 |

4.6.5.3 Result analysis

Evaluate equally according to M 2709:2006 8.1.6 c) after performing a significance test by T-test.

4.6.6

Include the following in the test report:

4.6.6.1

Test specific data (including the results of surface fabric softeners) and standard deviation

4.6.6.2

Details of towels (Features, such as weight, size, yarn type, which may influence the test results)

4.6.6.3

Panel details (Empirical chart)

4.7 Test Methods of absorption and friction to voltage

4.7.1 Principles:

4.7.1.1

Absorption: Take two 20cm×2cm test pieces, one processed with a surface fabric softener and the other with a sample fabric softener as test pieces, vertically soak the tips for ten minutes, spread test solution on test pieces, compare spread distances against each other and check whether the sample fabric softener is the same as or higher than the surface softening agent in terms of performance.

4.7.1.2

Friction to voltage: Take two 20cm×2cm pieces, one processed with a surface fabric softener and the other with a sample fabric softener as test pieces, test in accordance with the KS K 0555 (Test Methods of the Electrification of Fabrics and Knit Fabrics), compare test results with each other and check whether the sample fabric softener is the same as or lower than the surface softening agent in terms of performance.

4.7.2 Test Equipment and Materials

4.7.2.1

Washing machine: Use a washing machine the same as that used for the softening test in 4.6.

4.7.2.2

Index fabric softener Use an agent the same as that used for the softening test in 4.6.

4.7.2.3

Test cloths

a) Friction to voltage: Attach cotton and wool cloths stipulated in the KS K 0905 (Attached White Cloths for the Color Fastness Test)

b) Absorption: Cotton cloth stipulated in the KS K 0905 (Attached White Cloth for the Color Fastness Test)

4.7.2.4

Fabric for weight compensation: Use an agent the same as that used for the softening test in 4.6.

4.7.3 Preprocessing for test piece

4.7.3.1

Fabric softeners for an agitator type washer:

a) Adjust the full water level in the washing machine using the flow meter separated from the washing machine and input the standard quantity as labeled on the product.

b) Select the following rinsing and dehydration procedures in Table 2 of the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test). At the time, set rinsing at twice.

| Agitation when washing and rinsing | Total load (Drying weight) [kg] | Temperature [°C] | Rinsing water level | Dehydration |
|------------------------------------|---------------------------------|------------------|---------------------|-----------------|
| Normal setup | 2±0.1 | 20±3 | Full water level | Normal rotation |

Note1) Supply cool water during the rotation of rinsing

Note2) However, temperature was changed to the level commonly used by consumers.

c) Put the fabric softeners test cloth into the washing machine and sufficient fabric for weight supplementation to create the total air drying weight presented in the set washing procedure.

d) After dehydration is finished, remove the test pieces and flat dry them at room temperature without stretching or creasing.

4.7.3.2

Fabric softeners for a cylinder style washing machine:

a) Adjust the full water level in the washing machine using the flow meter separated from the washing machine and input the standard quantity as labeled on the product.

b) Select the washing process following 6A in Table 1 of the KS K ISO 6330 (Home Laundry and Drying Process for Fabric Test)

| Agitation when heating, washing and rinsing | Total load (Drying weight) [kg] | Temperature ¹⁾ [°C] | Rinsing 3 | | |
|---|---------------------------------------|-----------------------------------|--------------------------------------|--|---|
| | | | Water level ²⁾ [cm] | Rinsing time ^{4,6)} [min] | Dehydrati on time ⁴⁾ [min] |
| Normal | 2±0.1 | 20±3 | 13 | 2 | 2 |

Note1) Set the supply water temperature for laundry and rinsing at 20±3 °C.

Note2) Measure the water quantity for water level using the flow meter separated from the machine.

Note3) Each time shall have a permissible error of ± 20seconds.

Note4) The rinsing time shall be measured when the designated water level is reached.

c) Put the fabric softeners test cloth into the washing machine and sufficient fabrics for weight supplementation to create the total air drying weight presented in the set washing procedure.

d) After dehydration is finished, remove the test pieces and flat dry them at room temperature without stretching or creasing.

4.7.4 Test Methods of the absorption

4.7.4.1

Measure the test cloths preprocessed In 4.7.3 in accordance with the B method of absorption speed among the evaluation methods of absorption of KS K 0815(test methods of fabrics).

4.7.4.2

Judge by comparing the developed distances [mm] of test cloths processed with softening agents as test samples to the developed distances processed with surface fabric softeners, measuring their results three times in each for warp and pick directions and calculate mean values down to three decimal places.

4.7.5

Test Methods of friction to voltage

4.7.5.1

Measure the test cloths preprocessed pursuant to 4.7.3 in accordance with the KS K 0555 (Test Methods of Fabrics and Knit Fabrics) B method. However, use friction cloth as cotton cloth.

4.7.5.2

Judge by comparing the developed distances [mm] of test cloths processed with softening agents as test samples to the developed distances processed with surface fabric softeners, measuring their results three times in each for warp and pick directions and calculate mean values down to one decimal place.

4.7.6 Include the following in the test report.

4.7.6.1

Test specific data (including all the three results of surface fabric softeners) and standard deviation

4.7.6.2 Details of test pieces

5. Reasons for Certification:

“Less harmful effects on the human body, Less water pollution, Environmental friendly package materials”

[Annex] Verification Methods Regarding Water Quality Contamination

A. Purpose

This annex is aimed to describe the verification method regarding the water quality contamination effects.

B. Definitions

(1) "AC (Active Contents)" refers to the total weight of chemical substances, excluding water, which compose a product [mg].

(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 aerotropic 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 = $(aX_1+b \times 3.5) + (cX_2+d \times 1.5) + (eX_3+f \times 3) + (gX_3+h \times 7)$

<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 Chemicals belonging to the following class and label according to the UN Globally Harmonized System of Classification and Labeling of Chemicals

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

H340 : may cause genetic defects

H341 : suspected of causing genetic defects

H350 : may cause cancer

H350i : may cause cancer by inhalation

H351 : suspected of causing cancer

H360F : may impair fertility

H360FD : may damage fertility, may damage the unborn child

H361f : suspected of damaging fertility

H360Fd : may damage fertility, suspected of damaging the unborn child

H362 : may cause harm to breast-fed children

- H400 : very toxic to aquatic life
- 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

(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 name | CAS No. | Toxicity | | | DF | Bio-degradability | |
| | | Measured value [mg/L] | S | F | | T | Anaerobic 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.

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

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 multibranch | 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 multibranch | 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 | ε-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 | Tetraacetylenediamine (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) Povidone-iodine (PVIPI) | 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 | Proteinhydrolyzates, 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 ecotoxicological 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. (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.