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(54) VISCOSE RAYON TREATMENT AGENT, AQUEOUS SOLUTION OF VISCOSE RAYON TREATMENT AGENT, VISCOSE RAYON, METHOD FOR MANUFACTURING VISCOSE RAYON

(57) A viscose rayon treatment agent according to the present invention is characterized by comprising a zinc compound and a surfactant. An aqueous solution of a viscose rayon treatment agent according to the present invention is characterized by comprising a surfactant-containing viscose rayon treatment agent, a zinc compound and water.

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Description

TECHNICAL FIELD

[0001] The present invention relates to a viscose rayon treatment agent, a viscose rayon to which the treatment agent is adhered, an aqueous liquid of viscose rayon treatment agent, a viscose rayon to which the aqueous liquid is adhered, and a method for manufacturing a viscose rayon.

BACKGROUND ART

[0002] Viscose rayons are known as regenerated fibers made from raw material such as pulp or cotton linter. Viscose rayons are excellent in biodegradability and have been attracting attention as alternative fibers to cotton from viewpoints of being excellent in hygroscopicity and water absorbency. A viscose rayon fiber is generally obtained by preparing and thereafter wet spinning a raw material solution and then undergoing a yarn spinning step. A viscose rayon treatment agent is applied at times, for example, to improve process passability before the yarn spinning process.

[0003] Conventionally, Patent Document 1 discloses a known viscose rayon treatment agent. The viscose rayon treatment agent of Patent Document 1 contains an oil or fat, an anionic surfactant, and a nonionic surfactant.

PRIOR ART LITERATURE

PATENT LITERATURE

[0004] Patent Document 1: Japanese Patent No. 5630932

SUMMARY OF THE INVENTION

PROBLEMS THAT THE INVENTION IS TO SOLVE

[0005] However, due to containing surfactants, the conventional viscose rayon treatment agent has a problem of foaming during use or preparation of an aqueous liquid and especially foaming readily in a step of adhering the aqueous liquid to viscose rayon. On the other hand, if the content of surfactants is decreased, there is a problem in that the aqueous liquid decreases in emulsion stability and thus the aqueous liquid degrades readily in appearance.

[0006] The present invention has been made in view of such circumstances and an object thereof is to provide a viscose rayon treatment agent by which a prepared aqueous liquid can be improved in appearance and foaming can be reduced. Also, an object is to provide an aqueous liquid of viscose rayon treatment agent by which appearance can be improved and foaming can be reduced. Also, an object is to provide a viscose rayon with which the viscose rayon treatment agent or the aqueous liquid of viscose rayon treatment agent is adhered. Also, an object is to provide a method for manufacturing a viscose rayon by using the viscose rayon treatment agent or the aqueous liquid of viscose rayon treatment agent.

MEANS FOR SOLVING THE PROBLEMS

[0007] As a result of performing research toward solving the above problem, the inventors of the present invention found that a treatment agent with which a zinc compound is contained in a viscose rayon treatment agent that contains a surfactant is truly favorable.

[0008] A viscose rayon treatment agent (excluding that which is added to a spinning bath or that which is a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a zinc compound and a surfactant.

[0009] A viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a zinc compound, a surfactant, and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters are liquid at 70°C.

[0010] The viscose rayon treatment agent is preferably one with which the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

[0011] A viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a zinc compound and at least an anionic surfactant as a surfactant.

[0012] The viscose rayon treatment agent preferably further contains a nonionic surfactant.

[0013] Preferably, with the viscose rayon treatment agent, the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

[0014] Preferably, with the viscose rayon treatment agent, the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

[0015] Preferably, with the viscose rayon treatment agent, if the total content of the zinc compound and the surfactant is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 5% by mass.

[0016] The viscose rayon treatment agent preferably further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

[0017] Preferably, with the viscose rayon treatment agent, if the total content of the zinc compound, the surfactant, and the oil is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 1% by mass.

[0018] Preferably, the viscose rayon treatment agent is used on raw stock for yarn spinning.

[0019] A viscose rayon for solving the above problem is characterized in that the viscose rayon treatment agent is adhered thereto.

[0020] An aqueous liquid of viscose rayon treatment agent (excluding a spinning bath or a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a viscose rayon treatment agent that contains a surfactant and containing a zinc compound and water.

[0021] An aqueous liquid of viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a viscose rayon treatment agent that contains a surfactant and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C, a zinc compound, and water.

[0022] The aqueous liquid of viscose rayon treatment agent is preferably one with which the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

[0023] An aqueous liquid of viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) for solving the above problem is characterized by containing a viscose rayon treatment agent that contains at least an anionic surfactant as a surfactant and containing a zinc compound and water.

[0024] The aqueous liquid of viscose rayon treatment agent preferably further contains a nonionic surfactant.

[0025] Preferably, with the aqueous liquid of viscose rayon treatment agent, the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

[0026] Preferably, with the aqueous liquid of viscose rayon treatment agent, the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

[0027] Preferably, with the aqueous liquid of viscose rayon treatment agent, if the total content of the zinc compound, the surfactant, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.4% by mass.

[0028] The aqueous liquid of viscose rayon treatment agent preferably further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

[0029] Preferably, with the aqueous liquid of viscose rayon treatment agent, if the total content of the zinc compound, the surfactant, the oil, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.3% by mass.

[0030] Preferably, the aqueous liquid of viscose rayon treatment agent is used on raw stock for yarn spinning.

[0031] A viscose rayon for solving the above problem is characterized in that the aqueous liquid of viscose rayon treatment agent is adhered thereto.

[0032] A method for manufacturing a viscose rayon for solving the above problem is characterized by including adhering an aqueous liquid (excluding a spinning bath or a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) that contains a surfactant and a zinc compound to a viscose rayon.

[0033] A method for manufacturing a viscose rayon for solving the above problem is characterized by including adhering an aqueous liquid (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono

azo dye bonded thereto) that contains a zinc compound, a surfactant, and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C to a viscose rayon.

[0034] A method for manufacturing a viscose rayon for solving the above problem is characterized by including adhering an aqueous liquid (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) that contains a zinc compound and at least an anionic surfactant as a surfactant to a viscose rayon.

[0035] Preferably, with the method for manufacturing a viscose rayon, the aqueous liquid further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

[0036] Preferably, with the method for manufacturing a viscose rayon, the zinc compound is contained in the aqueous liquid at a ratio of 0.00001% to 0.3% by mass.

[0037] Preferably, with the method for manufacturing a viscose rayon, the zinc compound, the surfactant, and the oil are adhered such as to be 0.01% to 1.0% by mass in total with respect to the viscose rayon.

EFFECT OF THE INVENTION

[0038] By the present invention, the aqueous liquid that is prepared can be improved in appearance and foaming, especially foaming in a step of adhering the aqueous liquid can be reduced.

MODES FOR CARRYING OUT THE INVENTION

(First Embodiment)

[0039] A first embodiment that embodies a viscose rayon treatment agent according to the present invention (hereinafter referred to as treatment agent in some cases) will now be described. The treatment agent contains a zinc compound and a surfactant. With the present invention, the treatment agent excludes a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto. That is, the treatment agent of the present invention is different from such a shading composition and is not a treatment agent used for shading processing of a fabric such as a woven fabric. Also, the treatment agent of the present invention differs from a treatment agent added to a viscose rayon spinning bath and is used on a viscose rayon that has been spun.

[0040] The zinc compound reduces foaming of the treatment agent that contains the surfactant. Examples of the zinc compound include a salt of an inorganic acid, a salt of an organic acid, zinc chloride, zinc oxide, zinc sulfide, and zinc paraphenol sulfonate. Specific examples of a salt of an inorganic acid include zinc sulfate, zinc acetate, zinc nitrate, zinc carbonate, zinc chromate, zinc stannate, zinc phosphate, and zinc molybdate. Specific examples of a salt of an organic acid include zinc laurate, zinc gluconate, and zinc stearate. With these zinc compounds, one type may be used alone or two or more types may be used in combination.

[0041] If the total content of the zinc compound and the surfactant in the treatment agent is taken as 100% by mass, the lower limit of the content of the zinc compound, although not restricted in particular, is preferably not less than 0.001% by mass and more preferably not less than 0.01% by mass. If the content of the zinc compound is not less than 0.001% by mass, foaming of a prepared aqueous liquid can be reduced further. The upper limit of the content of the zinc compound, although not restricted in particular, is preferably not more than 5% by mass and more preferably not more than 3% by mass. If the content of the zinc compound is not more than 5% by mass, influence on impartment of yarn spinning characteristics by the surfactant to be described below can be suppressed.

[0042] The surfactant improves the stability of an emulsion obtained from the treatment agent and improves appearance of the aqueous liquid. As a smoothing component or bundling component, it can impart excellent yarn spinning characteristics to a rayon fiber. Examples of the surfactant include an anionic surfactant, a cationic surfactant, and a nonionic surfactant. With these surfactants, one type may be used alone or two or more types may be used in combination.

[0043] Specific examples of an anionic surfactant include (1) alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, such as alkali metal salts of castor oil fatty acid sulfuric acid esters, alkali metal salts of sesame oil fatty acid sulfuric acid esters, alkali metal salts of tall oil fatty acid sulfuric acid esters, alkali metal salts of soybean oil fatty acid sulfuric acid esters, alkali metal salts of rapeseed oil fatty acid sulfuric acid esters, alkali metal salts of palm oil fatty acid sulfuric acid esters, alkali metal salts of lard fatty acid sulfuric acid esters, alkali metal salts of tallow fatty acid sulfuric acid esters, and alkali metal salts of whale oil fatty acid sulfuric acid esters, (2) alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, such as alkali metal salts of lauryl sulfuric acid ester, alkali metal salts of cetyl sulfuric acid ester, alkali metal salts of oleyl sulfuric acid ester, and alkali metal salts of stearyl sulfuric acid ester, (3) alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles (representing the average number of moles added) of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, such as alkali metal salts of sulfuric acid ester of polyoxyethylene (with the number of oxyethylene units being 3; hereinafter indicated as n = 3) lauryl ether, alkali metal salts of sulfuric acid ester of polyoxyethylene (n =

5) lauryl ether, alkali metal salts of sulfuric acid ester of polyoxyethylene (n = 3) polyoxypropylene (with the number of oxypropylene units being 3; hereinafter indicated as m = 3) lauryl ether, alkali metal salts of sulfuric acid ester of polyoxyethylene (n = 3) oleyl ether, and alkali metal salts of sulfuric acid ester of polyoxyethylene (n = 5) oleyl ether, (4) alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, such as alkali metal salts of lauryl phosphoric acid ester, alkali metal salts of cetyl phosphoric acid ester, alkali metal salts of oleyl phosphoric acid ester, and alkali metal salts of stearyl phosphoric acid ester, (5) alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms, such as alkali metal salts of lauryl sulfonic acid ester, alkali metal salts of cetyl sulfonic acid ester, alkali metal salts of oleyl sulfonic acid ester, alkali metal salts of stearyl sulfonic acid ester, and alkali metal salts of tetradecane sulfonic acid ester, (6) alkali metal salts of phosphoric acid esters of compounds having a total of 1 to 20 moles (representing the average number of moles added) of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol, such as alkali metal salts of polyoxyethylene (n = 5) lauryl ether phosphoric acid ester, alkali metal salts of polyoxyethylene (n = 5) oleyl ether phosphoric acid ester, and alkali metal salts of polyoxyethylene (n = 10) stearyl ether phosphoric acid ester, (7) sulfated oils, such as sulfuric acid esters of oils and fats (for example, sulfuric acid ester of castor oil, sulfuric acid ester of sesame oil, sulfuric acid ester of tall oil, sulfuric acid ester of soybean oil, sulfuric acid ester of rapeseed oil, sulfuric acid ester of palm oil, sulfuric acid ester of lard, sulfuric acid ester of tallow, and sulfuric acid ester of whale oil), amine salts thereof, or alkali metal salts thereof, (8) alkali metal salts of fatty acids, such as alkali metal salts of lauric acid, alkali metal salts of oleic acid, and alkali metal salts of stearic acid, and (9) alkali metal salts of sulfosuccinic acid esters of aliphatic alcohols, such as alkali metal salts of dioctyl sulfosuccinic acid.

[0044] Specific examples of alkali metal salts that constitute the anion surfactants mentioned above include sodium salts and potassium salts. Specific examples of amine salts that constitute the anion surfactants mentioned above include (1) aliphatic amines, such as methylamine, dimethylamine, trimethylamine, ethylamine, diethylamine, triethylamine, N-N-diisopropylethylamine, butylamine, dibutylamine, 2-methylbutylamine, tributylamine, octylamine, and dimethyllaurylamine, (2) aromatic amines or heterocyclic amines, such as aniline, N-methylbenzylamine, pyridine, morpholine, piperazine, and derivatives thereof, (3) alkanolamines, such as monoethanolamine, N-methylethanolamine, diethanolamine, triethanolamine, isopropanolamine, diisopropanolamine, triisopropanolamine, dibutylethanolamine, butyldiethanolamine, octyldiethanolamine, and lauryldiethanolamine, (4) aryl amines, such as N-methylbenzylamine, (5) polyoxyalkylene alkyl aminoethers, such as polyoxyethylene lauryl aminoethers and polyoxyethylene stearyl aminoethers, and (6) ammonia.

[0045] Among these anionic surfactants, the anionic surfactants of (1) to (5) and the sulfated oils of (7) are preferable from a viewpoint of improving the stability of the emulsion obtained from the treatment agent and improving the appearance of the aqueous liquid further, and the sulfated oils of (7) are more preferable from a standpoint of imparting excellent yarn spinning characteristics to the rayon fiber as a smoothing component. Further, from a standpoint of improving the effects of the present invention, it is preferable to use at least one type selected from among the anionic surfactants of (1) to (5) and a sulfated oil of (7) in combination.

[0046] Specific examples of a cationic surfactant include lauryltrimethylammonium chloride, cetyltrimethylammonium chloride, stearyltrimethylammonium chloride, behenyltrimethylammonium chloride, and didecyldimethylammonium chloride.

[0047] Examples of a nonionic surfactant include compounds with which an alkylene oxide is added to an alcohol or a carboxylic acid, ester compounds of a carboxylic acid and a polyhydric alcohol, and ether/ester compounds with which an alkylene oxide is added to an ester compound of a carboxylic acid and a polyhydric alcohol.

[0048] Specific examples of an alcohol used as a raw material of a nonionic surfactant include (1) straight-chain alkyl alcohols, such as methanol, ethanol, propanol, butanol, pentanol, hexanol, octanol, nonanol, decanol, undecanol, dodecanol, tridecanol, tetradecanol, pentadecanol, hexadecanol, heptadecanol, octadecanol, nonadecanol, eicosanol, heneicosanol, docosanol, tricosanol, tetracosanol, pentacosanol, hexacosanol, heptacosanol, octacosanol, nonacosanol, and triacontanol, (2) branched alkyl alcohols, such as isopropanol, isobutanol, isohexanol, 2-ethylhexanol, isononanol, isodecanol, isododecanol, isotridecanol, isotetradecanol, isotriacontanol, isohexadecanol, isoheptadecanol, isooctadecanol, isononadecanol, isoeicosanol, isoheneicosanol, isodocosanol, isotricosanol, isotetracosanol, isopentacosanol, isohexacosanol, isoheptacosanol, isooctacosanol, isononacosanol, and isopentadecanol, (3) straight-chain alkenyl alcohols, such as tetradecenol, hexadecenol, heptadecenol, octadecenol, and nonadecenol,(4) branched alkenyl alcohols, such as isohexadecenol and isooctadecenol, (5) cyclic alkyl alcohols, such as cyclopentanol and cyclohexanol, and (6) aromatic alcohols, such as phenol, benzyl alcohol, monostyrenated phenol, distyrenated phenol, and tristyrenated phenol.

[0049] Specific examples of a carboxylic acid used as a raw material of a nonionic surfactant include (1) straight-chain alkyl carboxylic acids, such as octylic acid, nonanoic acid, decanoic acid, undecanoic acid, dodecanoic acid, tridecanoic acid, tetradecanoic acid, pentadecanoic acid, hexadecanoic acid, heptadecanoic acid, octadecanoic acid, nonadecanoic acid, eicosanoic acid, heneicosanoic acid, and docosanoic acid, (2) branched alkyl carboxylic acids, such as 2-ethylhexanoic acid, isododecanoic acid, isotridecanoic acid, isotetradecanoic acid, isohexadecanoic acid, and isooctadecanoic acid, (3) straight-chain alkenyl carboxylic acids, such as octadecenoic acid, octadecadienoic acid, and octadeca-

trienoic acid, and (4) aromatic based carboxylic acid, such as benzoic acid.

[0050] Specific examples of an alkylene oxide used as a raw material of a nonionic surfactant include ethylene oxide and propylene oxide. The number of moles of alkylene oxide added is set as appropriate and is preferably 0.1 to 60 moles, more preferably 1 to 40 moles, and even more preferably 2 to 30 moles. The number of moles of alkylene oxide added represents the number of moles of the alkylene oxide with respect to 1 mole of the alcohol or the carboxylic acid in charged raw materials.

[0051] Specific examples of a polyhydric alcohol used as a raw material of a nonionic surfactant include ethylene glycol, propylene glycol, 1,3-propanediol, 1,2-butanediol, 1,3-butanediol, 1,4-butanediol, 1,4-butanediol, 2-methyl-1,2-propanediol, 1,5-pentanediol, 1,6-hexanediol, 2,5-hexanediol, 2-methyl-2,4-pentanediol, 2,3-dimethyl-2,3-butanediol, glycerin, 2-methyl-2-hydroxymethyl-1,3-propanediol, 2-ethyl-2-hydroxymethyl-1,3-propanediol, trimethylolpropane, sorbitan, pentaerythritol, and sorbitol.

[0052] Preferably, the treatment agent further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C. By blending this oil, for example, the rayon fiber can be imparted with yarn spinning characteristics. Also, the foaming of the aqueous liquid that is prepared from the treatment agent that contains this oil and the surfactant is reduced. With these oils, one type may be used alone or two or more types may be used in combination.

[0053] The state of the oil at 70°C can be measured in accordance with JIS K 0064.

[0054] Specific examples of hydrocarbon compounds include mineral oils and paraffin wax.

[0055] Specific examples of oils and fats include castor oil, sesame oil, tall oil, palm oil, palm kernel oil, coconut oil, rapeseed oil, lard, tallow, whale oil, and hydrogenated oils of these oils.

[0056] Specific examples of esters include butyl stearate, stearyl stearate, glycerin monooleate, glycerin trioleate, sorbitan monolaurate, sorbitan trilaurate, sorbitan monooleate, sorbitan trioleate, sorbitan monostearate, and sorbitan tristearate.

[0057] If the total content of the zinc compound, the surfactant, and the oil in the treatment agent is taken as 100% by mass, the lower limit of the content of the zinc compound, although not restricted in particular, is preferably not less than 0.001% by mass and more preferably not less than 0.01% by mass. If the content of the zinc compound is not less than 0.001% by mass, the foaming of the prepared aqueous liquid can be reduced further. The upper limit of the content of the zinc compound, although not restricted in particular, is preferably not more than 1% by mass. If the content of the zinc compound is not more than 1% by mass, the appearance of the prepared aqueous liquid can be improved further.

[0058] The contents of the respective components mentioned above in the treatment agent are set as appropriate from viewpoints of the effects of the present invention and imparting of yarn spinning characteristics. For example, a sulfated oil is used in a range of 1% to 30% by mass, an anionic surfactant is used in a range of 1% to 50% by mass, an oil is used in a range of 15% to 75% by mass, and a nonionic surfactant is used in a range of 30% to 80% by mass.

[0059] It is noted that, depending on the surfactant or oil used, transition metal ions are contained at times in the treatment agent. For example, a transition metal, such as Ti, Mo, Mn, or Sn, is used as a catalyst in synthesizing an ester and residual transition metal ions are thus contained at times in the treatment agent. As with Ca ions, a foam reducing effect can also be obtained from transition metal ions. From a viewpoint of exhibiting the foam reducing effect in the aqueous liquid, the transition metal ion concentration in the treatment agent is preferably 10 ppm to 30,000 ppm and more preferably 10 ppm to 10,000 ppm.

(Second Embodiment)

[0060] Next, a second embodiment that embodies a viscose rayon according to the present invention will be described. The viscose rayon of the present embodiment has the treatment agent of the first embodiment adhered thereto. As an adhering method, a known method, such as an immersion method, a spraying method, a roller method, a shower method, and a dropping/flow-down method, can be applied. Although not restricted in particular, adhering is conducted in, for example, a yarn spinning step or a post-process step of a refining step. In particular, use on raw stock for yarn spinning in the post-process step of the refining step, that is, before the yarn spinning step is preferable.

[0061] Examples of a form of the treatment agent of the first embodiment in the process of adhering the treatment agent to a viscose rayon fiber include an aqueous liquid. It is not prohibited for a small amount of an organic solvent to be contained within a range in which the effects of the present invention are not impaired. As a treatment method of the viscose rayon fiber, it is preferable to dilute the treatment agent of the first embodiment with water to form an aqueous liquid with a concentration, for example, of 0.5% to 30% by mass and adhere the aqueous liquid such that a ratio as the treatment agent of the first embodiment not including solvent will be 0.01% to 1% by mass with respect to the viscose rayon fiber. By applying at such ratio, excellent yarn spinning characteristics can be imparted in particular to the rayon fiber.

(Third Embodiment)

[0062] A third embodiment that embodies an aqueous liquid of viscose rayon treatment agent according to the present invention (hereinafter referred to as aqueous liquid in some cases) will now be described. The aqueous liquid contains a surfactant-containing viscose rayon treatment agent, a zinc compound, and water. With the present invention, the aqueous liquid excludes a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto. That is, the aqueous liquid of the present invention is different from such a shading composition and is not an aqueous liquid used for shading processing of a fabric such as a woven fabric. Also, the aqueous liquid of the present invention differs from an aqueous liquid used as a viscose rayon spinning bath and is used on a viscose rayon that has been spun.

[0063] The surfactant improves emulsion stability of the aqueous liquid that contains the treatment agent and improves appearance of the aqueous liquid. As specific examples of the surfactant, the specific examples given for the first embodiment can be adopted.

[0064] The zinc compound reduces foaming of the aqueous liquid that contains the surfactant. The aqueous liquid may be prepared by mixing the treatment agent and the zinc compound and thereafter mixing water therewith or may be prepared by mixing the treatment agent and water and thereafter blending the zinc compound therein. As specific examples of the zinc compound, the specific examples given for the first embodiment can be adopted.

[0065] If the total content of the zinc compound, the surfactant, and water in the aqueous liquid is taken as 100% by mass, the lower limit of the content of the zinc compound, although not restricted in particular, is preferably not less than 0.00001% by mass and more preferably not less than 0.0001 % by mass. If the content of the zinc compound is not less than 0.00001% by mass, the foaming of the aqueous liquid can be reduced further. The upper limit of the content of the zinc compound, although not restricted in particular, is preferably not more than 0.4% by mass and more preferably not more than 0.35% by mass. If the content of the zinc compound is not more than 0.4% by mass, the appearance of the aqueous liquid can be improved further.

[0066] Preferably, the aqueous liquid further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C. By blending this oil, for example, the rayon fiber can be imparted with yarn spinning characteristics. As specific examples of the oil, the specific examples given for the first embodiment can be adopted.

[0067] If the total content of the zinc compound, the surfactant, the oil, and water in the treatment agent is taken as 100% by mass, the lower limit of the content of the zinc compound, although not restricted in particular, is preferably not less than 0.00001% by mass and more preferably not less than 0.0001 % by mass. If the content of the zinc compound is not less than 0.00001% by mass, foaming of the aqueous liquid can be reduced further. The upper limit of the content of the zinc compound, although not restricted in particular, is preferably not more than 0.3% by mass. If the content of the zinc compound is not more than 0.3% by mass, the appearance of the aqueous liquid can be improved further.

[0068] The contents of the respective components mentioned above in the aqueous liquid are set as appropriate from viewpoints of the effects of the present invention and imparting of yarn spinning characteristics. For example, a sulfated oil is used in a range of 0.001 % to 6% by mass, an anionic surfactant is used in a range of 0.001% to 10% by mass, an oil is used in a range of 0.02% to 18% by mass, a nonionic surfactant is used in a range of 0.03% to 21% by mass, and water is used in a range of 70% to 99.9% by mass.

[0069] The concentration of solids other than solvent in the aqueous liquid is set as appropriate in accordance with a method of adhering onto rayon, etc., and is, for example, a concentration of 0.5% to 30% by mass.

(Fourth Embodiment)

[0070] Next, a fourth embodiment that embodies a viscose rayon according to the present invention will be described. The viscose rayon of the present embodiment has the aqueous liquid of the third embodiment adhered thereto. As an adhering method, a known method, such as an immersion method, a spraying method, a roller method, a shower method, and a dropping/flow-down method, can be applied. Although not restricted in particular, adhering is conducted in, for example, a yarn spinning step or a post-process step of a refining step. In particular, use on raw stock for yarn spinning in the post-process step of the refining step, that is, before the yarn spinning step is preferable. The aqueous liquid is preferably adhered such that a ratio as solids (total of the zinc compound, the surfactant, and the oil) not including solvent will be 0.01% to 1% by mass with respect to a viscose rayon fiber. By applying at such ratio, excellent yarn spinning characteristics can be imparted in particular to the rayon fiber.

[0071] The operation and effects of the treatment agent, the aqueous liquid, and the viscous rayon of the embodiments will now be described.

(1) The treatment agent or the aqueous liquid of the embodiments contains the zinc compound. Therefore, foaming during preparation of the aqueous liquid from the treatment agent and foaming during use of the aqueous liquid and

especially foaming in a step of adhering the aqueous liquid can be reduced. Also, the surfactant improves the stability of the emulsion that is obtained from the treatment agent and improves the appearance of the aqueous liquid.

(2) In particular, the treatment agent or the aqueous liquid of the embodiments can reduce foaming even when applied to a fiber by a method such as an immersion method, a spraying method, a shower method, or a dropping/flow-down method in which foaming occurs readily.

(3) The treatment agent or the aqueous liquid of the embodiments can improve the stability of the emulsion and reduce foaming. Therefore, especially when used on raw stock for yarn spinning in a post-process step of a refining step, that is, before a yarn spinning step, the treatment agent or the aqueous liquid can be applied to the viscose rayon uniformly and the yarn spinning characteristics are improved further.

[0072] The embodiments described above can be modified as follows. The embodiments described above and the following modifications can be implemented upon being combined with each other within a range that is not technically inconsistent.

[0073] · As stabilizers and antistatic agents for quality maintenance of the treatment agent or the aqueous liquid of the embodiments described above, surfactants, electrostatic preventing agents, binders, antioxidants, ultraviolet absorbers, pH adjusters, and other components besides those mentioned above and ordinarily used in the treatment agent or the aqueous liquid may further be blended in the treatment agent or the aqueous liquid within a range that does not impair the effects of the present invention.

[0074] · The type of water used in preparing the aqueous liquid of the embodiments described above is not restricted in particular and may be distilled water that hardly contains any impurities or may be hard water or soft water that contains Ca ions or Mg ions. From a viewpoint of obtaining a foaming reducing effect by Ca ions and Mg ions, soft water or hard water is preferably applied. From a viewpoint of exhibiting the foaming reducing effect, the concentration of metal ions, such as Ca ions, in the aqueous liquid is preferably 0.1 ppm to 10,000 ppm and more preferably 0.1 ppm to 100 ppm.

[0075] Also, depending on the surfactant or oil used, transition metal ions are contained at times in the treatment agent. For example, a transition metal, such as Ti, Mo, Mn, or Sn, is used as a catalyst in synthesizing an ester and residual transition metal ions are thus contained at times in the treatment agent. As with Ca ions, a foam reducing effect can also be obtained from transition metal ions. From a viewpoint of exhibiting the foam reducing effect, the transition metal ion concentration in the aqueous liquid is preferably 0.1 ppm to 10,000 ppm and more preferably 0.1 ppm to 1,000 ppm.

EXAMPLES

[0076] Examples will be given below to describe the features and the effects of the present invention more specifically, but the present invention is not restricted to these examples. In the following description of working examples and comparative examples, parts means parts by mass and % means % by mass.

[0077] Experimental Part 1 (Preparation of viscose rayon treatment agents)

(Example 1)

[0078] The following materials were used as raw materials of a treatment agent. The numerical values of the respective components represent the contents in the treatment agent.

Zinc compound: Zinc acetate (A-1) 0.1%
Anionic surfactant: Sodium salt of sulfuric acid ester of tall oil fatty acid (B-1) 3%
Anionic surfactant: Sodium salt of sulfuric acid ester of polyoxyethylene (n = 3) oleyl ether (B-2) 3%
Anionic surfactant (sulfated oil): Sodium salt of tallow sulfuric acid ester (C-2) 9%
Nonionic surfactant: Polyoxyethylene (n = 5) stearate (D-1) 9%
Nonionic surfactant: Polyoxyethylene (n = 10) oleate (D-2) 39.9%
Oil: Mineral oil with a viscosity at 20°C of 10 mm^2/s (E-1) 15%
Oil: Tallow (E-2) 21%

(Examples 2 to 20 and Comparative Examples 1 and 2)

[0079] Besides adopting the materials and blending ratios shown in Table 1, treatment agents were prepared by the same procedure as in Example 1. The types of the respective components used in the respective examples and the contents (%) of the respective components in the treatment agents are shown in the "Zinc compound" column, the "Anionic surfactant" column, the "Nonionic surfactant" column, and the "Oil" column in Table 1.

Table 1

Category	Viscose rayon treatment agent											Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil			
						Sulfated oil							
	Type	Amount used (% by mass)	*1 Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 1	A-1	0.1	0.16	B-1 B-2	3 3	C-2	9	D-1 D-2	9 39.9	E-1 E-2	15 21	○○	○○
Example 2	A-1	0.1	0.16	B-4	3	C-2	10	D-1 D-2	9 39.9	E-1 E-2	16 22	○○	○○
Example 3	A-2	1	1.49	B-3	7	C-3	1	D-2 D-3	23 35	E-3 E-5	28 5	○○	○○
Example 4	A-2	1	1.35	B-3	5	C-1	9	D-1 D-4 D-6 D-7 D-8	10 10 24 11 4	E-1 E-2	5 21	○○	○○
Example 5	A-2	1	1.49	B-3	7	C-2	12	D-1 D-4 D-6 D-7 D-8	13 13 12 6 2	E-1 E-2	7 27	○○	○○
Example 6	A-3	0.1	0.17	B-1 B-2	3 3	C-4	11	D-1 D-2	11 29.9	E-1 E-2	18 24	○○	○○
Example 7	A-3	1	1.61	B-4	3	C-5	10	D-1 D-2	9 39	E-1 E-2	16 22	○○	○○
Example 8	A-2	1	1.31	B-1 B-2	2 2	C-1	6	D-1 D-2	6 59	E-1 E-2	10 14	○○	○○

(continued)

Category	Viscose rayon treatment agent											Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil			
						Sulfated oil							
	Type	Amount used (% by mass)	*1 Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 9	A-2	0.1	0.22	B-3	9.9	C-2	3	D-3 D-4 D-5	17 5 11	E-1 E-2 E-3 E-4	2 6 30 16	○○	○○
Example 10	A-2	0.1	0.22	B-3	9.9	C-5	3	D-3 D-4 D-5	17 5 11	E-1 E-2 E-3 E-4	2 6 30 16	○○	○○
Example 11	A-1	0.01	0.019	B-1 B-2	4 4	C-1	12	D-1 D-2	12 20	E-1 E-2	20 27.99	○○	○○
Example 12	A-1	1	1.33	B-4	21	C-1	10	D-1	43	E-1	25	○○	○○
Example 13	A-2	1	1.33	B-1 B-5	5 5	C-3	20	D-5 D-8	24 20	E-1	25	○○	○○
Example 14	A-1	1	1.43	B-3 B-6	5 2	C-2 C-6	6 6	D-3 D-5 D-6	20 20 10	E-3 E-4	15 15	○○	○○
Example 15	A-2	1	3.8			C-2	25			E-1 E-2	20 54	○	○○
Example 16	A-3	0.0001	0.00016	B-1 B-2	3 3	C-1	9	D-1 D-2	9 39.9999	E-1 E-2	15 21	○○	○
Example 17	A-1	1.5	2.34	B-4	5	C-4	10	D-1 D-2	9 38.5	E-3	36	○	○○
Example 18	A-2	1	1.25	B-4	30			D-5 D-6	30 19	E-4	20	○	○○

(continued)

Category	Viscose rayon treatment agent											Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil			
						Sulfated oil							
	Type	Amount used (% by mass)	*1 Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 19	A-2	0.1	0.1	B-3 B-6	10 10	C-3 C-6	20 10	D-2 D-8	25 24.9			○○	○
Example 20	A-2	1	1.25					D-1 D-4 D-8	20 20 39	E-1 E-5	10 10	○	○○
Comparative Example 1				B-1 B-2	3 3	C-1	9	D-1 D-2	9 40	E-1 E-2	15 21	○○	×
Comparative Example 2	A-1	0.1	100							E-3 E-4	80 19.9	×	○○

[0080] In Table 1,

A-1 represents zinc acetate,
A-2 represents zinc sulfate,
A-3 represents zinc nitrate,
B-1 represents sodium salt of sulfuric acid ester of tall oil fatty acid,
B-2 represents sodium salt of sulfuric acid ester of polyoxyethylene (n = 3) oleyl ether,
B-3 represents sodium salt of lauryl sulfonic acid,
B-4 represents potassium salt of lauryl phosphoric acid ester,
B-5 represents sodium salt of lauryl sulfuric acid ester,
B-6 represents sodium salt of sulfuric acid ester of polyoxyethylene (n = 3) lauryl ether,
C-1 represents sodium salt of lard sulfuric acid ester,
C-2 represents sodium salt of tallow sulfuric acid ester,
C-3 represents sodium salt of castor oil sulfuric acid ester,
C-4 represents sodium salt of sesame oil sulfuric acid ester,
C-5 represents sodium salt of tall oil sulfuric acid ester,
C-6 represents triethanolamine salt of castor oil sulfuric acid ester,
D-1 represents polyoxyethylene (n = 5) stearate,
D-2 represents polyoxyethylene (n = 10) oleate,
D-3 represents polyoxyethylene (n = 10) stearate,
D-4 represents polyoxyethylene (n = 3) oleate,
D-5 represents polyoxyethylene (n = 13) oleate,
D-6 represents polyoxyethylene (n = 10) laurate,
D-7 represents polyoxyethylene (n = 8) laurate,
D-8 represents polyoxyethylene (n = 20) sorbitan monooleate,
E-1 represents a mineral oil with a viscosity at 20°C of 10 mm^2/s,
E-2 represents tallow,
E-3 represents a mineral oil with a viscosity at 20°C of 31 mm^2/s,
E-4 represents sorbitan monooleate,
E-5 represents paraffin wax (melting point: 56°C),
F-1 represents water, and
*1 represents the content of the zinc compound if the total content of the zinc compound and the surfactant is taken as 100% by mass.

Experimental Part 2 (Evaluation of treatment agents)

(Evaluation tests)

[0081] Aqueous liquid appearance and aqueous liquid foam tests were performed using the treatment agents of Examples 1 to 20 and Comparative Examples 1 and 2. The procedures of the respective tests are described below. Also, the test results are shown in the "Aqueous liquid appearance" column and the "Aqueous liquid foam test" column of Table 1.

(Aqueous liquid appearance)

[0082] To 10 parts of the treatment agent of each example prepared such as to be of the blending ratios given above, 990 parts of water were added and stirring at 50°C was performed to prepare an aqueous liquid containing 1% of the treatment agent. The appearance of the aqueous liquid was checked visually and evaluated based on the following criteria.

· Evaluation criteria for aqueous liquid appearance

[0083]

○○ (excellent): Precipitation of scum is not seen.
○ (satisfactory): Although scum is slightly precipitated, it mostly floats on the surface and is not of a level that presents a problem in terms of practical use.
× (poor): Much scum is precipitated and the appearance is poor.

(Aqueous liquid foam test)

[0084] 1% aqueous liquids of the treatment agents obtained in Experimental Part 1 were prepared using distilled water and thereafter kept warm at 50°C. Next, 25 g of each aqueous liquid were placed in a 100 mL stoppered graduated cylinder and shaken strongly 30 times in 30 seconds and, after leaving still for 30 seconds, shaken strongly 30 times in 30 seconds again. After then leaving still for 5 minutes, a height from the water surface to the upper surface of foam was measured.

· Evaluation criteria for aqueous liquid foam test

[0085]

○○ (excellent): The height from the water surface to the upper surface of foam is less than 5 cm.
○ (satisfactory): The height from the water surface to the upper surface of foam is not less than 5 cm but less than 10 cm.
× (poor): The height from the water surface to the upper surface of foam is not less than 10 cm.

[0086] As is clear from the results in Table 1, the effect of suppressing the foaming of the aqueous liquid without degrading the appearance of the aqueous liquid is provided by the present invention.

Experimental Part 3 (Preparation of aqueous liquids of viscose rayon treatment agent)

(Example 21)

[0087] The following materials were used as raw materials of an aqueous liquid. The numerical values of the respective components represent the contents in the aqueous liquid.

Zinc compound: Zinc acetate (A-1) 0.001%
Anionic surfactant: Sodium salt of sulfuric acid ester of tall oil fatty acid (B-1) 0.03%
Anionic surfactant: Sodium salt of sulfuric acid ester of polyoxyethylene (n = 3) oleyl ether (B-2) 0.03%
Anionic surfactant (sulfated oil): Sodium salt of tallow sulfuric acid ester (C-2) 0.09%
Nonionic surfactant: Polyoxyethylene (n = 5) stearate (D-1) 0.09%
Nonionic surfactant: Polyoxyethylene (n = 10) oleate (D-2) 0.399%
Oil: Mineral oil with a viscosity at 20°C of 10 mm^2/s (E-1) 0.15%
Oil: Tallow (E-2) 0.21%

[0088] To 10 parts of a treatment agent prepared such as to be of the blending ratios given above, 990 parts of water were added and stirring at 50°C was performed to prepare an aqueous liquid containing 1% of the treatment agent.

(Examples 22 to 40 and Comparative Examples 3 and 4)

[0089] Besides adopting the materials and blending ratios shown in Table 2, aqueous liquids were prepared by the same procedure as in Example 21. The types of the respective components used in the respective examples and the contents (%) of the respective components in the aqueous liquids are shown in the "Zinc compound" column, the "Anionic surfactant" column, the "Nonionic surfactant" column, the "Oil" column, and the "Water" column in Table 2.

Table 2

Category	Aqueous liquid of viscose rayon treatment agent												Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil		Water			
						Sulfated oil									
	Type	Amount used (% by mass)	*2 Amount used (% by mass)	Type	Amount used (%by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 21	A-1	0.001	0.001	B-1 B-2	0.03 0.03	C-2	0.09	D-1 D-2	0.09 0.399	E-1 E-2	0.15 0.21	F-1	99	○○	○○
Example 22	A-1	0.001	0.001	B-4	0.03	C-2	0.1	D-1 D-2	0.09 0.399	E-1 E-2	0.16 0.22	F-1	99	○○	○○
Example 23	A-2	0.1	0.1	B-3	0.7	C-3	0.1	D-2 D-3	2.3 3.5	E-3 E-5	2.8 0.5	F-1	90	○○	○○
Example 24	A-2	0.01	0.01	B-3	0.05	C-1	0.09	D-1 D-4 D-6 D-7 D-8	0.1 0.1 0.24 0.11 0.04	E-1 E-2	0.05 0.21	F-1	99	○○	○○
Example 25	A-2	0.3	0.33	B-3	2.1	C-2	3.6	D-1 D-4 D-6 D-7 D-8	3.9 3.9 3.6 1.8 0.6	E-1 E-2	2.1 8.1	F-1	70	○○	○○
Example 26	A-3	0.001	0.001	B-1 B-2	0.03 0.03	C-4	0.11	D-1 D-2	0.11 0.299	E-1 E-2	0.18 0.24	F-1	99	○○	○○
Example 27	A-3	0.01	0.01	B-4	0.03	C-5	0.1	D-1 D-2	0.09 0.39	E-1 E-2	0.16 0.22	F-1	99	○○	○○
Example 28	A-2	0.05	0.51	B-1 B-2	0.1 0.1	C-1	0.3	D-1 D-2	0.3 2.95	E-1 E-2	0.5 0.7	F-1	95	○○	○○

(continued)

Category	Aqueous liquid of viscose rayon treatment agent												Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil		Water			
						Sulfated oil									
	Type	Amount used (% by mass)	*2 Amount used (% by mass)	Type	Amount used (%by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 29	A-2	0.01	0.01	B-3	0.99	C-2	0.3	D-3 D-4 D-5	1.7 0.5 1.1	E-1 E-2 E-3 E-4	0.2 0.6 3 1.6	F-1	90	○○	○○
Example 30	A-2	0.001	0.001	B-3	0.099	C-5	0.03	D-3 D-4 D-5	0.17 0.05 0.11	E-1 E-2 E-3 E-4	0.02 0.06 0.3 0.16	F-1	99	○○	○○
Example 31	A-1	0.0001	0.0001	B-1 B-2	0.04 0.04	C-1	0.12	D-1 D-2	0.12 0.2	E-1 E-2	0.2 0.2799	F-1	99	○○	○○
Example 32	A-1	0.3	0.32	B-4	6.3	C-1	3	D-1	12.9	E-1	7.5	F-1	70	○○	○○
Example 33	A-2	0.01	0.01	B-1 B-5	0.05 0.05	C-3	0.2	D-5 D-8	0.24 0.2	E-1	0.25	F-1	99	○○	○○
Example 34	A-1	0.01	0.01	B-3 B-6	0.05 0.02	C-2 C-6	0.06 0.06	D-3 D-5 D-6	0.2 0.2 0.1	E-3 E-4	0.15 0.15	F-1	99	○○	○○
Example 35	A-2	0.1	0.11			C-2	2.5			E-1 E-2	2 5.4	F-1	90	○	○○
Example 36	A-3	0.000001	0.000001	B-1 B-2	0.03 0.03	C-1	0.09	D-1 D-2	0.09 0.399999	E-1 E-2	0.15 0.21	F-1	99	○○	○
Example 37	A-1	0.4	0.45	B-4	1.5	C-4	3	D-1 D-2	2.7 11.6	E-3	10.8	F-1	70	○	○○

(continued)

Category	Aqueous liquid of viscose rayon treatment agent												Aqueous liquid appearance	Aqueous liquid foam test
	Zinc compound			Anionic surfactant				Nonionic surfactant		Oil		Water			
						Sulfated oil									
	Type	Amount used (% by mass)	*2 Amount used (% by mass)	Type	Amount used (%by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)	Type	Amount used (% by mass)		
Example 38	A-2	0.01	0.01	B-4	0.3			D-5 D-6	0.3 0.19	E-4	0.2	F-1	99	○	○○
Example 39	A-2	0.001	0.001	B-3 B-6	0.1 0.1	C-3 C-6	0.2 0.1	D-2 D-8	0.25 0.249			F-1	99	○○	○
Example 40	A-2	0.01	0.01					D-1 D-4 D-8	0.2 0.2 0.39	E-1 E-5	0.1 0.1	F-1	99	○	○○
Comparative Example 3				B-1 B-2	0.03 0.03	C-1	0.09	D-1 D-2	0.09 0.4	E-1 E-2	0.15 0.21	F-1	99	○○	×
Comparative Example 4	A-1	0.001	0.001							E-3 E-4	0.8 0.199	F-1	99	×	○○

[0090] Although the representations of components such as A-1 in Table 2 are the same as in Table 1,

*2 represents the content of the zinc compound if the total content of the zinc compound, the surfactant, and water is taken as 100% by mass.

Experimental Part 4 (Evaluation of aqueous liquids)

(Evaluation tests)

[0091] Aqueous liquid appearance and aqueous liquid foam tests were performed using the aqueous liquids of Examples 21 to 40 and Comparative Examples 3 and 4. The evaluation methods and evaluation criteria are the same as in Experimental Part 2. The test results are shown in the "Aqueous liquid appearance" column and the "Aqueous liquid foam test" column of Table 2.

[0092] As is clear from the results in Table 2, the effect of suppressing the foaming of the aqueous liquid without degrading the appearance of the aqueous liquid is provided by the present invention.

[0093] The present invention also encompasses the following embodiments.

(Additional Embodiment 1)

[0094] A viscose rayon treatment agent comprising a zinc compound and a surfactant.

(Additional Embodiment 2)

[0095] The viscose rayon treatment agent according to additional embodiment 1, wherein the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

(Additional Embodiment 3)

[0096] The viscose rayon treatment agent according to additional embodiment 2, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

(Additional Embodiment 4)

[0097] The viscose rayon treatment agent according to additional embodiment 2 or 3, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

(Additional Embodiment 5)

[0098] The viscose rayon treatment agent according to any one of additional embodiments 1 to 4, wherein if the total content of the zinc compound and the surfactant is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 5% by mass.

(Additional Embodiment 6)

[0099] The viscose rayon treatment agent according to any one of additional embodiments 1 to 5, further comprising at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

(Additional Embodiment 7)

[0100] The viscose rayon treatment agent according to additional embodiment 6, wherein if the total content of the zinc compound, the surfactant, and the oil is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 1% by mass.

(Additional Embodiment 8)

[0101] The viscose rayon treatment agent according to any one of additional embodiments 1 to 7, wherein the viscose rayon treatment agent is used on raw stock for yarn spinning.

(Additional Embodiment 9)

[0102] A viscose rayon to which the viscose rayon treatment agent according to any one of additional embodiments 1 to 8 is adhered.

(Additional Embodiment 10)

[0103] An aqueous liquid of viscose rayon treatment agent comprising a viscose rayon treatment agent that contains a surfactant and comprising a zinc compound and water.

(Additional Embodiment 11)

[0104] The aqueous liquid of viscose rayon treatment agent according to additional embodiment 10, wherein the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

(Additional Embodiment 12)

[0105] The aqueous liquid of viscose rayon treatment agent according to additional embodiment 11, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

(Additional Embodiment 13)

[0106] The aqueous liquid of viscose rayon treatment agent according to additional embodiment 11 or 12, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

(Additional Embodiment 14)

[0107] The aqueous liquid of viscose rayon treatment agent according to any one of additional embodiments 10 to 13, wherein if the total content of the zinc compound, the surfactant, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.4% by mass.

(Additional Embodiment 15)

[0108] The aqueous liquid of viscose rayon treatment agent according to any one of additional embodiments 10 to 14, further comprising at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

(Additional Embodiment 16)

[0109] The aqueous liquid of viscose rayon treatment agent according to additional embodiment 15, wherein if the total content of the zinc compound, the surfactant, the oil, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.3% by mass.

(Additional Embodiment 17)

[0110] The aqueous liquid of viscose rayon treatment agent according to any one of additional embodiments 10 to

16, wherein the aqueous liquid is used on raw stock for yarn spinning.

(Additional Embodiment 18)

[0111] A viscose rayon to which the aqueous liquid of viscose rayon treatment agent according to any one of additional embodiments 10 to 17 is adhered.

(Additional Embodiment 19)

[0112] A method for manufacturing a viscose rayon, comprising adhering an aqueous liquid that contains a zinc compound and a surfactant to a viscose rayon.

(Additional Embodiment 20)

[0113] The method for manufacturing a viscose rayon according to additional embodiment 19, wherein the aqueous liquid further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

(Additional Embodiment 21)

[0114] The method for manufacturing a viscose rayon according to additional embodiment 20, wherein the zinc compound is contained in the aqueous liquid at a ratio of 0.00001% to 0.3% by mass.

(Additional Embodiment 22)

[0115] The method for manufacturing a viscose rayon according to additional embodiment 20 or 21, wherein the zinc compound, the surfactant, and the oil are adhered such as to be 0.01% to 1.0% by mass in total with respect to the viscose rayon.

Claims

1. A viscose rayon treatment agent (excluding that which is added to a spinning bath or that which is a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a zinc compound and a surfactant.

2. A viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a zinc compound, a surfactant, and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

3. The viscose rayon treatment agent according to claim 1 or 2, wherein the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

4. A viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a zinc compound and at least an anionic surfactant as a surfactant.

5. The viscose rayon treatment agent according to claim 4, further comprising a nonionic surfactant.

6. The viscose rayon treatment agent according to any one of claims 3 to 5, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

7. The viscose rayon treatment agent according to any one of claims 3 to 6, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an

alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

8. The viscose rayon treatment agent according to any one of claims 1, 4, and 5, wherein if the total content of the zinc compound and the surfactant is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 5% by mass.

9. The viscose rayon treatment agent according to claim 1 or 4, further comprising at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

10. The viscose rayon treatment agent according to claim 2 or 9, wherein if the total content of the zinc compound, the surfactant, and the oil is taken as 100% by mass, the zinc compound is contained at a ratio of 0.001% to 1% by mass.

11. The viscose rayon treatment agent according to any one of claims 1 to 10, wherein the viscose rayon treatment agent is used on raw stock for yarn spinning.

12. A viscose rayon to which the viscose rayon treatment agent according to any one of claims 1 to 11 is adhered.

13. An aqueous liquid of viscose rayon treatment agent (excluding a spinning bath or a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a viscose rayon treatment agent that contains a surfactant and comprising a zinc compound and water.

14. An aqueous liquid of viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a viscose rayon treatment agent that contains a surfactant and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C, a zinc compound, and water.

15. The aqueous liquid of viscose rayon treatment agent according to claim 13 or 14, wherein the surfactant includes at least one selected from among anionic surfactants and nonionic surfactants.

16. An aqueous liquid of viscose rayon treatment agent (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) comprising a viscose rayon treatment agent that contains at least an anionic surfactant as a surfactant and comprising a zinc compound and water.

17. The aqueous liquid of viscose rayon treatment agent according to claim 16, further comprising a nonionic surfactant.

18. The aqueous liquid of viscose rayon treatment agent according to any one of claims 15 to 17, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one sulfated oil selected from among sulfuric acid esters of oils and fats, amine salts of sulfuric acid esters of oils and fats, and alkali metal salts of sulfuric acid esters of oils and fats.

19. The aqueous liquid of viscose rayon treatment agent according to any one of claims 15 to 18, wherein the surfactant includes the anionic surfactant and the anionic surfactant includes at least one selected from among alkali metal salts of sulfuric acid esters of fatty acids with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of aliphatic alcohols with 8 to 24 carbon atoms, alkali metal salts of sulfuric acid esters of compounds having a total of 1 to 20 moles of an alkylene oxide with 2 to 4 carbon atoms added to an aliphatic alcohol with 8 to 24 carbon atoms, alkali metal salts of aliphatic alkyl phosphoric acid esters with 8 to 24 carbon atoms, and alkali metal salts of aliphatic alkyl sulfonic acids with 8 to 24 carbon atoms.

20. The aqueous liquid of viscose rayon treatment agent according to any one of claims 13, 16, and 17, wherein if the total content of the zinc compound, the surfactant, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.4% by mass.

21. The aqueous liquid of viscose rayon treatment agent according to claim 13 or 16, further comprising at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

22. The aqueous liquid of viscose rayon treatment agent according to claim 14 or 21, wherein if the total content of the

zinc compound, the surfactant, the oil, and water is taken as 100% by mass, the zinc compound is contained at a ratio of 0.00001% to 0.3% by mass.

23. The aqueous liquid of viscose rayon treatment agent according to any one of claims 13 to 22, wherein the aqueous liquid is used on raw stock for yarn spinning.

24. A viscose rayon to which the aqueous liquid of viscose rayon treatment agent according to any one of claims 13 to 23 is adhered.

25. A method for manufacturing a viscose rayon, comprising adhering an aqueous liquid (excluding a spinning bath or a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) that contains a zinc compound and a surfactant to a viscose rayon.

26. A method for manufacturing a viscose rayon, comprising adhering an aqueous liquid (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) that contains a zinc compound, a surfactant, and at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C to a viscose rayon.

27. A method for manufacturing a viscose rayon, comprising adhering an aqueous liquid (excluding a shading composition containing a sulfonated Zn phthalocyanine compound with a mono azo dye bonded thereto) that contains a zinc compound and at least an anionic surfactant as a surfactant to a viscose rayon.

28. The method for manufacturing a viscose rayon according to claim 25 or 27, wherein the aqueous liquid further contains at least one oil selected from among hydrocarbon compounds, oils and fats, and esters that are liquid at 70°C.

29. The method for manufacturing a viscose rayon according to claim 26 or 28, wherein the zinc compound is contained in the aqueous liquid at a ratio of 0.00001% to 0.3% by mass.

30. The method for manufacturing a viscose rayon according to claim 28 or 29, wherein the zinc compound, the surfactant, and the oil are adhered such as to be 0.01% to 1.0% by mass in total with respect to the viscose rayon.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/014714

A. CLASSIFICATION OF SUBJECT MATTER

D06M 101/06(2006.01)n; ***D06M 11/44***(2006.01)i; ***D06M 13/165***(2006.01)i; ***D06M 13/256***(2006.01)i; ***D06M 15/53***(2006.01)i; ***D01F 11/02***(2006.01)i
FI: D06M11/44; D06M13/256; D06M15/53; D06M13/165; D01F11/02; D06M101:06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06M101/06; D06M11/44; D06M13/165; D06M13/256; D06M15/53; D01F11/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2021
Registered utility model specifications of Japan 1996-2021
Published registered utility model applications of Japan 1994-2021

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

JSTPlus/JST7580 (JDreamIII); CAplus (STN); Japio-GPG/FX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP 50-25051 B1 (ASAHI KASEI KOGYO CO., LTD.) 20 August 1975 (1975-08-20) entire text	1-30
A	JP 46-7210 B1 (MITSUBISHI RAYON CO., LTD.) 23 February 1971 (1971-02-23) entire text	1-30
A	JP 2012-251265 A (TOYOBO SPECIALTIES TRADING CO., LTD.) 20 December 2012 (2012-12-20) entire text	1-30
A	JP 2013-204205 A (DAIWABO HOLDINGS CO., LTD.) 07 October 2013 (2013-10-07) entire text	1-30
A	JP 2011-501977 A (NANOPOLY CO., LTD.) 20 January 2011 (2011-01-20) entire text	1-30

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2021	**06 July 2021**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2021/014714

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/JP2021/014714

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REFERENCES CITED IN THE DESCRIPTION

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