

JIS

JAPANESE INDUSTRIAL STANDARD

**Testing Methods for
Quantitative Analysis
of Fibre Mixtures**

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In the event of any doubt arising,
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Testing Methods for Quantitative
Analysis of Fibre Mixtures

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1. Scope

This Japanese Industrial Standard specifies testing methods for quantitative analysis of fibre mixtures in fibre products.

- Remarks 1. Even in the case of confirming that the composition fibres are of one type, this testing method applies, as appropriate.
2. Relative to angora rabbit hair, cashmere, mohair, etc., these shall be treated in accordance with wool, as appropriate.
3. Each fibre characteristics specified in text are shown in Informative Reference Tables 1 and 2 and Informative Reference Figs. 1 and 2, the combination of fibre mixtures of two types and the applicable testing methods are shown in Informative Reference Table 3 and the systematic discrimination methods, in Informative Reference Fig. 3.
4. In this Standard, the numerical values shown in { } are in accordance with traditional units and are Standard values.

2. Summary

In this test, there are four types of cancel release method, dissolution method, specific gravity method and microscopic method. For the sample capable of being applied with cancel release method, as a rule, the method is to be applied. For the sample not capable of being applied with the cancel release method, the dissolution method or specific gravity method is to be applied. The microscopic method is to be applied to mixtures of cotton and hemp and to mixtures containing their combination.

3. Definitions

For the purposes of this Standard, following definitions apply:

- (1) mixture ratio Relating to textile product of two or more types in fibres in composition fibres, the ratio of each type of composition fibres to total composition fibres expressed by mass percentage.

Applicable Standards, Corresponding International Standards and Reference Standard: See pages 50 and 51.

- (2) mixture ratio based on bone-dry weight The mixture ratio obtained from bone-dry mass ⁽¹⁾.

Note ⁽¹⁾ This means the mass when the sample is left as it is in a hot-gas dryer at a temperature of $105 \pm 2^{\circ}\text{C}$ and made a constant quantity. Herein, the constant quantity means the condition where the mass is measured at interval of 15 min or more and the difference of mass before and after it has become within 0.1 % of the after mass (however, in the case where the 0.1 % mass is not more than 0.5 mg, 0.5 mg). However, relating to fibres of 0 % in official regain, the mass of sample in the standard condition is considered the bone-dry mass.

- (3) mixture ratio based on corrected mass The mixture ratio obtained from the mass when the water content corresponding to official regain shown respectively in Table 1 is contained in fibre mixtures.

Table 1. Official Regains of Fibres

Type of fibre	Official regain %	Type of fibre	Official regain %
Cotton	8.5	Nylon	4.5
Hemp (flax, ramie)	12.0	Vinylidene	0.0
Silk	12.0	Polyvinyl chloride	0.0
Wool	15.0	Polyester	0.4
Rayon	11.0	Acrylic	2.0
Polynosic	11.0	Modacrylic	2.0
Cupro	11.0	Polyethylene	0.0
Acetate	6.5	Polypropylene	0.0
Triacetate	3.5	Polyurethane	1.0
Promix	5.0	Benzoate	0.4
Vinylon	5.0	Polychlal	3.0
		Aramid	7.0

4. Discrimination

4.1 Preparation of Sample Remove preliminarily resin, dyestuff, etc. which are adhered on the sample to interfere with use according to a suitable method and carry out the test with unfastening the sample to yarn or fibre state.

4.2 Discrimination Test the sample on each item and compare the result with the test result of known fibre to discriminate the type of fibre of sample (See Informative Reference).

- (1) Combustion Test ⁽²⁾ Observe the condition of fibres in each type condition to the fire with the yarn as it is and bundling to a suitable size for fibres. In the case of testing the odor, extinguish the flame of sample during burning, and take the smell of generated smoke.

Note ⁽²⁾ Carry out the test on the flame of 0.5 to 1 cm approximately.

- (2) Test for Existence of Chlorine in Fibre Attach the sample to incandescent copper wire, put into oxidation flame of gas burner, and if chlorine exists, green flame is generated.
- (3) Test for Existence of Nitrogen in Fibre Put soda lime [or mixture of sodium hydroxide and calcium oxide (mass ratio 1 : 1.4)] into a test tube, add a small amount of sample, heat the bottom of test tube and apply the red litmus paper wet with purified water to the tube opening. Then, if nitrogen exists, it turns to blue.
- (4) Microscopic Test Observe the side face and sectional face of fibre at a magnification of 150 to 500.
- (5) Colouring Test by Iodine-potassium Iodide Solution ⁽³⁾ After immersing the fibre into iodine-potassium iodide solution for 30 s to 1 min, wash sufficiently with water, and observe the colouring condition of fibre with naked eyes or a microscope.

Note ⁽³⁾ Prepare the iodine-potassium iodide solution by dissolving iodine of 20 g in saturated potassium iodide solution of 100 ml.

- (6) Xanthoproteic Reaction Place the fibre on a slide glass under a microscope, and drop nitric acid. Then, if it becomes yellow colour and next when neutralized with ammonia if it becomes orange colour, protein exists.
- (7) Solubility Test for Each Kind of Reagent Take reagent 4 to 15 ml in a test tube (18 mm in diameter), put approximately 10 mg of sample into it, treat at a definite temperature for a definite time, and observe the solubility of each type reagent.
- (8) Measurement of Infrared Absorption Spectra By using an infrared spectrophotometer measure the infrared absorption spectra of sample according to the following method. Main absorption zones and characteristic wave numbers are shown in Table 2.
- (a) Method A (Potassium Bromide Disk Method) Pulverize finely potassium bromide for infrared absorption in an agate mortar, take powders of 53 to 74 μm with a filter, dry by heating at 120 to 150°C for not less than 24 h, and cool in a desiccator (containing phosphorus pentoxide) ⁽⁴⁾. Next, after drying sufficiently the sample, cut finely, take its 2 to 4 mg, combine it with dry powder approximately 400 mg of potassium bromide cooled previously to put into an agate mortar and while taking care so as not to absorb moisture, pulverize and mix. Put this mixed power of approximately 200 mg into a tablet former, while exhausting air ⁽⁵⁾ by using a vacuum pump, apply a pressure of 19.61 to 39.23 MPa {200 to 400 kgf/cm²} for 5 to 10 min to form tablets, and measure the infrared absorption spectra according to JIS K 0117.

Notes (⁴) If potassium bromide absorbs moisture, absorption of water-content appears on the spectra, and therefore take care sufficiently to dry cooling.

(⁵) Exhaust air until approximately 0.13 kPa {1 mmHg}.

- (b) Method B (Film Method) Dissolve the fibre sample into dissolution reagent shown in Table 3, flow into an evaporating dish, and dry by vacuum drying or by heating in the range where the sample is not decomposed. Next, peel off the dried film (⁶) so as not to break, cut it to a suitable size (⁷), place it between paper boards and measure the infrared absorption spectra according to JIS K 0117.

Notes (⁶) The film shall be of such thickness that it becomes transparent.

(⁷) The size is different according to infrared spectrophotometer to be used, but it is required to be not less than 1 cm², at least.

Table 2. Main Absorption Zones and Characteristic Wave Number by Infrared Absorption Spectra of Each Type Fibre

Number	Name of fibre	Preparing method of sample	Main absorption zones and its characteristic wave number cm ⁻¹									
1	Cotton	K	3 450~3 250	2 900	1 630	1 430	1 370	1 100~	970	550		
2	Flax	K	3 450~3 250	2 900	1 730	1 630	1 430	1 370	1 100~970	550		
3	Ramie	K	3 400~3 350	2 900	1 630	1 430	1 370	1 100~	970	550		
4	Wool (⁸)	K	3 400~3 250	2 900	1 720~1 600	1 500	1 220					
5	Fresh silk (⁹)	K	3 300~3 200	2 950	1 710~1 500	1 220	1 050					
6	Degummed silk	K	3 300	2 950	1 710~1 630	1 530~1 500	1 440	1 220	610	540		
7	Styrene graft silk	K	3 300	3 050	2 950	1 710~1 630	1 530~1 490	1 450				
							1 220	750	690	540		
8	Polystyrene	F	3 050	2 950	1 600	1 490	1 450	1 020	750	690	540	
9	Rayon	K										
10	Polynosic		3 450~3 250	2 900	1 650	1 430~1 370	1 060~	970	890			
11	Cupro											
12	Acetate	F										
13	Triacetate		3 500	2 950	1 750	1 430	1 370	1 230	1 040	900	600	
14	Promix	K	3 300	2 900	2 250	1 680~1 630	1 530	1 450	1 230	540		
15	Nylon 6	K	3 500~3 250	2 950	2 850	1 680~1 630	1 560~1 510	680				
16	Nylon 6	F	3 300	3 050	2 950	2 850	1 630	1 530	1 450	1 250	680	570
17	Nylon 66	K	3 500~3 250	2 950	2 850	1 680~1 630	1 560~1 510	930	680			
18	Nylon 66	F	3 300~2 950	2 850	1 630	1 530	1 470	1 270	930	680	570	
19	Vinylon	F	3 400~2 950	1 430~1 400	1 090~1 050	1 020	850	790				
20	Vinylidene	K	3 000	1 730	1 400	1 350	1 270	1 070~	950	590	530	450
21	Vinylidene	F	3 000	1 730	1 400	1 350	1 070	1 050~	650	600	530	450
22	Polyvinyl chloride	F	2 950	2 900	1 420	1 350	1 250	1 090~	950	690	650~	600
23	Polyester	K	1 770~1 670	1 500	1 410	1 320	1 200	1 130~1 050	870	720		
24	Polyester	F	1 730	1 410	1 340	1 250	1 120	1 100	1 020~	870	720	
25	Acrylic A	F										
26	Acrylic B		2 950	2 250	1 730	1 450	1 360	1 220	1 160	1 060	540	
27	Acrylic C	F	2 950	2 250	1 730	1 450	1 360	1 220	1 070~1 020			
28	Acrylic D	F	2 950	2 250	1 730	1 680	1 450	1 360	1 160	1 070	530	
29	Modacrylic A	F	2 950	2 250	1 510	1 450	1 360	1 250	990	620		
30	Modacrylic B	F	3 550	2 950	2 250	1 730	1 450	1 250	1 050	990	620	
31	Polyethylene	F	2 900	2 850	1 470	1 460	1 370	740	720			
32	Polypropylene	F	2 970~2 940	2 850	1 450	1 370	1 160	990	970	840		
33	Polychlal	K	3 400	2 900	1 430	1 240	1 100~1 050	1 010	850	600		
34	Benzoate	F	1 710	1 610	1 510	1 360	1 270	1 240	1 160	1 100	1 050	
									930	840	770	690

Table 2 (Continued)

Number	Name of fibre	Preparing method of sample	Main absorption zones and its characteristic wave number cm^{-1}
35	Polyurethane A	F	3 300 2 950 2 850 1 730 1 630 1 590 1 530 1 410 1 370 1 300 1 220 1 100 760 650 510
36	Polyurethane B		
37	Polyurethane C		
38	Polyurethane D	F	3 300 2 950 1 730 1 590 1 530 1 410 1 300 1 220 1 160 1 070 810 760 510
39	Aramid A	K	3 500~3 200 1 650 1 540 1 510 1 400 1 310 1 260 1 110 1 020 890 860 820 780 720 520
40	Aramid B		3 500~3 200 1 660 1 600 1 540 1 480 1 430 1 410 1 300 1 240 780 720 680 570
41	Aramid C		3 500~3 200 1 650 1 600 1 510 1 400 1 310 1 260 1 210 1 140 1 020 890 860 830 780 720 520

Notes (⁸) The wool is from 1800 to 1000 cm^{-1} and generally shows blow absorption.

(⁹) The fresh silk is from 1710 to 1370 cm^{-1} and generally shows blow absorption.

- Remarks 1. K in the column of sample preparation indicates potassium bromide disk method, and F, the sample for infrared absorption by film method.
- The absorption wave number of each fibre is different in the degree of $\pm 20 \text{ cm}^{-1}$ according to the used infrared spectrophotometer.
 - Spectra of revised fibres and the like are duplicated with the fibre itself absorption and absorption of revised substance.
 - A, B, C and D in the column of name of fibre indicate the type of fibre.

Table 3. Dissolution Reagent of Each Fibre in Infrared Absorption Spectra Measurement (Film Method)

Reagent Name of fibre	Nitric acid	Glacial acetic acid	Acetone	Dimethyl- formamide	Tetra- hydro- furan	Dioxane	Monochloro- benzene	Xylene	Nitro- benzene	m-cresol	Methylene- chloride	Dimethyl- sulfoxide	Decahydro- naphthalene
Acetate	—	○	○	○	○	○	—	—	○	○	—	○	—
Triacetate	—	○	○	○	—	○	—	—	○	○	○	○	—
Nylon 6	○	○	—	—	—	—	—	—	—	○	—	—	—
Nylon 66	○	○	—	—	—	—	—	—	—	○	—	—	—
Vinylon	—	—	—	—	—	—	—	—	—	—	—	○	—
Vinylidene	—	—	—	○	○	○	○	—	○	—	—	○	—
Polyvinyl chloride	—	—	—	—	○	—	○	—	—	○	—	—	—
Polyester	—	—	—	—	—	—	—	—	○	○	—	—	—
Acrylic A	—	—	—	—	—	—	—	—	—	—	—	○	—
Acrylic B	—	—	—	—	—	—	—	—	—	—	—	○	—
Acrylic C	—	—	—	—	—	—	—	—	—	—	—	○	—
Acrylic D	—	—	—	—	—	—	—	—	—	—	—	○	—
Modacrylic A	—	—	—	—	—	—	—	—	○	○	—	○	—
Modacrylic B	—	—	—	—	—	—	—	—	○	○	—	○	—
Polyethylene	—	—	—	—	—	—	—	—	—	—	—	—	○
Polypropylene	—	—	—	—	—	—	—	○	—	—	—	—	○
Benzoate	—	—	—	—	—	—	—	—	○	○	—	—	—
Polyurethane A	—	—	—	○	—	—	—	—	○	○	—	○	—
Polyurethane B	—	—	—	○	—	—	—	—	○	○	—	○	—
Polyurethane C	—	—	—	○	—	—	—	—	○	○	—	○	—
Polyurethane D	—	—	—	○	—	—	—	—	○	○	—	○	—

Remark: ○ mark indicates the most suitable dissolution reagent of the fibre.

5. Reagents and Apparatus

For reagents and apparatus, the following shall be used.

- (1) Carbon Tetrachloride The guaranteed grade of JIS K 8459
- (2) Petroleum Ether The guaranteed grade of JIS K 8593
- (3) Sodium Carbonate The guaranteed grade of JIS K 8625
- (4) Hydrochloric Acid The guaranteed grade of JIS K 8180
- (5) Ammonia Water The guaranteed grade of JIS K 8085
- (6) Sulfuric Acid The guaranteed grade of JIS K 8951
- (7) Sodium Hydroxide The guaranteed grade of JIS K 8576
- (8) Copper The guaranteed grade of JIS K 8660
- (9) Saccharose The guaranteed grade of JIS K 8383
- (10) Methyl Red The guaranteed grade of JIS K 8896
- (11) Glacial Acetic Acid The guaranteed grade of JIS K 8355
- (12) Formic Acid The guaranteed grade of JIS K 8264
- (13) Acetone The guaranteed grade of JIS K 8034
- (14) Potassium Iodide The guaranteed grade of JIS K 8913
- (15) Methyl Orange The guaranteed grade of JIS K 8893
- (16) Sodium Thiosulfate The guaranteed grade of JIS K 8637
- (17) Hydrogen Peroxide Water The guaranteed grade of JIS K 8230
- (18) Dimethylformamide The guaranteed grade of JIS K 8500
- (19) Potassium Thiocyanate The guaranteed grade of JIS K 9001
- (20) Phenol The guaranteed grade of JIS K 8798
- (21) Methylene Chloride The guaranteed grade of JIS K 8161
- (22) m-Cresol The grade 1 of JIS K 8305
- (23) Benzene The guaranteed grade of JIS K 8858
- (24) Cyclohexanone The guaranteed grade of JIS K 8463
- (25) Xylene The grade 1 of JIS K 8271
- (26) Soda Lime The grade 1 of JIS K 8603

- (27) Iodine The guaranteed grade of JIS K 8920
- (28) Nitric Acid The guaranteed grade of JIS K 8541
- (29) Apparatuses Generally, apparatuses specified in JIS R 3503, JIS R 3505, JIS R 4203 and JIS B 7525 or those having quality equivalent or superior thereto.

6. Pretreatment of Sample

6.1 Sample without Execution of Sizing or Resin Working

- (1) In the case of other fibres excluding vinylidene, polyvinyl chloride, polypropylene and polyurethane, by using a Soxhlet extractor carry out syphon motion with carbon tetrachloride 10 or more times to remove oil contents and the like by extraction. Thereafter, dry the sample with wind, after further boiling with water of 100 times amount, wash sufficiently with water at 60 to 70°C, and dry to remove natural nonfibrous substances and substances added during manufacturing process.
- (2) Relating to fibres of mixture of vinylidene, polyvinyl chloride or polypropylene, put the sample into water solution of nonionic surface-active agent of approximately 1 % of 100 times quantity, while mixing by stirring at times at 23 to 25°C, immerse for 15 min. Thereafter, draw up, wash sufficiently with water and then dry to remove the nature nonfibrous substances in fibres contained in the sample and substances added during manufacturing process.
- (3) Relating to fibres mixed with polyurethane, after shaking vigorously together with petroleum ether of 50 times amount in an Erlenmeyer flask with ground-in stopper for 10 min, by using new petroleum ether of the same amount again repeat the same operation. Next, after removing the petroleum ether by drying, further project the sample into hot water to treat for 5 min, wash with water, and dry to remove natural nonfibrous substances in fibres contained in the sample and substances added during manufacturing process.

- Remarks 1. It is able to apply simple method instead of extraction method according to carbon tetrachloride by using Soxhlet extractor. That is, after immersing the sample in a beaker containing carbon tetrachloride of its 50 times amount for 10 min while pressing thoroughly by using a glass rod or others suitable thereto, draw up to throttle and again by using new carbon tetrachloride of the same amount repeat the same operation. Next, after air-drying to remove carbon tetrachloride, project the sample into hot water, and after treating for 5 min, wash with water and dry.
2. In the case of other fibres excluding silk, wool, acetate, promix, polyvinyl chloride and vinylidene, put the sample into 0.5 % sodium carbonate (anhydrous) solution of 100 times amount, after treating on boiling water bath for 15 min, wash twice for each 10 min in water at 60 to 70°C, and further the method to wash with water to dry may be applied.

3. Relating to fibre mixtures of wool or polyester, put the sample into water solution of approximately 0.3 % nonionic surface active agent of 100 times amount and after treating for 15 min while mixing by stirring at 60 to 70°C, wash with water and dry sufficiently. This method may be applied.

6.2 Sample Executed with Sizing or Resin Working In addition to the treatment of 6.1, put into 0.25 % hydrochloric acid solution of 100 times amount, treat on boiling water bath for 15 min, wash this in the order of hot water, 0.2 % ammonia solution and water, and dry. Provided that in the case of vinylon other than formalizing vinylon, instead of 0.25 % hydrochloric acid treatment carry out the operation of Remark 2. of 6.1.

Remark: Relating to fibres executed with special drying or woking, having interference to the test of 7., decoloration and other suitable treatment shall be carried out according to further suitable method.

7. Testing Methods

7.1 Procedures of Test Procedures of test shall be as given in following (1) to (4). Combination of composition fibres and application test methods are shown in Table 4 and Table 5. Relating to the combination not contained in these and the combination of not less than four types, the test shall be carried out in accordance with these, as appropriate (refer to Annex).

Table 4. In the Case of Fibre Mixture of Two or More Types

Composition fibre	Application testing method	Remark
(1) Cotton and hemp	7.4 Microscopic method	Dissolve wool
(2) Cotton and wool (Other method)	7.2.9 5 % sodium hydroxide method	Dissolve wool
(3) Cotton and silk (Other method)	7.2.16 Sodium hypochlorite method	Dissolve silk
(4) Cotton and rayon or cupro (Other method)	7.2.9 5 % sodium hydroxide method	Dissolve silk
	7.2.16 Sodium hypochlorite method	Dissolve rayon or cupro
	7.2.1 60 % sulfuric acid method	Apply only to the case of mixture of mercerized cotton and polynosic and dissolve polynosic
	7.2.7 Mixed acid method	Dissolve acetate
(5) Cotton and acetate	7.2.15 100 % acetone method	Dissolve triacetate
(6) Cotton and triacetate	7.2.22 Methylene chloride method	Dissolve cotton
(7) Cotton and promix	7.2.11 Copper oxide ammonia method	Dissolve cotton
(8) Cotton and vinylon (Other method)	7.2.11 Copper oxide ammonia method	Dissolve vinylon
(9) Cotton and nylon	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(10) Cotton and polyvinyl chloride (Other method 1)	7.2.5 20 % hydrochloric acid method	Dissolve cotton
(Other method 2)	7.2.2 70 % sulphuric acid method	Dissolve cotton
(11) Cotton and acrylic (Other method 1)	7.2.11 Copper oxide ammonia method	Dissolve polyvinyl chloride
(Other method 2)	7.2.20 Tetrahydrofuran method	Dissolve acrylic
	7.2.17 Warm dimethylformamide method	Dissolve acrylic
	7.2.19 65 % potassium thiocyanate method	Dissolve cotton
	7.2.11 Copper oxide ammonia method	

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(12) Cotton and modacrylic (Other method 1) (Other method 2)	7.2.2 70 % sulphuric acid method 7.2.17 Warm dimethylformamide method 7.2.11 Copper oxide ammonia method	Dissolve cotton Dissolve modacrylic Dissolve cotton
(13) Cotton and polyester (Other method)	7.2.2 70 % sulphuric acid method 7.2.11 Copper oxide ammonia method	Dissolve cotton Dissolve cotton
(14) Cotton and polypropylene (Other method)	7.2.2 70 % sulphuric acid method 7.2.11 Copper oxide ammonia method	Dissolve cotton Dissolve cotton
(15) Cotton and polyurethane (Other method)	7.2.18 Hot dimethylformamide method 7.2.2 70 % sulphuric acid method	Dissolve polyurethane Dissolve cotton
(16) Cotton and benzoate (Other method)	7.2.11 Copper oxide ammonia method 7.2.11 Copper oxide ammonia method	Dissolve cotton Dissolve cotton
(17) Cotton and polychloral (Other method)	7.2.11 Copper oxide ammonia method 7.2.2 70 % sulphuric acid method	Dissolve cotton Dissolve cotton
(18) Cotton and aramid (Other method)	7.2.2 70 % sulphuric acid method 7.2.11 Copper oxide ammonia method	Dissolve cotton Dissolve cotton
(19) Hemp and wool (Other method)	7.2.2 70 % sulphuric acid method 7.2.11 Copper oxide ammonia method	Dissolve hemp Dissolve cotton
(20) Hemp and silk	7.2.16 Sodium hypochlorite method	Dissolve silk
(21) Hemp and rayon or cupro	7.2.1 60 % sulfuric method	Dissolve rayon or cupro
(22) Hemp and acetate	7.2.15 100 % acetone method	Dissolve acetate
(23) Hemp and triacetate	7.2.22 Methylene chloride method	Dissolve triacetate
(24) Hemp and promix	7.2.11 Copper oxide ammonia method	Dissolve hemp
(25) Hemp and vinylon (Other method)	7.2.11 Copper oxide ammonia method 7.2.5 20 % hydrochloric acid method	Dissolve hemp Dissolve vinylon

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(26) Hemp and nylon	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(27) Hemp and polyvinyl chloride (Other method 1) (Other method 2)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method 7.2.20 Tetrahydrofuran method	Dissolve hemp Dissolve hemp Dissolve polyvinyl chloride
(28) Hemp and acrylic (Other method 1) (Other method 2)	7.2.17 Warm dimethylformamide method 7.2.19 65 % potassium thiocyanate method 7.2.11 Copper oxide ammonia method	Dissolve acrylic Dissolve acrylic Dissolve hemp
(29) Hemp and modacrylic (Other method 1) (Other method 2)	7.2.2 70 % sulfuric acid method 7.2.17 Warm dimethylformamide method 7.2.11 Copper oxide ammonia method	Dissolve modacrylic Dissolve hemp Dissolve hemp
(30) Hemp and polyester (Other method)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method	Dissolve hemp Dissolve hemp
(31) Hemp and polypropylene (Other method)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method	Dissolve hemp Dissolve hemp
(32) Hemp and polyurethane	7.2.18 Hot dimethylformamide method	Dissolve polyurethane
(33) Hemp and benzoate (Other method)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method	Dissolve hemp Dissolve hemp
(34) Hemp and polychloral	7.2.11 Copper oxide ammonia method	Dissolve hemp
(35) Hemp and aramid (Other method)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method	Dissolve hemp Dissolve hemp

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(36) Wool and silk	7.2.6 35 % hydrochloric acid method	Dissolve silk
(37) Wool and rayon or cupro	7.2.16 Sodium hypochlorite method	Dissolve wool
(38) Wool and acetate	7.2.15 100 % acetone method	Dissolve acetate
(39) Wool and triacetate	7.2.22 Methylene chloride method	Dissolve triacetate
(40) Wool and promix	7.3 Specific gravity method	
(41) Wool and vinylon	7.2.9 5 % sodium hydroxide method	Dissolve wool
(42) Wool and nylon	7.2.9 5 % sodium hydroxide method	Dissolve wool
(Other method 1)	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(Other method 2)	7.2.16 Sodium hypochlorite method	Dissolve wool
(43) Wool and polyvinyl chloride	7.2.16 Sodium hypochlorite method	Dissolve wool
(Other method)	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(44) Wool and acrylic	7.2.16 Sodium hypochlorite method	Dissolve wool
(Other method 1)	7.2.8 2.5 % sodium hydroxide method	Dissolve wool
(Other method 2)	7.2.17 Warm dimethylformamide method	Dissolve acrylic
(Other method 3)	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(45) Wool and modacrylic	7.2.16 Sodium hypochlorite method	Dissolve wool
(Other method)	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
(46) Wool and polyester	7.2.16 Sodium hypochlorite method	Dissolve wool
(Other method)	7.2.8 2.5 % sodium hydroxide method	Dissolve wool
(47) Wool and polypropylene	7.2.9 5 % sodium hydroxide method	Dissolve wool
(48) Wool and polyurethane	7.2.18 Hot dimethylformamide method	Dissolve polyurethane

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(49) Wool and benzoate	7.2.16 Sodium hypochlorite method	Dissolve wool
(50) Wool and polychlal	7.2.9 5 % sodium hydroxide method	Dissolve Wool
(51) Wool and aramid	7.2.9 5 % sodium hydroxide method	Dissolve wool
(52) Silk and rayon or cupro (Other method)	7.2.9 5 % sodium hydroxide method	Dissolve silk
(53) Silk and acetate	7.2.16 Sodium hypochlorite method	Dissolve silk
(54) Silk and triacetate	7.2.15 100 % acetone method	Dissolve acetate
(55) Silk and promix (Other method)	7.2.22 Methylene chloride method	Dissolve triacetate
(56) Silk and nylon	7.2.11 Copper oxide ammonia method	Dissolve silk
(57) Silk and nylon (Other method)	7.3 Specific gravity method	
(58) Silk and polyvinyl chloride (Other method)	7.2.9 5 % sodium hydroxide method	Dissolve silk
(59) Silk and acrylic (Other method 1) (Other method 2)	7.2.9 5 % sodium hydroxide method	Dissolve silk
	7.2.16 Sodium hypochlorite method	Dissolve silk
	7.2.16 Sodium hypochlorite method	Dissolve silk
	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
	7.2.16 Sodium hypochlorite method	Dissolve silk
	7.2.17 Warm dimethylformamide method	Dissolve acrylic
	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(60) Silk and modacrylic (Other method)	7.2.16 Sodium hypochlorite method	Dissolve silk
(61) Silk and polyester	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
	7.2.16 Sodium hypochlorite method	Dissolve silk

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(62) Silk and polypropylene	7.2.9 5 % sodium hydroxide method	Dissolve silk
(63) Silk and polyurethane	7.2.18 Hot dimethylformamide method	Dissolve polyurethane
(64) Silk and benzoate	7.2.16 Sodium hypochlorite method	Dissolve silk
(65) Silk and polychloral	7.2.9 5 % sodium hydroxide method	Dissolve silk
(66) Silk and aramid (Other method)	7.2.9 5 % sodium hydroxide method	Dissolve silk
(67) Rayon or cupro and acetate	7.2.6 35 % hydrochloric acid method	Dissolve silk
(68) Rayon or cupro and triacetate	7.2.15 100 % acetone method	Dissolve acetate
(69) Rayon or cupro and promix	7.2.22 Methylene chloride method	Dissolve triacetate
(70) Rayon or cupro and vinylon (Other method)	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
(71) Rayon or cupro and nylon	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
(72) Rayon or cupro and polyvinyl chloride (Other method 1)	7.2.5 20 % hydrochloric acid method	Dissolve vinylon
(Other method 2)	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(73) Rayon or cupro and acrylic (Other method 1)	7.2.2 70 % sulfuric acid method	Dissolve rayon or cupro
(Other method 2)	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
(74) Rayon or cupro and modacrylic (Other method 1)	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(Other method 2)	7.2.17 Warm dimethylformamide method	Dissolve acrylic
	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
	7.2.2 70 % sulfuric acid method	Dissolve rayon or cupro

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(75) Rayon or cupro and polyester (Other method)	7.2.2 70 % sulfuric acid method	Dissolve rayon or cupro
(76) Rayon or cupro and polypropylene (Other method)	7.2.11 Copper oxide ammonia method 7.2.18 Hot dimethylformamide method	Dissolve rayon or cupro Dissolve rayon or cupro
(77) Rayon or cupro and polyurethane	7.2.11 Copper oxide ammonia method 7.2.18 Hot dimethylformamide method	Dissolve rayon or cupro Dissolve polyurethane
(78) Rayon or cupro and benzoate	7.2.2 70 % sulfuric acid method	Dissolve rayon or cupro
(79) Rayon or cupro and polychloral	7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro
(80) Rayon or cupro and aramid (Other method)	7.2.2 70 % sulfuric acid method 7.2.11 Copper oxide ammonia method	Dissolve rayon or cupro Dissolve rayon or cupro
(81) Acetate and vinylon	7.2.15 100 % acetone method	Dissolve acetate
(82) Acetate and vinylon	7.2.15 100 % acetone method	Dissolve acetate
(83) Acetate and nylon	7.2.15 100 % acetone method	Dissolve acetate
(84) Acetate and polyvinyl chloride	7.2.2 70 % sulfuric acid method	Dissolve acetate
(85) Acetate and acrylic	7.2.15 100 % acetone method	Dissolve acetate
(86) Acetate and modacrylic (Other method)	7.2.14 80 % acetone method 7.2.2 70 % sulfuric acid method	Dissolve acetate Dissolve acetate
(87) Acetate and polyester	7.2.15 100 % acetone method	Dissolve acetate
(88) Acetate and polypropylene	7.2.15 100 % acetone method	Dissolve acetate
(89) Acetate and polyurethane	7.2.13 75 % formic acid method	Dissolve acetate
(90) Acetate and benzoate	7.2.15 100 % acetone method	Dissolve acetate

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(91) Acetate and polychloral	7.2.14 80 % acetone method	Dissolve acetate
(92) Acetate and aramid (Other method)	7.2.15 100 % acetone method	Dissolve acetate
(93) Triacetate and vinylon	7.2.13 75 % formic acid method	Dissolve acetate
(94) Triacetate and nylon	7.2.22 Methylene chloride method	Dissolve triacetate
(95) Triacetate and polyvinyl chloride	7.2.22 Methylene chloride method	Dissolve triacetate
(96) Triacetate and acrylic	7.2.2 70 % sulfuric acid method	Dissolve triacetate
(97) Triacetate and modacrylic	7.2.22 Methylene chloride method	Dissolve triacetate
(98) Triacetate and polyester	7.2.2 70 % sulfuric acid method	Dissolve triacetate
(99) Triacetate and polypropylene	7.2.2 70 % sulfuric acid method	Dissolve triacetate
(100) Triacetate and benzoate	7.2.2 70 % sulfuric acid method	Dissolve triacetate
(101) Triacetate and aramid (Other method)	7.2.2 70 % sulfuric acid method	Dissolve triacetate
(102) Promix and vinylon (Other method)	7.2.22 Methylene chloride method	Dissolve triacetate
(103) Promix and nylon	7.2.5 20 % hydrochloric acid method	Dissolve triacetate
(104) Promix and polyvinyl chloride	7.3 Specific gravity method	Dissolve vinylon
(105) Promix and acrylic	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(106) Promix and modacrylic	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(107) Promix and polyester	7.2.17 Warm dimethylformamide method	Dissolve acrylic
(108) Promix and polypropylene	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
	7.2.21 Phenol · ethane tetra- chloride mixture solution method	Dissolve polyester
	7.3 Specific gravity	

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(109) Promix and aramid	7.3 Specific gravity	Dissolve nylon
(110) Vinyon and nylon	7.2.12 Glacial acetic acid method	Dissolve vinyon
(111) Vinyon and polyvinyl chloride (Other method)	7.2.5 20 % hydrochloric acid method	Dissolve polyvinyl chloride
(112) Vinyon and acrylic (Other method)	7.2.20 Tetrahydrofuran method	Dissolve acrylic
(113) Vinyon and modacrylic (Other method)	7.2.17 Warm dimethylformamide method	Dissolve vinyon
(114) Vinyon and polyester (Other method)	7.2.5 20 % hydrochloric acid method	Dissolve modacrylic
(115) Vinyon and polypropylene (Other method)	7.2.5 20 % hydrochloric acid method	Dissolve vinyon
(116) Vinyon and polyurethane	7.2.5 20 % hydrochloric acid method	Dissolve vinyon
(117) Vinyon and benzoate (Other method)	7.2.2 70 % sulfuric acid method	Dissolve vinyon
(118) Vinyon and aramid (Other method)	7.2.5 20 % hydrochloric acid method	Dissolve vinyon
(119) Nylon and polyvinyl chloride (Other method)	7.2.2 70 % sulfuric acid method	Dissolve vinyon
(120) Nylon and acrylic	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(121) Nylon and modacrylic	7.2.2 70 % sulfuric acid method	Dissolve polyvinyl chloride
(122) Nylon and polyester	7.2.5 20 % hydrochloric acid method	Dissolve nylon

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(123) Nylon and polypropylene	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(124) Nylon and polyurethane	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(125) Nylon and benzoate	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(126) Nylon and polychlal	7.2.23 <i>m</i> -cresol method	Dissolve nylon
(127) Nylon and aramid	7.2.5 20 % hydrochloric acid method	Dissolve nylon
(Other method 1)	7.2.12 Glacial acetic acid method	Dissolve nylon
(Other method 2)	7.2.23 <i>m</i> -cresol method	Dissolve nylon
(128) Polyvinyl chloride and acrylic	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(Other method 1)	7.2.24 Benzene•cyclohexanone mixture method	Dissolve polyvinyl chloride
(Other method 2)	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(129) Polyvinyl chloride and modacrylic	7.2.24 Benzene•cyclohexanone mixture method	Dissolve polyvinyl chloride
(130) Polyvinyl chloride and polyester	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(131) Polyvinyl chloride and polypropylene	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(132) Polyvinyl chloride and benzoate	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(133) Polyvinyl chloride and polychlal	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(134) Polyvinyl chloride and aramid	7.2.20 Tetrahydrofuran method	Dissolve polyvinyl chloride
(Other method)	7.2.24 Benzene•cyclohexanone mixture method	Dissolve polyvinyl chloride

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(135) Acrylic and polyester (Other method)	7.2.17 Warm dimethylformamide method 7.2.21 Phenol · ethanetetrachloride mixture solution method	Dissolve acrylic Dissolve polyester
(136) Acrylic and polypropylene	7.2.17 Warm dimethylformamide method	Dissolve acrylic
(137) Acrylic and polyurethane	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(138) Acrylic and benzoate	7.2.17 Warm dimethylformamide method	Dissolve acrylic
(139) Acrylic and polychloral	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(140) Acrylic and aramid	7.2.19 65 % potassium thiocyanate method	Dissolve acrylic
(141) Modacrylic and polyester (Other method)	7.2.17 Warm dimethylformamide method 7.2.21 Phenol · ethanetetrachloride mixture solution method	Dissolve modacrylic Dissolve polyester
(142) Modacrylic and polypropylene	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
(143) Modacrylic and benzoate	7.2.17 Warm dimethylformamide method	Dissolve modacrylic
(144) Modacrylic and aramid	7.3 Specific gravity method	
(145) Polyester and polypropylene (Other method)	7.2.21 Phenol · ethanetetrachloride mixture solution method 7.2.4 Concentrated sulfuric acid method	Dissolve polyester
(146) Polyester and polyurethane	7.2.3 80 % sulfuric acid method	Dissolve polyester
(147) Polyester and benzoate	7.2.10 30 % sodium hydroxide method	Dissolve polyester
(148) Polyester and polychloral	7.2.21 Phenol · ethanetetrachloride mixture solution method	Dissolve polyester

Table 4 (Continued)

Composition fibre	Application testing method	Remark
(149) Polyester and aramid	7.2.21 Phenol · ethanetetrachloride mixture solution method	Dissolve polyester
(150) Vinylidene and other fibre	7.3 Specific gravity method	
(151) Polypropylene and benzoate	7.3 Specific gravity method	
(152) Polypropylene and polychloral	7.3 Specific gravity method	
(153) Polypropylene and aramid	7.3 Specific gravity method	
(154) Polyurethane and polypropylene	7.2.18 Hot dimethylformamide method	Dissolve polyurethane
(155) Polyurethane and aramid	7.3 Specific gravity method	

Table 5. In the Case of Fibre Mixture of Three Types

Composition fibre	Application testing method		Remark
	{first stage second stage}		
(1) Cotton, nylon, and acrylic (Other method)	7.2.5	20 % hydrochloric acid method	Dissolve nylon
(2) Hemp, rayon, and polyester (Other method)	7.2.17	Warm dimethylformamide method	Dissolve acrylic
(3) Hemp, acrylic, and wool (Other method)	7.2.1	60 % sulfuric acid method	Dissolve rayon
(4) Hemp, acrylic, and polyester (Other method)	7.2.2	70 % sulfuric acid method	Dissolve hemp
(5) Wool, rayon, and acetate (Other method)	7.2.17	Warm dimethylformamide method	Dissolve acrylic
(6) Wool, rayon, and acrylic (Other method)	7.2.2	70 % sulfuric acid method	Dissolve hemp
(7) Wool, rayon, and polyester (Other method)	7.2.15	100 % acetone method	Dissolve acetate
(8) Wool, rayon, and acrylic (Other method)	7.2.16	Sodium hypochlorite method	Dissolve wool
(9) Wool, rayon, and polyester (Other method)	7.2.16	Sodium hypochlorite method	Dissolve wool
(10) Wool, nylon, and acrylic (Other method)	7.2.17	Warm dimethylformamide method	Dissove acrylic
(11) Rayon, nylon, and acrylic (Other method)	7.2.16	Sodium hypochlorite method	Dissove wool
	7.2.2	70 % sulfuric acid method	Dissolve rayon
	7.2.16	Sodium hypochlorite method	Dissolve wool
	7.2.5	20 % hydrochloric acid method	Dissolve nylon
	7.2.9	5 % sodium hydroxide method	Dissolve wool
	7.2.12	Glacial acetic acid method	Dissolve nylon
	7.2.16	Sodium hypochlorite method	Dissolve wool
	7.2.17	Warm dimethylformamide method	Dissolve acrylic
	7.2.5	20 % hydrochloric acid method	Dissolve nylon
	7.2.17	Warm dimethylformamide method	Dissolve acrylic