

DESCRIPTION

Title of Invention: COATING FILM REMOVING COMPOSITION AND METHOD
FOR REMOVING COATING FILM

5 Technical Field

[0001]

The present invention relates to a coating film remover
composition for use in the step of removing old coating films on
steel constructions, constructions, vehicles, and aircrafts, and
10 to a coating film removal method.

Background Art

[0002]

Steel road bridges and other steel structures are
15 painted for aesthetic, design, and rust prevention purposes;
however, they require repainting as they deteriorate over time.
This repainting work is carried out on a regular basis, and thus,
tends to be costly. In order to reduce the life cycle costs (LCC)
of such steel structures, typical coating systems that have been
20 conventionally used are replaced with heavy-duty anticorrosion
coating systems; however, to apply the heavy-duty anticorrosion
coating systems, the entire surface of old coating films needs to
be removed. Typical coating systems applied in the past contain
toxic substances, such as lead, chromium, and PCBs, and removal
25 using a physical method, such as blasting and power tool
treatment, generates dust containing harmful substances, which
causes health problems for workers, effects to surrounding
environments, and leads to other social problems. On the other
hand, in a chemical removal method using a coating film remover,
30 the coating film remover is applied to a coating film to be
removed, and the old coating film is softened and swollen, and
removed wet. Accordingly, such a method is attracting attention
as an effective method that does not generate dust containing
harmful substances.

35 [0003]

Similarly, buildings are painted for aesthetics, design, and building protection purposes. Conventionally, asbestos-containing coating films have been often used for buildings, and the generation of asbestos-containing dust during repainting or building demolition has become a concern. In this area as well, attention has been drawn to coating film removers that can remove old coating films without generating dust.

[0004]

Coating film removers can be roughly divided into solvent-type coating film removers using a chlorinated solvent such as dichloromethane (Patent Literature 1) and solvent-type coating film removers using a heterocyclic compound (Patent Literature 2). Solvent coating film removers using a chlorinated solvent have the advantage of having high removal performance and not catching fire; however, they have a problem in that the effects do not last long due to volatilization in a relatively short time. Additionally, there is a health hazard concern with chlorinated solvents, especially the risk of carcinogenesis, and there are legal restrictions; the use of the chlorinated solvents is limited. Solvent-type coating film removers that contain a heterocyclic compound, i.e., N-methyl-2-pyrrolidone as a main component and that are thickened with a clay mineral-based thickener are removers obtained by mixing a dibasic acid ester, a fatty acid ester, a benzyl alcohol, etc. in addition to the solvent. Since such a solvent has a higher boiling point and a slower volatility rate than those of chlorinated solvents, it is expected to have long-lasting effects. However, there is also a health risk concern with N-methyl-2-pyrrolidone. Additionally, since removers using these solvents have a flash point, there is a growing demand for making the removers water-based from the perspective of fire prevention.

[0005]

Patent Literature 3 discloses a W/O-type emulsion composition comprising an oil phase containing ethylcellulose and a solvent that can swell the ethylcellulose, and an aqueous phase

containing a water-soluble polymer. This W/O-type emulsion composition ensures excellent emulsion stability by containing the ethylcellulose and the water-soluble polymer; however, this composition is used as a cosmetic, and the invention does not
5 relate to coating film removal.

[0006]

In Patent Literature 4, terpene, aromatic hydrocarbon, and ammonia are incorporated, which causes problems with odors by evaporation of these materials and health problems by inhalation
10 of ammonia. Further, the incorporation of ammonia makes the solution highly alkaline, which causes wastewater treatment problems.

Citation List

15 Patent Literature

[0007]

PTL 1: JPH5-171076A

PTL 2: JPH5-279607A

PTL 3: Japanese Patent No. 3549995

20 PTL 4: JPH10-330660A

Summary of Invention

Technical Problem

[0008]

25 A water-free, non-chlorine solvent-based coating film remover ensures high removal performance; however, since it consists only of an organic solvent, the remover has a flash point, and there is a concern of fire risk. Further, there are indications that N-methyl-2-pyrrolidone, which is used as the
30 main solvent, may also pose a health hazard.

[0009]

A major object of the present invention is to provide a water-based, coating-type coating film remover composition that is capable of reducing the risk of fire, health hazards, and the
35 like during the coating film removal work, and that can ensure

removal performance equal to or greater than that of a solvent-based remover, as well as a method for removing a coating film.

Solution to Problem

5 [0010]

The present invention provides the following coating film remover compositions and methods for removing a coating film.

10 Item 1. A coating film remover composition comprising water, an alcohol having an aromatic group, an ether having an aromatic group, and at least one cellulose derivative;

the coating film remover composition having a pH of 5 to 9, and satisfying all of the following conditions (i) to

15 (viii):

(i) the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹ is in the range of 80,000 to 500,000 mPa·s;

(ii) the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;

20 (iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹ is in the range of 20,000 to 200,000 mPa·s;

(iv) the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;

25 (v) the rate of change in temperature (5°C/25°C) η_1/η_3 at a shear rate of 0.1 s⁻¹ is in the range of 1.5 to 5.0;

(vi) the rate of change in temperature (5°C/25°C) η_2/η_4 at a shear rate of 1,000 s⁻¹ is in the range of 0.85 to 2.0;

(vii) the thixotropic ratio η_3/η_4 at 25°C is in the range of 50 to 1,000; and

30 (viii) the thixotropic ratio η_1/η_2 at 5°C is in the range of 100 to 1,000.

Item 2. The composition according to Item 1, wherein the sum of the alcohol having an aromatic group and the ether having an
35 aromatic group is 30 to 85 mass% based on the entire amount of

the coating film remover composition.

Item 3 The composition according to Item 1 or 2, wherein the cellulose derivative is at least one member selected from the group consisting of methylcellulose, hydroxyethylcellulose, hydroxypropyl methylcellulose, butyl cellulose, and propyl cellulose.

Item 4 The composition according to any one of Items 1 to 3, wherein the amount of the cellulose derivative is 0.8 to 3 wt% based on the entire amount.

Item 5 A method for removing a coating film, comprising applying the coating film remover composition according to any one of Items 1 to 4 to a coating film, and removing the coating film.

[0011]

The present invention also encompasses the following embodiments.

Item A. A composition used for removing a coating film, the composition comprising water, an alcohol having an aromatic group, an ether having an aromatic group, and at least one cellulose derivative; the composition having a pH of 5 to 9, and satisfying all of the following (i) to (viii),

- (i) the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹ is in the range of 80,000 to 500,000 mPa·s;
- (ii) the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;
- (iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹ is in the range of 20,000 to 200,000 mPa·s;
- (iv) the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;
- (v) the rate of change in temperature (5°C/25°C) η_1/η_3 at a shear rate of 0.1 s⁻¹ is in the range of 1.5 to 5.0;

(vi) the rate of change in temperature ($5^{\circ}\text{C}/25^{\circ}\text{C}$) η_2/η_4 at a shear rate of $1,000\text{ s}^{-1}$ is in the range of 0.85 to 2.0;

(vii) the thixotropic ratio η_3/η_4 at 25°C is in the range of 50 to 1,000; and

5 (viii) the thixotropic ratio η_1/η_2 at 5°C is in the range of 100 to 1,000.

Item B. Use of the following composition as a coating film remover:

the composition comprising water, an alcohol having an aromatic group, an ether having an aromatic group, and at least one
10 cellulose derivative;

the composition having a pH of 5 to 9, and satisfying all of the following (i) to (viii);

(i) the viscosity η_1 at 5°C and a shear rate of 0.1 s^{-1} is in the
15 range of 80,000 to 500,000 mPa.s;

(ii) the viscosity η_2 at 5°C and a shear rate of $1,000\text{ s}^{-1}$ is in the range of 200 to 1,000 mPa.s;

(iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s^{-1} is in the range of 20,000 to 200,000 mPa.s;

20 (iv) the viscosity η_4 at 25°C and a shear rate of $1,000\text{ s}^{-1}$ is in the range of 200 to 1,000 mPa.s;

(v) the rate of change in temperature ($5^{\circ}\text{C}/25^{\circ}\text{C}$) η_1/η_3 at a shear rate of 0.1 s^{-1} is in the range of 1.5 to 5.0;

(vi) the rate of change in temperature ($5^{\circ}\text{C}/25^{\circ}\text{C}$) η_2/η_4 at a
25 shear rate of $1,000\text{ s}^{-1}$ is in the range of 0.85 to 2.0;

(vii) the thixotropic ratio η_3/η_4 at 25°C is in the range of 50 to 1,000; and

(viii) the thixotropic ratio η_1/η_2 at 5°C is in the range of 100 to 1,000.

30 Item C. Use of the following composition for producing a coating film remover:

the composition comprising water, an alcohol having an aromatic group, an ether having an aromatic group, and at least one cellulose derivative;

35 the composition having a pH of 5 to 9, and satisfying all of the

following (i) to (viii);

- (i) the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹ is in the range of 80,000 to 500,000 mPa·s;
- (ii) the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹ is in
5 the range of 200 to 1,000 mPa·s;
- (iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹ is in the range of 20,000 to 200,000 mPa·s;
- (iv) the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;
- 10 (v) the rate of change in temperature (5°C/25°C) η_1/η_3 at a shear rate of 0.1 s⁻¹ is in the range of 1.5 to 5.0;
- (vi) the rate of change in temperature (5°C/25°C) η_2/η_4 at a shear rate of 1,000 s⁻¹ is in the range of 0.85 to 2.0;
- (vii) the thixotropic ratio η_3/η_4 at 25°C is in the range of 50
15 to 1,000; and
- (viii) the thixotropic ratio η_1/η_2 at 5°C is in the range of 100 to 1,000.

Advantageous Effects of Invention

20 [0012]

The coating film remover composition of the present invention has excellent coating film removal performance and can greatly reduce the risk of fire due to the water contained therein. Further, the cellulose derivative used in the
25 composition has viscosity-improving action in addition to emulsification properties; therefore, the composition does not easily flow down after the application. Further, since the composition forms a film on the coated surface after it permeates through the coating film, the composition is prevented from
30 drying, thereby reducing the removal time.

Description of Embodiments

[0013]

The coating film remover composition of the present
35 invention is an emulsion composition, preferably an water-in-oil

type emulsion composition, comprising (i) water, (ii) an alcohol having an aromatic group and an ether having an aromatic group, constituting the oil phase, and (iii) a cellulose derivative having emulsifying and thickening actions.

5 [0014]

In the present invention, various studies have been conducted to improve the removal performance of a water-based coating film remover at low temperature. The present inventors found that the removal performance at low temperature is improved
10 when an ether having an aromatic group is added to an alcohol having an aromatic group, which is used as the main solvent at around a neutral pH, i.e., pH of 5 to 9. It was also found that even when N-methyl-2-pyrrolidone, a mixture of dibasic acid esters, or a ketone-based solvent, which are often used in
15 solvent-type coating film removers, is added in place of the above aromatic ether-based solvent, the removal performance, especially at low temperatures, is not improved. It was found that coating film remover compositions having the following preferable viscosity range have excellent workability with a
20 brush, a roller, an airless sprayer, or the like, and do not flow down and hold the agent after the application to a vertical surface. However, since an aromatic hydrocarbon solvent or terpene to be added to dissolve a wax such as a paraffin wax inhibits an increase in viscosity, and an alkali such as ammonia
25 hydrolyzes a cellulose derivative, the coating film remover composition using the above materials has a viscosity out of the preferable viscosity range.

[0015]

The coating film remover composition of the present
30 invention satisfies all of the following conditions (i) to (viii):

- (i) the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹ is 80,000 to 500,000 mPa·s, preferably 100,000 to 400,000 mPa·s, and more preferably 150,000 to 300,000 mPa·s;
- 35 (ii) the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹ is 200

to 1,000 mPa·s, preferably 250 to 700 mPa·s, and more preferably 300 to 600 mPa·s;

(iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹ is 20,000 to 200,000 mPa·s, preferably 30,000 to 150,000 mPa·s, and
5 more preferably 35,000 to 100,000 mPa·s;

(iv) the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹ is 200 to 1,000 mPa·s, preferably 250 to 700 mPa·s, and more preferably 300 to 600 mPa·s;

(v) the rate of change in temperature (5°C/25°C) of viscosity
10 η_1/η_3 at a shear rate of 0.1 s⁻¹ is 1.5 to 5.0, preferably 1.5 to 4.0, and more preferably 1.7 to 3.5;

(vi) the rate of change in temperature (5°C/25°C) of viscosity
 η_2/η_4 at a shear rate of 1,000 s⁻¹ is 0.85 to 2.0, preferably 0.85 to 1.5, and more preferably 0.9 to 1.2;

15 (vii) the thixotropic ratio η_3/η_4 at 25°C is 50 to 1,000, preferably 100 to 700, and more preferably 150 to 500; and

(viii) the thixotropic ratio η_1/η_2 at 5°C is 100 to 1,000, preferably 200 to 800, and more preferably 400 to 700.

[0016]

20 When the viscosity, the rate of change in temperature of viscosity (5°C/25°C), and the thixotropic ratio are within the above ranges, the coating film remover composition does not flow down after the application in the temperature range in which the coating film remover can be applied, thereby ensuring excellent
25 application workability. The temperature range in which the coating film remover can be applied is, for example, -5°C to 50°C, and preferably 0°C to 40°C. The coating film remover of the present invention can be suitably used in the temperature range between a low temperature range in winter and a high temperature
30 range in summer.

[0017]

The alcohol having an aromatic group does not contain a phenolic hydroxyl group. Examples of the alcohol having an aromatic group include benzyl alcohol, 2-phenylethanol, 1-
35 phenylethanol, 2-phenoxyethanol, and 2-phenoxypropanol. In a

preferred embodiment, an alcohol having an aromatic group is the main component of the oil phase. Only one kind of alcohol having an aromatic group may be used, or two or more kinds of alcohols having an aromatic group may be used in combination.

5 [0018]

Examples of the ether having an aromatic group include alkoxybenzenes, such as anisole (methoxybenzene), ethoxybenzene, propoxybenzene, and butoxybenzene; 1,2-methylenedioxybenzene; 1,2-ethylenedioxybenzene; diphenyl ether; and dibenzyl ether.

10 However, such examples do not contain compounds that correspond to the alcohols having an aromatic group described above. Only one kind of ether having an aromatic group may be used, or two or more kinds of ethers having an aromatic group may be used in combination. By incorporating an ether having an aromatic group, 15 the removal performance of the coating film at low temperature is improved. Although these ethers having an aromatic group have a low flash point, they are formed into a water-based composition, which can reduce the risk of fire.

[0019]

20 Examples of the cellulose derivatives used in the present invention include alkyl etherated cellulose, such as methyl cellulose, ethyl cellulose, butyl cellulose, and propyl cellulose; hydroxyalkyl etherated cellulose, such as hydroxypropyl cellulose, hydroxyethyl cellulose, and 25 hydroxypropyl methyl cellulose; and the like. Examples of the alkyl group in alkyl etherated cellulose and hydroxyalkyl etherated cellulose include straight or branched C₁₋₆ alkyl groups. Only one kind of cellulose derivative may be used alone, or two or more kinds of cellulose derivatives can be used in 30 combination.

[0020]

The amount of the alcohol having an aromatic group is preferably 20 to 70 mass%, and more preferably 30 to 60 mass%, based on the entire amount of the coating film remover 35 composition.

[0021]

The amount of the ether having an aromatic group is preferably 5 to 30 mass%, and more preferably 5 to 20 mass%, based on the entire amount of the coating film remover composition.

[0022]

The sum of the mass of the alcohol having an aromatic group and the ether having an aromatic group is preferably 35 to 80 mass%, and more preferably 40 to 70 mass%, based on the entire amount of the coating film remover composition.

[0023]

The mass ratio (a)/(b) of (a) an alcohol having an aromatic group and (b) an ether having an aromatic group is preferably 20 to 1, and more preferably 10 to 3.

[0024]

The amount of the cellulose derivative is preferably 0.8 to 2.5 mass%, and more preferably 1.0 to 2.0 mass%, based on the entire amount of the coating film remover composition. When the amount of the cellulose derivative falls within the range described above, the composition has excellent emulsification stability and viscosity.

[0025]

The amount of water is preferably 10 to 60 mass%, and more preferably 25 to 55 mass%, based on the entire amount of the coating film remover.

[0026]

In the present invention, only one kind of cellulose derivative may be used alone, or two or more kinds of cellulose derivatives may be used in combination. The viscosity at each temperature and each shear rate can be measured with a rheometer. The thixotropic ratio and the rate of change of viscosity can be calculated based on the viscosity measured at each temperature and each shear rate.

[0027]

The pH range in which the cellulose derivative

contained in the coating film remover composition of the present invention is not hydrolyzed is about 5 to 9, preferably about 5 to 8, more preferably about 6 to 8. Accordingly, addition of amines such as ammonia, basic compounds such as alkali metal hydroxides, and acidic compounds such as organic acids and inorganic acids to the coating film remover composition of the present invention is undesirable.

[0028]

Preservatives such as thiazolines, evaporation inhibitors such as solid paraffins, chelating agents such as ethylene diamine tetraacetic acid, and rheology control agents such as fatty acid amide may be suitably added to the coating film remover composition of the present invention.

[0029]

The objects to which the coating film remover composition of the present invention is applied include coating films of steel constructions such as steel highway bridges; and coating films of building surfaces, such as exterior walls. The coating film remover composition of the present invention is useful for the removal of coating films mainly containing melamine, acrylic, phthalic acid, lacquer, chlorinated rubber, urethane, epoxy, or fluorine resin.

[0030]

The application amount of the coating film remover composition of the present invention is preferably about 0.5 to 2 kg/m², more preferably about 0.5 to 1 kg/m². For example, the coating film remover composition of the present invention may be applied to a coating film, and the coating film may be removed using a hand tool, such as a scraper, 12 to 48 hours, preferably about 16 to 24 hours after the application. The application of the coating film remover composition to a coating film may be performed by using a spray, roller, brush, or the like. The temperature in the step in which the coating film remover composition is applied to the coating film, and is removed after a predetermined period of time, can be, for example, -5°C to

50°C, and preferably 0°C to 40°C. It is preferable to maintain such a temperature, and perform application of the coating film remover composition to the coating film and removal of the coating film.

5 [0031]

The coating film is removed from the coated object. Therefore, the coating film can be easily discarded by being contained in a disposal bag or the like, and harmful substances will therefore not be scattered.

10

Examples

[0032]

The present invention is specifically described below with reference to Examples. However, the present invention is not limited to these Examples.

15

[0033]

In the Examples and Comparative Examples described below, the following cellulose derivatives were used.

20 Cellulose Derivative

Metolose 60SH-4000: Hydroxypropyl methylcellulose produced by Shin-Etsu Chemical Co., Ltd.

Metolose 90SH-4000: Hydroxypropyl methylcellulose produced by Shin-Etsu Chemical Co., Ltd.

25 [0034]

- Examples 1 to 7 and Comparative Examples 1 to 5
- Emulsification Test and Viscosity Measurement

The coating film remover compositions of Examples 1 to 7 and Comparative Examples 1 to 5 were prepared according to the proportions shown in Table 3. The state of the liquid was confirmed by visual inspection after 24 hours after the preparation, thereby evaluating the emulsification state (evaluation of emulsification). The evaluation criteria are as follows.

30

35 [0035]

A: The milky-white color was maintained.

C: The liquid underwent layer separation, and it was clear and transparent.

[0036]

5 The viscosity of each coating film remover composition obtained in Examples 1 to 7 and Comparative Examples 1 to 5 was measured using a rheometer. Specifically, the viscosity was measured using an MCR302 rheometer produced by Anton Paar GmbH in accordance with JIS Z8803:2011.

10 [0037]

 Further, the pH of each coating film remover composition of Examples 1 to 7 and Comparative Examples 1 to 5 was measured using a pH-test paper. As a result, the pH was 7 in all of the Examples.

15 [0038]

▪ Coating Film Removal Test

 Each remover composition thus prepared in the emulsification test was applied to two kinds of test plates (Coated Article A and Coated Article B), and the test plates were
20 allowed to stand at a defined temperature. After a predetermined amount of time passed, the surface of each test plate was rubbed with a scraper so as to examine whether the coating could be removed. The defined temperature was 5°C, and the predetermined time was 24 hours. The evaluation criteria were as follows.

25 [0039]

 "Coated Article A" indicates an article for "general external surfaces in general environments" in the uses described in the "Handbook for Coatings and Anticorrosion for Steel Highway Bridges." "Coated Article B" indicates an article for "general
30 outer surfaces in slightly harsh corrosive environments" in the uses described in the "Handbook for Coatings and Anticorrosion for Steel Highway Bridges."

[0040]

A: The coating film was easily removed.

35 B: The coating film was removed by applying strong force.

C: The coating film was not removed.

[0041]

Coated Article A and Coated Article B are described below. All of the coating compositions are produced by Kansai

5 Paint Co., Ltd.

[0042]

Table 1

Coated Article A

Step of Application	Name of coating composition	Product name
Primer	Long-term-exposure etching primer (JIS K 5633: 2002, two types of etching primers)	METALACT H15
Undercoating	Rust-preventive coating composition free from lead or chromium (JIS K 5674: 2008, one type of rust-preventive paint free from lead or chromium)	RUSGON SAFETY, gray
Undercoating	Rust-preventive coating composition free from lead or chromium (JIS K 5674: 2008, one type of rust-preventive paint free from lead or chromium)	RUSGON SAFETY, red rust
Intermediate coating	Phthalic acid resin coating composition for intermediate coating (JIS K 5516: 2003, two types of synthesis resin preparation paint for intermediate coating)	SD MARINE SAFETY for intermediate coating, white
Top coating	Phthalic acid resin coating composition for top coating (JIS K 5516: 2003, two types of synthesis resin preparation paint for top coating)	SD MARINE SAFETY for top coating, yellow

10 [0043]

Table 2

Coated Article B

Application step	Name of coating composition	Product name
Primer	Long-term-exposure etching primer (JIS K 5633: 2002, two types of etching primers)	METALACT H15
Undercoating	Rust-preventive coating composition free from lead or chromium (JIS K 5674: 2008, one type of rust-preventive paint free from lead or chromium)	RUSGON SAFETY, gray
Undercoating	Rust-preventive coating composition free from lead or chromium (JIS K 5674: 2008, one type of rust-preventive paint free from lead or chromium)	RUSGON SAFETY, red dust
Intermediate coating	Phenol resin MIO coating composition	FERRODOR F34
Top coating	Chromium rubber-based coating composition for intermediate coating	RABATECT N for intermediate coating, white
Top coating	Chromium rubber-based coating composition for top coating	RABATECT N for top coating, blue

[0044]

- Coating compositions shown in Table 1 or 2 were sequentially applied to a flat plate (0.3×210×300 mm) of rolled steel sheet (SS400) for general structure to form test pieces of
- 5 Coated Article A and Coated Article B. After each coating film remover composition was applied with a brush to the resulting coating film, each test piece was allowed to stand in a constant-temperature bath at 5°C for 24 hours. Thereafter, evaluation was performed to examine whether the coating film could be removed.
- 10 Table 3 shows the results. Table 4 shows the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹, the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹, the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹, the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹, the rate of change in temperature η_1/η_3 at a shear rate of 1,000
- 15 s⁻¹, the rate of change in temperature η_2/η_4 at a shear rate of 1,000 s⁻¹, the thixotropic ratio η_3/η_4 at 25°C, and the thixotropic ratio η_1/η_2 at 5°C in Examples 1 to 7 and Comparative Examples 1 to 5.

[0045]

- 20 Table 3

	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Comp. Ex.1	Comp. Ex.2	Comp. Ex.3	Comp. Ex.4	Comp. Ex.5
Benzyl alcohol	30	65	40	35	50	50	50	60	50	50	50	80
Anisole	25	15	10									
Ethoxybenzene				10								10
Butoxybenzene					15							
Diphenylether						10						
Dibenzylether							10					
N-methyl-2-pyrrolidone									5			
Dibasic acid ester mixture											10	
Diacetone alcohol										10		
Metolose 60SH4000	1	1.2	0.6	1	1	0.9	0.9	1	0.8	0.9	0.9	1
Metolose 90SH4000	0.8	1	0.7	0.5	0.7	0.6	0.6	0.5	0.7	0.6	0.6	1
Water	43.2	17.8	48.7	53.5	33.3	38.5	38.5	38.5	43.5	38.5	38.5	8
Total	100	100	100	100	100	100	100	100	100	100	100	100
pH	7	7	7	7	7	7	7	7	7	7	7	7
Evaluation of emulsification (visually observed)	A	A	A	A	A	A	A	A	A	A	A	C
Removal test (Coated Article A)	A	A	A	A	A	A	A	B	C	C	C	C
Removal test (Coated Article B)	A	A	A	A	A	A	A	C	C	C	C	C

[0046]

Table 4

	η_1 (mPa·s)	η_2 (mPa·s)	η_3 (mPa·s)	η_4 (mPa·s)	η_1/η_2	η_2/η_4	η_1/η_3	η_2/η_4
Ex. 1	147.875	391.33	32.603	423.48	377.88	76.99	4.54	0.92
Ex. 2	102.333	409.60	24.433	368.75	249.84	66.26	4.19	1.11
Ex. 3	471.500	675.00	133.300	448.90	698.52	296.95	3.54	1.50
Ex. 4	297.400	564.10	131.125	589.15	527.21	222.57	2.27	0.96
Ex. 5	96.763	417.65	25.708	439.03	231.68	58.56	3.76	0.95
Ex. 6	109.140	459.20	23.118	444.38	237.67	52.02	4.72	1.03
Ex. 7	153.775	545.58	38.368	515.30	281.86	74.46	4.01	1.06
Comp. Ex. 1	219.600	303.75	79.023	81.45	722.96	970.20	2.78	3.73
Comp. Ex. 2	60.513	356.70	67.673	137.55	169.65	491.98	0.89	2.59
Comp. Ex. 3	143.200	555.28	32.978	481.18	257.89	68.54	4.34	1.15
Comp. Ex. 4	105.273	465.15	25.633	471.43	226.32	54.37	4.11	0.99
Comp. Ex. 5	66.945	436.18	11.164	308.30	153.48	36.21	6.00	1.41

CLAIMS

[Claim 1]

A coating film remover composition comprising water, an alcohol having an aromatic group, an ether having an aromatic group, and at least one cellulose derivative;

the coating film remover composition having a pH of 5 to 9, and satisfying all of the following (i) to (viii):

- (i) the viscosity η_1 at 5°C and a shear rate of 0.1 s⁻¹ is in the range of 80,000 to 500,000 mPa·s;
- (ii) the viscosity η_2 at 5°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;
- (iii) the viscosity η_3 at 25°C and a shear rate of 0.1 s⁻¹ is in the range of 20,000 to 200,000 mPa·s;
- (iv) the viscosity η_4 at 25°C and a shear rate of 1,000 s⁻¹ is in the range of 200 to 1,000 mPa·s;
- (v) the rate of change in temperature η_1/η_3 at a shear rate of 0.1 s⁻¹ is in the range of 1.5 to 5.0;
- (vi) the rate of change in temperature η_2/η_4 at a shear rate of 1,000 s⁻¹ is in the range of 0.85 to 2.0;
- (vii) the thixotropic ratio η_3/η_4 at 25°C is in the range of 50 to 1,000; and
- (viii) the thixotropic ratio η_1/η_2 at 5°C is in the range of 100 to 1,000.

[Claim 2]

The composition according to claim 1, wherein the sum of the alcohol having an aromatic group and the ether having an aromatic group is 30 to 85 mass% based on the entire amount of the coating film remover composition.

[Claim 3]

The composition according to claim 1 or 2, wherein the cellulose derivative is at least one member selected from the group consisting of methylcellulose, hydroxyethylcellulose, hydroxypropyl methylcellulose, butyl cellulose, and propyl

cellulose.

[Claim 4]

The composition according to any one of claims 1 to 3,
5 wherein the amount of the cellulose derivative is 0.8 to 3 wt%
based on the entire amount.

[Claim 5]

A method for removing a coating film, comprising
10 applying the coating film remover composition according to any
one of claims 1 to 4 to a coating film, and removing the coating
film.