EL308. Shampoo and Rinse

[EL308-2009/3/2014-53]

1. Scope

This standard is applicable to shampoo and rinse for conditioning effect, which are used for cleanliness and health maintenance of hair and scalp.

2. Definition

2.1

"Preservatives" indicate medications which are added for preservation of an organic material by preventing it from decomposition due to an action of microorganism.

2.2

“Bioconcentration” refers to relative increase of concentration of chemical substance in the organism compared to that in the environment. Bioconcentration factor refers to the ratio of the concentration.

2.3

“Bioconcentration factor: BCF” is the concentration of ratio of aquatic ratio and organism cell tissue when the chemical concentration of an aquatic organism and water are at an equal level.

2.4

“ Octanol/water partition coefficient ” is the partition coefficient of compound concentration in water and octanol layer when the two solvents, water and octanol, are dissolved in chemical compound.

2.5

“Active Contents (AC)” is the total weight (mg) of all chemical substance, excluding water, in a product. However, when calculating active contents, scrub product is excluded.

2.6

“Aerobic non-biodegradable substance” is the total amount (g/wash) of all the comprising substance in 1g of AC (total amount of organic substance of a product; excludes water) that is not biodegraded in aerobic status.

2.7

“Anaerobic non-biodegradable substance” is the total amount (g/wash) of all the comprising substance in 1g of AC that is not biodegraded in anaerobic status.

2.8

“The critical dilution volume toxicity (CDVtox)” is the amount of (L/wash) water required to dissolve the toxicity of all the substance of 1g of AC composition to the acceptable point to be released into the environment.

2.9

“Aquatic ecotoxicity” is the toxicity that appears among aquatic plant or animals such as fish, algae, or water flea that inhabit fresh or salt water when exposed to chemical substance for short or long term.

3. Certification Criteria

3.1. Environmental criteria

3.1.1

During the chemical substance usage phase of the manufacturing process, the following substance shall not be used as a product material to prevent water pollution. However the accompanying ingredients and impurities such as the already-contained preservatives in the original ingredient itself, not as an additional ingredient according to the prescription instructions, are excluded from the application of the prohibited substance standards.

3.1.1.1. Fragrance

a) It should be appropriate to the Code of practice for the fragrance industry by the International Fragrance Association (IFRA).

b) Musk xylene (CAS-no. 81-15-2), and over 0.02% of Musk keton (CAS-no. 81-14-1) shall not be used.

3.1.1.2 Preservatives

a) Preservatives contained in the product should be applicable to the following standards.

<table>
<tr><th>CAS No.</th><th colspan="2">Substance</th><th>Criteria [mg/kg]</th></tr>
<tr><td>50-00-0</td><td colspan="2">Formaldehyde</td><td>less than 25</td></tr>
<tr><td>99-76-3</td><td rowspan="4">p-hydroxy benzoic acid, its salts and esters</td><td>Methyl paraben: methyl-4-hydroxybenzoate</td><td rowspan="3">Less than 1000 as acid in case of a single ingredient
Less than 3000 as acid in case of combined use</td></tr>
<tr><td>120-47-8</td><td>Ethyl paraben: ethyl-4-hydroxybenzoate</td></tr>
<tr><td>94-13-3</td><td>Propyl paraben: propyl-4-hydroxybenzoate)</td></tr>
<tr><td>94-26-8</td><td>Butyl paraben: butyl-4-hydroxybenzoate)</td></tr>
</table>

b) The following preservatives should not be used in the product.

- Use of the material over the limiting concentration, which must display the H400, H411 on the product according to EU Directives 1999/45/EC and UN GHS (Globally Harmonized System).

  Note) EU Regulation (EC) No. 1272/2008 Annex VI Part 3, (Harmonized Classification and Labeling Tables) should be followed.

  In regards to bioconcentration, preservative and colorant with BCF of over 100,
- and octanol/water partition coefficient of over 3.
-

CAS No.	Substance	CAS No.	Substance
127-65-1	Chloramine T	135-58-0	Thianthol
886-74-8	Chlorphenesin	106-48-9	p-Chlorophenol

c) The following preservative should be used less than the Critical Limit of the product.

CAS No.	Substance	Criteria [%]
8001-54-5 121-54-0	Benzalkonium chloride	≤0.05
3697-42-5	Chlorhexidine hydrochloride	≤0.001
18472-51-0	Chlorhexidine gluconate	≤0.05

89-83-8	Thymol	≤2
369-77-7	Halocarban	≤0.3
499-44-5	Hinokitiol	≤0.05
13463-41-7	Zinc pyrithione	≤0.01
55406-53-6	Iodopropynyl butylcarbamate(*6)	≤0.02
4080-31-3	Quaternium-15(quaternary ammonium salt)	≤0.1
126-11-4	Tris(hydroxymethyl) nitromethane	≤0.1
71-55-6	Hydroxymethylglycinate	≤0.1
52-51-7	2-Bromo-2-nitropropane-1,3-diol (Bronopol)	≤0.1

3.1.1.3. Endocrine Disruptors

a) The following Endocrine Disruptors (ED) should not be used in the product.

CAS No.	Substance
100-42-5	Styrene
85-68-7	Butylbenzylphtalate (BBP)
117-81-7	Di-(2-ethylhexyl)phtalate (DEHP)
84-74-2	Di-n-butylphtalate (DBP)
80-05-7	2,2-bis(4-hydroxyphenyl)-propane = Bisphenol A
59-50-7	4-chloro-3-methylphenol
26761-40-0	Diisodecyl phthalate
28553-12-0	Diisononyl phtalate = 1,2-Benzene-dicarboxylic acid, diisononyl ester(DINP)
90-43-7	o-phenylphenol
108-46-3	Resorcinol

3.1.1.4

Carcinogenicity, Toxicity for Reproduction, Mutagenic substance, Epispastic substance

a) 1,4-dioxane should be less than 20 mg/kg.

b) Chemicals belonging to the following class and label according to the UN Globally Harmonized System of Classification and Labeling of Chemicals, as the product components.

Type	Substance name
Carcinogenic substance	H350 : may cause cancer H350i : may cause cancer by inhalation H351 : suspected of causing cancer
Mutagenic substance	H340 : may cause genetic defects H341 : suspected of causing genetic defects
Reproductive toxicants	H360F : may impair fertility H360FD : may damage fertility, may damage the unborn child H360Fd : may damage fertility, suspected of damaging the unborn child H361f : suspected of damaging fertility
Irritant substance	H317 : may cause allergic skin reaction

c) APEOs(Alkylphenol ethoxylates) and APD(alkylphenol derivates) should not be used.

d) NTA(nitrilotriacetic acid) and BA (boric acid, borates, perborates) should not be used.

3.1.1.5
Other substances

a) Phosphate (e.g.: phosphate, phosphonate) and coloring should not be used.

3.1.2
When said product is being used, in regard to emission of water pollution substances, the total sum and the value for each criteria item calculated according to an appendix should satisfy the following requirements. However the accompanying ingredients such as the already-contained preservatives in the original ingredient itself, not as an additional ingredient according to the prescription instructions, and impurities are excluded from the application of the standards.

Items of Criteria	Shampoo		Rinse		formula
	Critical Limit of Xn	Calculation system formula	Critical Limit of Xn	Calculation system formula	
1. Aerobic non-biodegradable substance X_1 [mg/g AC]	≤150	$-0.067X_1+12$	≤700	$-0.0134X_1+13.3$	1.5
2. Anaerobic non-biodegradable substance X_2 [mg/g AC]	≤200	$-0.014X_2+7$	≤500	$-0.02X_2+15.2$	3
3. . Critical Dilution Limit (CDVtox) X_3 [L/g AC]	≤30,000	$-5x10^{-4}X_3+18$	≤200,000	$-9x10^{-6}X_3+7.5$	7
Total	≥60				

3.1.3

In the stage of manufacturing processes and the usage, it should be appropriate to the following standard in terms of discharge and recycling of hazardous substancesin the consumption and disposal stage of resources.

3.1.3.1

The total amount of lead (Pb), cadmium (Cd), Mercury (Hg) and Chromium VI (Cr^{+6}) that is contained in the package excluding the cap should be less than 100 mg/kg.

3.1.3.2

The container, label, trademark, and sticker should be used by a combination of synthetic resins of more than 3, which is the "level of not interfering with the recycling" in the following table.

		additive of plastic											
		PE	PVC	PS	PC	PP	PA	POM	SAN	ABS	PBTP	PETP	PMMA
plastic matrix	PE	1	4	4	4	1	4	4	4	4	4	4	4
	PVC	4	1	4	4	4	4	4	1	2	4	4	1
	PS	4	4	1	4	4	4	4	4	4	4	4	4
	PC	4	3	4	1	4	4	4	1	1	1	1	1
	PP	3	4	4	4	1	4	4	4	4	4	4	4
	PA	4	4	3	4	4	1	4	4	4	3	3	4
	POM	4	4	4	4	4	4	1	4	4	3	4	4
	SAN	4	1	4	1	4	4	4	1	1	4	4	1
	ABS	4	2	4	1	4	4	3	4	1	3	3	1
	PBTP	4	4	4	1	4	3	4	4	3	1	4	4
	PETP	4	4	3	1	4	3	4	4	3	4	1	4
	PMMA	4	1	3	1	4	4	3	1	1	4	4	1
Note	1 : appropriate 2 : appropriate with conditions 3 : appropriate in small amount 4 : inappropriate Source : Association of German Engineers (VDI: Verein Deutscher Ingenieure) VDI 2243 Part 1												

3.2 Quality Criteria

3.2.1

In terms of Product Quality, it should be appropriate to the 「Regulations on Cosmetics」 of the identical product.

3.2.2

The product quality should be appropriate to the following standards.

Items		Criteria
Contents of Surfactants or Soap[%]		more than 8
Safety of liquid products	45°C, 72hrs	No separation sedimentation or precipitation
	-10°C, 24hrs	Similar to products preserved at room temperature in appearance and use when thawed

3.2.3

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

3.2.4

If no Korean Industrial Standards are available as a national standard of the product in question, it should satisfy the quality and performance standard 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.).

3.2.4.1

National standards other than Korean Industrial Standards.

3.2.4.2

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

3.2.4.3

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

3.2.4.4

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

3.3 Consumer Information:

Mark the details contributing to the certification reason(Hyposensitization of skin stimulation and hyposensitization of water pollution) of the corresponding product, in the usage stage of a product.

4. Test Methods

<table>
<tr><td colspan="4">Certification Criteria</td><td>Test and verification Methods</td></tr>
<tr><td rowspan="12">Environmental Criteria</td><td rowspan="9">3.1.1</td><td colspan="2">3.1.1.1</td><td>Verification of required documents</td></tr>
<tr><td rowspan="3">3.1.1.2</td><td rowspan="2">3.1.1.2.1</td><td rowspan="2">Authorized test institution test reports pursuant to the following testing method or Verification of submitted documents
▪ Formaldehyde : 'Verification and Test Methods of 4.1 and 4.2' Note1)
▪ p-Hydroxy benzoic acid, its salts and esters:
「Guidelines for Analysis on Ingredients of Composition Limit in Cosmetics」 by KFDA(Korea Food & Drug Administration) director</td></tr>
<tr><td></td></tr>
<tr><td>3.1.1.2.2</td><td>Verification of submitted documents Note2)</td></tr>
<tr><td>3.1.1.2.3</td><td>Verification of submitted documents</td></tr>
<tr><td colspan="2">3.1.1.3</td><td>Verification of submitted documents</td></tr>
<tr><td rowspan="2">3.1.1.4</td><td>3.1.1.4.1</td><td>Test Report by an authorized organization according to 'Verification and Test Methods of 4.1 and 4.3 'Note1)</td></tr>
<tr><td>3.1.1.4.2
~
3.1.1.4.4</td><td>Verification of submitted documents</td></tr>
<tr><td colspan="2">3.1.1.4.5</td><td>Verification of submitted documents</td></tr>
<tr><td colspan="2">3.1.2</td><td>Verification of required documents and of the site</td></tr>
<tr><td rowspan="2">3.1.3</td><td>3.1.3.1</td><td>Authorized test institution test reports pursuant to the volume2006-143 [announcement of recommendation standard of heavy metal content of package material and its test method] notice by Ministry of Environment.</td></tr>
<tr><td>3.1.3.2</td><td>Verification of submitted documents</td></tr>
<tr><td rowspan="3">Quality Criteria</td><td colspan="2">3.2.1</td><td>Verification of submitted documents</td></tr>
<tr><td colspan="2">3.2.2</td><td>Verification of Test Report by an authorized organization according to the following test methods
▪ Content of surfactants and soap: KS M 2709(Test Method on synthetic detergents)
▪ Safety: 'Verification and Test Methods of 4.1 and 4.4'</td></tr>
<tr><td colspan="2">3.2.3~3.2.4</td><td>Test report conducted by an authorized test institution or</td></tr>
</table>

		certificates for the same or higher criteria
Information for Consumer		Verification of submitted documents

Note1) If formaldehyde or 1,4-dioxane analysis is included on an official document such as 「Guidelines for Analysis on Ingredients of Composition Limit in Cosmetics」 by KFDA, it is applicable accordingly.

Note2) The following verification methods can be applicable for verification of bioaccumulation.

- Bioconcentration Factor (BCF)
  1. Document recorded with the applicable test report (MSDS, Risk assessment report, etc.)
  2. OECD 305(Bioaccumulation - Sequential Static Fish Test(Simulation Test)) results
- n-Octanol/Water Partition Coefficient(Pow) (logkow)
  1. Document recorded with the applicable test report (MSDS, Risk assessmentreport, etc.)
  2. Estimated data by using the quantitative structure activity relationships (QSARs)
  3. Test results according to OECD 107 (Partition coefficient n-octanol/water) or OECD 117 (Partition coefficient n-octanol/water)

4.1 General

4.1.1

Make it a principle to take one test sample per product under application. Where one or more test samples are required, however, this shall not be applicable.

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 of data – Part 1: Statistical presentation of data).

4.2 Formaldehyde

Note) Items not presented under the identical test should be applicable to KS M 0033 (General principles on analytical methods of High Speed Liquid Chromatography).

4.2.1

Study Outline: Formaldehyde, contained in the specimen including large amount of surfactants, as in shampoo and body wash, should be analyzed by using HPLC-UVD

after applying DNPH Derivatization of EPA method 8315A.

4.2.2
Reagent and Standard Solution

4.2.2.1
Reagent
a) 2,4-dinitrophenylhydrazine, DNPH, 70% in H2O (w/w)

b) Sodium acetate trihydrate, CH3COONa·3H2O

c) Acetic acid, glacial, CH3COOH

d) Acetonitrile, more than HPLC

e) 3rd-distilled water (Organic-free reagent water)

f) 0.1 N hydrochloric acid aqueous solution, 0.1 N sodium hydroxide aqueous solution

g) Formaldehyde Standard Solution: Approved standard solution or formalin in the market; when formalin is used as the standard solution, it should be used according to the accurate amount specified in EPA method 8315A.

h) Derivatization solution: Dissolve 428.7 mg of 2,4-dinitrophenylhydrazine in 100mL of Acetonitrile and keep it in a shaded/sealed container (approximately 3,000 mg/L, 0.015 M)

i) Buffer Solution(0.1M pH 5.0): Dissolve 0.24g of Acetic acid and 0.816g of Sodium acetate trihydrate in 90mL of water, and produce 100mL by adding water after making its pH at 5.0 by using 0.1 N hydrochloric acid aqueous solution or 0.1 N sodium hydroxide aqueous solution.

j) 40% Acetonitrile aqueous solution: It is prepared by combining 3rd-distilled water and Acetonitrile in the volume fraction of 60:40.

4.2.2.2 Standard Solution

Take a certain amount of the standard solution in the market or the pre-standardized formalin in a 100 mL flask, and add 40% Acetonitrile aqueous solution to produce 100mL of the stock solution. Then, dilute this solution into 40% Acetonitrile aqueous solution and prepare more than 5 standard solutions from it according to the applicable concentration range.

4.2.3

Sample Collection and Preprocessing

Take approximately 2g of the specimen with homogeneity in a 100mL flask precisely,then add 40% of Acetonitrile aqueous solution to produce 100mL of solution. Then extract after stirring for 1hr while sealed. When there are insoluble substances, some of the extracted solutions are centrifuged to produce their supernatants as the specimen solution.

4.2.4

Procedures of Analysis

4.2.4.1

Derivatization

40% Acetonitrile aqueous solutionused in preparing the standard solution and the specimen solution is used as the blank test solution. Transfer 0.9mL of the blank test solution, standard solution, and specimen solution into a 2mL vial, and then add 0.9mL of the buffer solution in each. Add 50 uL of Derivatization solution, and then stir while sealed, and make it react by stirring for 30 minutes at 40 degrees. After the reaction, freeze it at room temperature.

4.2.4.2

Analysis of Equipments

Execute HPLC Analysis of the derivatized solution. The following conditions can be used as reference

- column: Mightysil C18 (4.6mm X 250mm, 5um) by Kanto, Japan or its equivalent, similar column
- mobile phase: methanol : water = 70 : 30

- flow rate: 1 mL/ min.
- optimum dosage: 10 ~ 50 uL
- detector: UV 354 nm (or PDA detector)
- column temperature: 30 degree
- time for analysis: 15 min.

4.2.4.3

Derivatization

Transfer 0.9 mL of the blank test solution, standard solution, and specimen solution into a 2 mL vial, and then add 0.9mL of buffer solution to each. Then, add 50 uL of derivatization solution and stir while sealed, and make it react by stirring for 30 minutes at 40 degrees. After the reaction, freeze it at room temperature and then analyze it with HPLC.

4.2.4.4

Qualitation and quantification

4.2.4.4.1

preparation of calibration

Calibration is prepared from the area value of these chromatograms (UV 354 nm) and the concentration of the standard solution after analyzing the blank test solution and the standard solution more than 3 times. The formula of calibration is confirmed as linear, and its linear coefficient (r2) should be more than 0.99.

4.2.4.4.2

confirmation of ingredients

When the peak retention time (R.T.) in the specimen solution is within 2% of the allowed error of the peak retention time (R.T.) in the standard solution, it is acknowledgedas formaldehyde. When PDA detector is used, it can be additionally confirmed as formaldehyde when the UV spectrum of each peak is confirmed to be identical. (See Figure 1, 2)

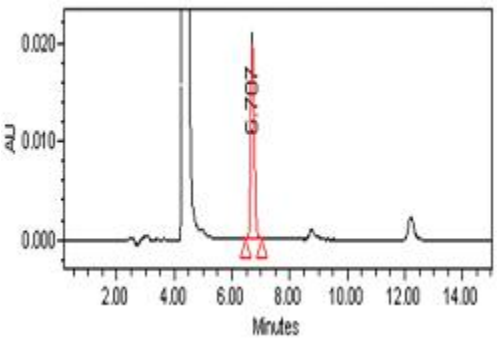

Fig.1 example of chromatogram of formaldehyde

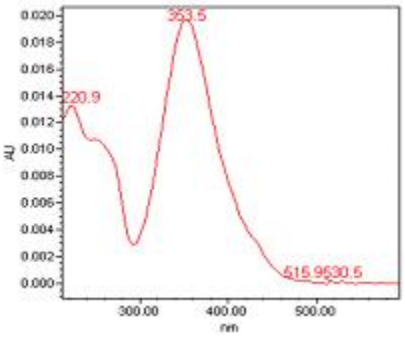

Fig.2 PDA spectrum of formaldehyde

4.2.4.4.3

Calculation

Obtain the concentration of formaldehyde in the specimen solution that is applicable to the peak area value of the sample from calibration. The content of formaldehyde in the sample is calculated from the concentration of formaldehyde in the specimen solution as follows. The numerical value of the test result is finished as integer, and its unit is expressed as mg/L, and when the detection limit is less than 1 mg/L, it is indicated as "no detection."

Content of formaldehyde in the sample[mg/kg] = Concentration in the specimen solution [mg/L] × Total volume of the specimen solution (100mL) ÷ Amount of the collected sample [g]

4.2.4.4.4

Considerations

4.2.4.4.4.1

Since formaldehyde can be detected in reagent, solvent, or water in use, the contamination level should be confirmed by imprinting the blank resin.

4.2.4.4.4.2

The content of formaldehyde detected in the blank test solution should be corrected according to the detected amount in the sample.

4.2.4.4.4.3

When using formalin (normally, 37.6% aqueous solution) in preparation of the standard solution, as the concentration is not accurate, it is either calculated by using the method in clause 5.7.1.1.in EPA method 8315A or .prepared by diluting the certified standard solution.

4.2.4.4.4.4

Sufficient organic solvents should be included because the solubility of DNPH and its derivatives to water is not good, so the solubility can be decreased to create sediments in high concentration and lead to a decrease in detection amount when the content of organic solvents is not sufficient in derivatization reaction.

4.2.5

Information to be included in the Test Report

4.2.5.1

Conditions of Analysis

4.2.5.2

All abnormal characteristics when they are acknowledged during quantification or when they do not satisfy the criteria for reproducibility and repeatability.

4.3 1,4-dioxane Test Methods

4.3.1

Study Outline : Analyze 1,4-dioxane contained in the specimen including the large amount of surfactantsand ingredients of fragrance, as in shampoo and body wash, by using headspace device and GC-MS. Use 1,4-dioxane-d8, which is a deuterium substituent as the internal standard substance, measure with SIM mode, and then qualitate/quantitate with the measured peak ion ratio and the measured peak retention time (R.T.).

4.3.2

Reagent and Standard Solution

4.3.2.1
Reagent

4.3.2.1.1
1, 4-dioxane: reagent class

4.3.2.1.2
1, 4-dioxane-d8: reagent class

4.3.2.1.3
3rd-distilled water (Organic-free reagent water)

4.3.2.1.4
Magnesium sulfate

4.3.2.2
Standard Solution / Internal Standard Solution

4.3.2.2.1
Standard Solution: Take 0.1g of the standard product of 1,4-dioxane precisely, put it into a 100mL flask, and then dissolve it with water to produce 100mL. Then, take 1mL of this solution into a 100mL flask and produce 100mL by adding water. (10 ug/mL)

4.3.2.2.1
Internal Standard Solution: Take 0.1g of the standard product of 1,4-dioxane-d8, put it into a 100mL flask, and then dissolve it with water to produce 100mL. Then, take 1mL of this solution into a 100mL flask and produce 100mL by adding water. (5 ug/mL)

4.3.3
Sample Collection and Preprocessing
Take approximately 2g of the specimen with homogeneity in a 100mL flask precisely, and then add water to produce 100mL of solution. Then extract after stirring for 1hr while sealed. This extracted solution is used as the specimen solution.

4.3.4

Procedures of analysis

Conduct the test more than 3 times per sample, according to the following conditions of Headspace and GC-MSD.

4.3.4.1

Sample manufacturing of Headspace

4.3.4.1.1

HS specimen solution: Add 5mL of water and 200 uL of internal standard solution each in a 20mL vial for headspace, and then mix thoroughly with the caps on. Then put the caps on after adding 1g of Magnesium Sulfate (Na2SO4).

4.3.4.1.2

Conditions of analysis for Headspace: The following conditions can be used as reference.

4.3.4.2.1

incubation Temp. : 90 °C ~ 95°C

4.3.4.2.2

incubation time : 1 hr

4.3.4.2.3

sample injection volume : 1000~2000 μL

4.3.4.2.4

Vial Pressurization : 13.7

4.3.4.2.5

Loop Fill : 0.20

4.3.4.2.6

Loop Equilibration : 0.10

4.3.4.2.7

transfer line Temp. : 95 °C

4.3.4.3

GC-MSD analysis: The following conditions can be used as reference.

4.3.4.3.1

Column : HP-Innowax (polyethylene glycol, film length 30 m, inner diameter 0.25 mm, thickness 0.25) or its similar/equivalent Fused Silica Capillary column

4.3.4.3.2

Temperature at pouring gate: 250 °C

4.3.4.3.3

Pouring gate: He, split mode (split ratio 5:1 or 10:1)

4.3.4.3.4

Flow rate: 1.0 or 1.2 mL/min

4.3.4.3.5

Oven temperature program: 40°C (maintained for 2 min.) -> increase 5 °C per min. up to 80 °C -> increase 25 °C per min. up to 200 °C

4.3.4.3.6

Analysis Time : 15 min.

4.3.4.3.7

SIM mode conditions: dwell time ; 50 msec, 3.66 cycles/sec

ingredient	quantification ion (m/z)	confirmation ion (m/z)
1, 4-dioxane	88	43, 58 (or 57, 58)
1, 4-dioxane-d8	96	64

4.3.4.3.8
Retention Time (R.T): 5~6 min.

4.3.4.3.9
MS quad temp.: 150 °C

4.3.4.3.10
MS source temp.: 230 °C

4.3.4.3.11
interface temp.: 260 °C

4.3.4.4
Qualitation and Quantification

4.3.4.4.1
Preparation of Calibration
Obtain the R.T. and the integral value of each peak after extracting the chromatogram applicable to each ion (m/z) from GC-MS Chromatogram, which is obtained from the HS standard solution.Obtain the relative % value (%abundance) of the confirmation ions with the integral value of the quantification ion at 100. Prepare the calibration while defining each of the peak area ratio [(m/z 88)/(m/z 96)], which was obtained from HS standard solutions, and the mass (ug) of 1,4-dioxaneadded in the HS standard solution as y-, x-axis, respectively. Confirm that the relation of the calibration is linear, and its linear coefficient (r2) should be more than 0.99.

4.3.4.4.2
Confirmation of Ingredients
When the peak retention time (R.T.) in the specimen solution is within 0.03 minutes of the allowed error from the peak R.T. in the standard solution, and when the relative % value of the confirmation ion is not larger than 20%, it is confirmed as the peak for 1,4-dioxane and 1,4-dioxane-d8.

4.3.4.4.3

Calculation

Obtain the content (g) of 1,4-dioxane in the HS specimen solution from calibration after obtaining the area ratio [(m/z 88)/(m/z 96)] to the confirmed peak. The content (ug /g) of 1,4-dioxane in the sample is obtained with the following formula.

Content of 1,4-dioxane [mg/kg] = Content of 1,4-dioxane in HS specimen solution [ug]÷(Amount of sample [g] ×5 mL / 100mL)

4.3.4.4.4

Considerations

4.3.4.4.4.1

The noise with small m/z value tends to manifest relatively severely since there are multiple quantity of volatile fragrant ingredients in the sample. In addition, when there is also the content of 1,4-dioxane in small quantity, large peak of m/z 43 occurs. In this case, it can be analyzed by substituting m/z 57 for m/z 43, as the confirmation ion. For m/z 88, 64, 96, there is almost no influence of noise.

4.3.4.4.4.2

The adjustment of the split ratio, flow rate, oven temp., and optimum dosage is possible according to the equipment and column. The optimal conditions for analysis on the equipment should be selected.

4.3.4.4.4.3

About 3-4 times of collection and analysis on head space sample for a single HS sample are possible. With the use of internal standard substance, its deviation is corrected. The initial incubation time alone is set for 1hr, and the incubation time for the next sampling is processed for approximately15 minutes.

4.3.4.4.4.4

This process can be conducted by directly obtaining around 0.1g of sample in the head space vial without taking the sample from the vial by dispersing the sample in water. In this case, the noise tends to get louder since the volatile matter exists more in quantity, although the analysis becomes convenient and needs less time.

4.3.5

Information to be included in the Test Report

4.3.5.1

Conditions for Analysis

4.3.5.2

All abnormal characteristics acknowledged during quantification or not satisfing the criteria for reproducibility and repeatability.

4.4 Test methods for Safety

4.4.1

Test equipments and materials

4.4.1.1

Messcylinder : 100mL volume with a scale of 1mL

4.4.1.2

Sealing film such as Parafilm, which can block the circulation of the sample and open air

4.4.1.3

Thermostat: temperature (45±2) °C, (-10±2) °C , (25±2) °C

4.4.2

Test Methods

4.4.2.1

High Temperature Stability

4.4.2.1.1

After putting 100 mL of the sample in messcylinder, seal with parafilm (sealing film), and then station it in a thermostat at (45±2) °C for 72 hrs.

4.4.2.1.2

Confirm whether it is stratified to the naked eyes.

4.4.2.2

Low Temperature Stability

4.4.2.2.1

After putting 100 mL of the samplein messcylinder, seal it with parafilm (sealing film) and then station it in a thermostat at (-10±2) °C for 24 hrs.

4.4.2.2.2

Stored it at room temperature after stationing it at (25±2) for 8hrs.

4.4.2.2.3

Confirm whether it is stratified to the naked eyes.

5. Reasons for Certification

“Reduction of skin stimulation, reduction of water pollution”

[Annex] Verification Methods with Water Pollution

A. Purpose

This Annex is aimed to describe how to verify the correlations of detergents and clearing agents (EL301 - EL309) with water pollution.

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 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) Aerobic non-biodegradable substance (X_1) [g/AC]: Total the use amounts [mg/gAC(i)] of the contents [%] for aerobic non-biodegradable constituents in the DID list.

(B) Anaerobic non-biodegradable substance (X_2)[g/ AC]: Total the use amounts [mg/gAC(i)] for the contents [%] for anaerobic non-biodegradable constituents in the DID list.

(C) Critical dilution volume, toxicity (CDVtox, X_3)[L/AC] : Calculate the CDVtox(i) $=\frac{g/AC(i)\times DF(i)}{TF(i)}$ for all the substances in the DID list using TF values, DF values and use amounts [L/gAC(i)] of contents [%] and then total the values.

(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 = $(aX_1+b\times1.5) + (cX_2+d\times3) + (eX_3+f\times7)$

<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, and shall conform to the following format. If substances not in DID are used, 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 without limit, regardless of the content amount.

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

(b) Active Contents(AC) Substances under 1%, and Chemicals not 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) 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 :

a) 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) Calculation Results of "AC[g] / Product[g]"

6) Composed substance fixed quantity result

- 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.

- 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.

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

Substance name	Content of the whole product [%]	AC in %	g/g AC	DID No.	TF	DF

(2) Document forms for submission

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]

(b) 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]	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 %) $L(E)C_{50i}$ = LC_{50} or EC_{50} of substance i (mg / L) N = Substance number (i has 1~ n value) $L(E)C_{50m}$= $L(E)C_{50}$ in the part where the test data exist among mixtures

※ 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) 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
211	Cumene sulfonate	66	100	0.66				0.05	R	N

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
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. (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]

1. The candidate products for Korea Eco-Label shall comply with the following regulations with regard to the appropriate processing of environmental contaminants that occur in the process of manufacturing or service operation, including air contaminants, water contaminants, waste and harmful chemical substances.

   1.1 A person who violates any environment-related law or agreement applicable in the region where his or her factory or operating establishment is located within one year prior to the date of application may not apply for Korea Eco-Label certification. For violations other than the ones subject to penalties, however, a person may apply for the certification after completion of any action for the violation.

   1.2 A person who has obtained Korea Eco-Label certification must comply with the environment-related laws and agreements applicable in the region where the factory or operating establishment is located during the certification period. If any violation against penal provisions is found during the certification period, however, the certification may be canceled, and for violations other than the ones against penal provisions, the certification may be suspended until the relevant action is completed.

2. In principle, the “consumer information” specified in the certification standards by product shall be marked in a way not to be removed easily on the surface of the product. If it is impossible or undesirable to mark it on the surface of a product, the information shall be marked on another appropriate part of a product where consumers will notice it, including product packaging, a guidebook, an instruction or etc. For services, however, the consumer information shall be, in principle, marked on the internal and external areas of a building where the service is provided. If it is impossible or undesirable to mark it on the internal or external area of a building, however, it shall be marked on an appropriate part where consumers can notice it, including a contract, statement of delivery, letter of guarantee or brochure.

3. A person who has applied for, or obtained approval for, use of Korea Eco-Label on a product shall comply with the Fair Labeling and Advertising Act in order to establish

fair trade order and protect consumers, and if they violate the law, their application for certification may be rejected or their certification may be canceled.

4. Unless otherwise specified, the various specifications cited in the certification criteria by product shall be the latest ones at the time of application for certification.

5. If application of the standards for quality in accordance with the certification criteria by product is deemed as inappropriate, the President of Korea Environmental Industry & Technology Institute (hereinafter referred to as KEITI president) may establish and operate the quality criteria for the product after deliberation committee review or expert consultation.