

DESCRIPTION

Title of the Invention: DEFOAMING AGENT COMPOSITION FOR HYDRAULIC COMPOSITION

Field of the Invention

[0001]

The present invention relates to a defoaming agent composition for hydraulic compositions, a hydraulic composition, a method for producing a hydraulic composition, a method for producing a hardened product of a hydraulic composition, use as a defoaming agent for hydraulic compositions, and a method for solubilizing a defoaming agent.

Background of the Invention

[0002]

Hydraulic powder such as cement and blast furnace slag has a property of reacting with water and hardening, and mixtures thereof with sand are called mortar and mixtures thereof further with gravel are called concrete. These materials, due to being able to be easily changed in their form before being hardened, have been used for various types of constructions. In addition, addition of chemical agents to concrete or the like before being hardened can impart an improvement in the workable time and an improvement in workability. Many of the chemical

agents being used are surfactants, and the use excessively generates bubbles in some cases to thereby cause strength reduction. Hence, many of these chemical agents contain a defoaming agent.

[0003]

For example, JP-A 4-2641 discloses an admixture for an air loss-prevented concrete prepared by using a high-performance water-reducing agent to be added to a concrete in combination with an AE agent and a defoaming agent composed of a specific defoaming agent and an alkaline earth metal salt of alkylbenzenesulfonic acid and being improved in water dilution stability.

[0004]

JP-A 2003-516301 discloses mixing a solubilizing agent with a water-insoluble defoaming agent and a dispersant for cementitious compositions, in order to provide an admixture for a cementitious compositions stable over a long period.

[0005]

JP-A 2006-511418 discloses an admixture for a cementitious compositions stable over time, the admixture being made by mixing an amine solubilizing agent with a water-insoluble defoamer and optionally a dispersant for cementitious compositions.

Summary of the Invention

[0006]

The present invention provides a defoaming agent composition for hydraulic compositions, excellent in storage stability and defoamability.

[0007]

The present invention relates to a defoaming agent composition for hydraulic compositions, containing an anionic surfactant (A) and a defoaming agent (B), wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt.

[0008]

The present invention relates further to an admixture for hydraulic compositions, containing the defoaming agent composition for hydraulic compositions according to the present invention and a dispersant for hydraulic powders.

[0009]

The present invention relates further to a hydraulic composition prepared by compounding the defoaming agent composition for hydraulic compositions according to the present invention, a dispersant for hydraulic powders, a hydraulic powder, an aggregate and water.

[0010]

The present invention relates further to a method for producing a hydraulic composition, including a step

of compounding the defoaming agent composition for hydraulic compositions according to the present invention.

[0011]

The present invention relates further to a method for producing a hardened product of a hydraulic composition, including a step of compounding the defoaming agent composition for hydraulic compositions according to the present invention to thereby prepare a hydraulic composition, and a step of hardening the hydraulic composition.

[0012]

The present invention relates further to use, as a defoaming agent for hydraulic compositions, of a composition containing an anionic surfactant (A) and a defoaming agent (B), wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt.

[0013]

The present invention relates further to a method for solubilizing a defoaming agent for hydraulic compositions with an anionic surfactant (A).

[0014]

The present invention relates further to a method for solubilizing, with an anionic surfactant (A), a defoaming agent for hydraulic compositions in a composition containing water.

[0015]

Hereinafter, the anionic surfactant (A) will be described as component (A); and the defoaming agent (B), as component (B). Further the defoaming agent composition for hydraulic compositions according to the present invention will be called the "defoaming agent composition according to the present invention" in some cases.

[0016]

The defoaming agent composition according to the present invention, due to being excellent in the solubilizing capability of a defoaming agent therein, exhibits so excellent storage stability that the defoaming agent composition does not separate even when being stored for a long period and excellent defoamability even when the defoaming agent composition is added in a small amount. In the case of using the defoaming agent composition for hydraulic compositions according to the present invention, the defoaming agent composition can develop an excellent bubble generation suppressing effect, and can suppress the strength reduction of a hardened product.

Embodiments of the Invention

[0017]

[Defoaming agent composition for hydraulic compositions]

The defoaming agent composition according to the present invention contains the following component (A) and the following component (B).

Component (A): an anionic surfactant being a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt

Component (B): a defoaming agent

The defoaming agent composition according to the present invention provides a defoaming agent composition exhibiting excellent defoamability even when the defoaming agent composition is added in a small amount, and having so excellent storage stability that the defoaming agent composition does not separate even when being stored for a long period. Although the reason for the effects being attained by the defoaming agent composition according to the present invention is not clear, it is presumed that in the defoaming agent composition, component (A) stably solubilizes component (B) whereas for example, in a hydraulic composition or a concrete, component (A) binds with calcium ions and precipitates to lose performance to solubilize component (B), whereby component (B) entrapped in micelles of component (A) is released and develops excellent defoamability. Then, excellence in defoamability allows development of the bubble generation suppressing effect on the hydraulic composition and thus can suppress the

strength reduction of a hardened product of the hydraulic composition.

[0018]

[Component (A)]

The anionic surfactant is a compound whose site exhibiting surface activity is an anion, and has an anionic group at the site. The anionic group the anionic surfactant has functions as an anionic hydrophilic group.

[0019]

Component (A) in the present invention is an anionic surfactant having an anionic group, and the anionic group is unneutralized, or an amine salt, an ammonium salt or an alkali metal salt.

[0020]

The anionic group of component (A) includes a group selected from a sulfate group, a sulfonate group and a carboxyl group. Component (A) is an anionic surfactant having an anionic group selected from a sulfate group, a sulfonate group and a carboxyl group, wherein the anionic group is unneutralized, or an amine salt, an ammonium salt or an alkali metal salt.

[0021]

Among components (A), compounds whose anionic group is unneutralized refer to those in which the anionic group the anionic surfactants have is not a salt.

[0022]

Among components (A), in compounds whose anionic group is an amine salt, the amine salt includes alkanolamine salts and alkylamine salts. The alkanolamine includes alkanolamines having 1 or more and 3 or less alkanol groups having 1 or more and 4 or less carbon atoms. The alkylamine includes alkylamines having 1 or more and 3 or less alkyl groups having 1 or more and 6 or less carbon atoms. From the viewpoint of high early strength, preferable is an alkanolamine selected from diethanolamine and triethanolamine. Further from the viewpoint of solubility in water, preferable is an alkanolamine selected from monoethanolamine, diethanolamine and triethanolamine.

In the compounds whose anionic group is an amine salt, the amine salt includes amine salts of alkylbenzenesulfonic acids having an alkyl group having 10 or more and 18 or less carbon atoms, amine salts of alkyl sulfuric acids having an alkyl group having 10 or more and 18 or less carbon atoms, and amine salts of fatty acids having 10 or more and 18 or less carbon atoms.

More specific compounds thereof include (1) monoethanolamine laurylbenzenesulfonate, diethanolamine laurylbenzenesulfonate, triethanolamine laurylbenzenesulfonate, monoethanolamine myristylbenzenesulfonate, diethanolamine myristylbenzenesulfonate and triethanolamine myristylbenzenesulfonate, (2) monoethanolamine lauryl

sulfate, diethanolamine lauryl sulfate and triethanolamine lauryl sulfate, and (3) monoethanolamine myristate, diethanolamine myristate, triethanolamine myristate, monoethanolamine oleate, diethanolamine oleate and triethanolamine oleate.

[0023]

Among components (A), in the compounds whose anionic group is an ammonium salt, the ammonium salt includes ammonium salts of alkylbenzenesulfonic acids having an alkyl group having 10 or more and 18 or less carbon atoms, ammonium salts of alkyl sulfuric acids having an alkyl group having 10 or more and 18 or less carbon atoms, and ammonium salts of fatty acids having 10 or more and 18 or less carbon atoms.

More specific compounds thereof include (1) ammonium laurylbenzenesulfonate and ammonium myristylbenzenesulfonate, (2) ammonium lauryl sulfate, and (3) ammonium myristate and ammonium oleate. From the viewpoint of economic efficiency, preferable are ammonium laurylbenzenesulfonate and ammonium lauryl sulfate, and more preferable is ammonium laurylbenzenesulfonate.

[0024]

Among components (A), in the compounds whose anionic group is an alkali metal salt, the alkali metal salt includes lithium salts, sodium salts, potassium salts, rubidium salts, cesium salts and francium salts. From the viewpoint of economic efficiency and safety,

preferable are lithium salts, sodium salts and potassium salts, and more preferable are sodium salts and potassium salts. Then, preferable alkali metals include lithium salts, sodium salts and potassium salts; from the viewpoint of economic efficiency and from the viewpoint of safety, preferable are sodium salts and potassium salts, and more preferable are sodium salts.

The compounds whose anionic group is an alkali metal salt include alkali metal salts of alkylbenzenesulfonic acids having an alkyl group having 10 or more and 18 or less carbon atoms, alkali metal salts of alkyl sulfuric acids having an alkyl group having 10 or more and 18 or less carbon atoms, and alkali metal salts of fatty acids having 10 or more and 18 or less carbon atoms.

More specific compounds thereof include (1) sodium laurylbenzenesulfonate, sodium myristylbenzenesulfonate and sodium mixed-alkyl (having 10 to 14 carbon atoms) benzenesulfonates, (2) sodium lauryl sulfate, and (3) potassium myristate and sodium oleate.

[0025]

It is preferable that component (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof.

From the viewpoint of solubility in water and economic efficiency, it is preferable that the number of

carbon atoms of the alkyl group the alkylbenzenesulfonic acids have be 10 or more and 18 or less. From the similar viewpoint, it is preferable that the number of carbon atoms of the alkyl group the alkyl sulfates have be 10 or more and 18 or less. It is preferable that the number of carbon atoms of the alkyl group the alkylsulfonic acids have be 10 or more and 18 or less. It is preferable that the number of carbon atoms the fatty acids have be 10 or more and 18 or less.

[0026]

It is more preferable, from the viewpoint of solubility in water, that component (A) be one or more selected from the group consisting of laurylbenzenesulfonic acid, myristylbenzenesulfonic acid, lauryl sulfuric acid, myristic acid and oleic acid, and ammonium salts and alkali metal salts thereof.

It is more preferable, from the viewpoint of solubility in water, that component (A) be one or more selected from the group consisting of laurylbenzenesulfonic acid, myristylbenzenesulfonic acid, lauryl sulfuric acid, myristic acid and oleic acid, and alkali metal salts thereof.

[0027]

From the viewpoint of low foamability when component (A) is added to a hydraulic composition, component (A) is preferably an anionic surfactant wherein a compound has a Krafft point of 40°C or more provided that an anionic

group thereof is a calcium salt (hereinafter, referred to as a Ca salt-type compound of component (A)). That is, it is preferable that component (A) have a Krafft point of 40°C or more provided that the anionic group thereof is replaced by a calcium salt [a Ca salt-type compound of component (A)]. The Ca salt-type compound of component (A) has a Krafft point of, from the viewpoint of low foamability when it is added to a hydraulic composition, preferably 50°C or more and more preferably 60°C or more.

The Krafft point of the Ca salt-type compound of component (A) can be measured by a conventional method including a measurement method using solubility and a method of using a pigment and measuring coloration. For example, as shown in Examples, in a case where the temperature of a 1% by mass aqueous solution of the Ca salt-type compound of component (A) is 40°C, if it is confirmed by visual observation that the solution causes cloudiness or precipitation, the Krafft point can be judged to be 40°C or more.

[0028]

[Component (B)]

As a defoaming agent of component (B), from the viewpoint of storage stability, there is preferably used a compound which is insoluble in water and is solubilized with component (A). Here, being insoluble in water means that the solubility in 100 g of water at 20°C is 0.01 g or less. Then, it is preferable that HLB (Davies method)

of component (B) be less than 0. In addition, it is preferable that HLB (Griffin method) of component (B) be 8 or less. Further, it is preferable that a 1% by mass water suspension of component (B) be visually separated or clouded. Further, it is preferable that the turbidity of a 1% by mass water suspension of component (B) be 100 NTU or more. Further, it is preferable that component (B) have no foamability. Here, the turbidity of the 1% by mass water suspension can be measured using a portable turbidimeter TN100IR (manufactured by Nikko Hansen & Co., Ltd.).

[0029]

It is preferable that component (B) be a non-ionic defoaming agent.

Component (B) is, from the viewpoint of defoamability, preferably one or two or more compounds selected from polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols. More preferable are these compounds which are insoluble in water. Among these, it is preferable that compounds having a polyoxyalkylene group be ones having a polyoxypropylene group as the polyoxyalkylene group. Component (B) is, from the viewpoint of defoamability,

more preferably one or two or more compounds selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols.

[0030]

The polysiloxane includes polysiloxane, dimethylpolysiloxane and polyhydroxymethylsiloxane.

[0031]

The polyoxyethylene polyoxypropylene includes polyoxyethylene polyoxypropylene random polymers and polypropylene oxide-polyethylene oxide-polypropylene oxide block polymers. From the viewpoint of defoamability, it is preferable that the weight-average molecular weight of these be 2,000 or more and 100,000 or less.

[0032]

The polypropylene oxide and derivatives thereof include polyoxypropylene glyceryl ether and polyoxypropylene. It is preferable from the viewpoint of defoamability that the weight-average molecular weight of these polypropylene oxide moieties be 2,000 or more and 100,000 or less.

[0033]

The acetylene glycol and derivatives thereof include commercially available products such as Acetylenol E00 and Acetylenol E13 (all manufactured by Kawaken Fine Chemicals Co., Ltd.) and DYNOL(R) 604, SURFYNOL(R) 440, SURFYNOL(R) 104, SURFYNOL(R) 2502, SURFYNOL(R) 420 and SURFYNOL(R) DF-75 (all manufactured by Air Products and Chemicals, Inc.). The derivatives of acetylene glycol include alkylene oxide adducts of acetylene glycol. From the viewpoint of defoamability, it is preferable that the average number of moles of added alkylene oxide be 2,000 or more and 100,000 or less. As the alkylene oxide, propylene oxide is preferable. That is, it is preferable that the alkylene oxide adducts of acetylene glycol be propylene oxide adducts of acetylene glycol. As the alkylene oxide adducts of acetylene glycol, preferable are also alkylene oxide adducts of acetylene glycol containing propylene oxide as the alkylene oxide.

[0034]

The polyoxyalkylene fatty acid esters include alkylene oxide adducts of fatty acids having 4 to 22 carbon atoms. From the viewpoint of defoamability, it is preferable that the average number of moles of added alkylene oxide be 1 or more and 100 or less. Further from the similar viewpoint, it is preferable that the alkylene oxide contain propylene oxide. That is, as the polyoxyalkylene fatty acid esters, polyoxypropylene fatty acid esters are preferable. As the polyoxyalkylene fatty

acid esters, preferable are also polyoxyalkylene fatty acid esters containing polyoxypropylene as the polyoxyalkylene.

[0035]

The polyoxyalkylene alkyl ethers include alkylene oxide adducts of alcohols having 4 to 22 carbon atoms. From the viewpoint of defoamability, it is preferable that the average number of moles of added alkylene oxide be 1 or more and 100 or less. From the similar viewpoint, as the alkylene oxide, propylene oxide is preferable. That is, as the polyoxyalkylene alkyl ethers, polyoxypropylene alkyl ethers are preferable. As the polyoxyalkylene alkyl ethers, preferable are also polyoxyalkylene alkyl ethers containing polyoxypropylene as the polyoxyalkylene. The polyoxyalkylene alkyl ethers specifically include polypropylene glycol lauryl ether, polypropylene glycol myristyl ether and mixtures thereof.

[0036]

The polyoxyalkylene alkylamides include alkylene oxide adducts of amides of fatty acids having 8 to 22 carbon atoms with amines such as monoethanolamine and diethanolamine. From the viewpoint of defoamability, it is preferable that the average number of moles of added alkylene oxide be 1 or more and 100 or less. From the similar viewpoint, as the alkylene oxide, propylene oxide is preferable. That is, as the polyoxyalkylene alkylamides, polyoxypropylene alkylamides are preferable.

That is, as the polyoxyalkylene alkylamides, preferable are also polyoxyalkylene alkylamides containing polyoxypropylene as the polyoxyalkylene.

[0037]

The trialkyl phosphates include tributyl phosphate and triisobutyl phosphate. From the viewpoint of defoamability, it is preferable that the number of carbon atoms of the alkyl group be 1 or more and 5 or less.

[0038]

The alkylamines include monoalkylamines, dialkylamines and trialkylamines. From the viewpoint of poor solubility in water and defoamability, preferable are monomethylalkylamines whose alkyl group has 8 or more and 18 or less carbon atoms, and dimethylalkylamines whose alkyl group has 8 or more and 18 or less carbon atoms.

[0039]

The alcohols include alcohols having 4 to 22 carbon atoms, preferably monohydric alcohols having 4 to 22 carbon atoms. From the viewpoint of defoamability, it is preferable that the number of carbon atoms of the alcohols be 6 or more and 18 or less.

[0040]

Suitable examples of the defoaming agent include: as polysiloxane, SAGTEX DSA(TM); as polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers or polyoxyalkylene alkylamides, polypropylene glycol lauryl

ether, polypropylene glycol myristyl ether and mixtures thereof, propylene oxide/ethylene oxide adducts of oleic acid, SN Defoamer 260(TM), SN Defoamer 265(TM) and SN Defoamer 466(TM) (all manufactured by San Nopco Ltd.), and defoaming agents NO. 21(TM) and NO. 8(TM) (all manufactured by Kao Corp.); as acetylene glycol, DYNOL(TM) 604 and SURFYNOL(R) 440; as trialkyl phosphates, tributyl phosphate and triisobutyl phosphate; as alcohols, 2-ethylhexanol; as polyoxyethylene polyoxypropylene, Newpol PE-61(TM) and Newpol PE-71(TM) (all manufactured by Sanyo Chemical Industries, Ltd.); and as polyoxypropylene, polypropylene glycol whose molecular weight is 2,000 or more and 100,000 or less.

[0041]

Then, from the viewpoint of storage stability, the defoaming agent preferably includes: as polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers or polyoxyalkylene alkylamides, polypropylene glycol lauryl ether, polypropylene glycol myristyl ether and mixtures thereof, propylene oxide/ethylene oxide adducts of oleic acid, SN Defoamer 260(TM), SN Defoamer 265(TM) and SN Defoamer 466(TM), and SHOHOZAI NO. 21(TM) and SHOHOZAI NO. 8(TM); as acetylene glycol, DYNOL(TM) 604 and SURFYNOL(R) 440; as trialkyl phosphates, tributyl phosphate and triisobutyl phosphate; as alcohols, 2-ethylhexanol; as polyoxyethylene polyoxypropylene, Newpol PE-61(TM) and Newpol PE-71(TM); and as polyoxypropylene, polypropylene

glycol whose molecular weight is 2,000 or more and 100,000 or less.

[0042]

Then, from the viewpoint of economic efficiency, the defoaming agent preferably includes: as polysiloxane, DK Q1-1183(TM); as polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers or polyoxyalkylene alkylamides, SN Defoamer 260(TM), SN Defoamer 265(TM) and SN Defoamer 466(TM), and defoaming agents NO. 21(TM) and NO. 8(TM); as trialkyl phosphates, tributyl phosphate and triisobutyl phosphate; as alcohols, 2-ethylhexanol; as polyoxyethylene polyoxypropylene, Newpol PE-61(TM) and Newpol PE-71(TM); and as polyoxypropylene, polypropylene glycol whose molecular weight is 2,000 or more and 100,000 or less.

[0043]

[Composition and others]

The mass ratio (A)/(B) of component (A) to component (B) in the defoaming agent composition according to the present invention is, from the viewpoint of storage stability, preferably 0.1 or more, more preferably 0.5 or more and furthermore preferably 0.8 or more, and then preferably 5 or less, more preferably 3 or less and furthermore preferably 2 or less.

[0044]

Then, the content of component (A) in the defoaming agent composition according to the present invention is,

from the viewpoint of storage stability and defoamability, preferably 1% by mass or more, more preferably 5% by mass or more and furthermore preferably 10% by mass or more, and then preferably 90% by mass or less, more preferably 70% by mass or less, further preferably 50% by mass or less and furthermore preferably 40% by mass or less.

[0045]

Then, the content of component (B) in the defoaming agent composition according to the present invention is, from the viewpoint of defoamability, preferably 10% by mass or more, more preferably 30% by mass or more and furthermore preferably 50% by mass or more, and then preferably 99% by mass or less, more preferably 95% by mass or less and furthermore preferably 90% by mass or less.

[0046]

It is preferable that the defoaming agent composition according to the present invention contain water. Water is a component constituting the rest of the composition, and is used in an amount such that the total amount thereof with component (A), component (B) and optional components becomes 100% by mass.

[0047]

In a case where the defoaming agent composition according to the present invention contains water, the pH at 20°C is preferably 1 or more and more preferably 3 or

more, and then preferably 14 or less and more preferably 10 or less.

[0048]

The defoaming agent composition according to the present invention can contain a salt obtained by a reaction of component (A) with component (B). Such a salt specifically includes salts obtained by a reaction of alkyl sulfates with dimethylalkylamines.

[0049]

In a case where the defoaming agent composition according to the present invention contains water, the defoaming agent composition is preferably prepared by making component (B) solubilized with component (A). The solubilization of component (B) with component (A) can be confirmed by turbidity, transmitted light intensity or appearance observation. It is preferable that the defoaming agent composition according to the present invention be a transparent composition, and it is more preferable that the defoaming agent composition according to the present invention be a transparent composition containing component (A), component (B) and water. Here, being transparent refers to a solution homogeneous, not separating over a long period and stable. For example, as shown in Examples, the defoaming agent composition can be judged to be a transparent composition in a case where it is confirmed that the composition is visually transparent and causes no separation when in storage

thereof at 40°C for 1 month. Further, the defoaming agent composition can also be judged to be transparent in a case where no visual separation is recognized and the turbidity measured using a turbidimeter is 100 NTU or less.

[0050]

The defoaming agent composition according to the present invention can contain, in addition to component (A) and component (B), other components allowed to be added to hydraulic compositions, such as a cement dispersant, a retarder and a hardening accelerator.

[0051]

A preferable form of the defoaming agent composition for hydraulic compositions according to the present invention will be described hereinafter.

A defoaming agent composition for hydraulic compositions, containing an anionic surfactant (A) and a defoaming agent (B),

wherein the anionic surfactant (A) is one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

that is, the anionic surfactant (A) is one or more selected from the group consisting of alkylbenzenesulfonic acids, amine salts of alkylbenzenesulfonic acids, ammonium salts of

alkylbenzenesulfonic acids, alkali metal salts of alkylbenzenesulfonic acids, alkyl sulfates, amine salts of alkyl sulfates, ammonium salts of alkyl sulfates, alkali metal salts of alkyl sulfates, alkylsulfonic acids, amine salts of alkylsulfonic acids, ammonium salts of alkylsulfonic acids, alkali metal salts of alkylsulfonic acids, fatty acids, amine salts of fatty acids, ammonium salts of fatty acids and alkali metal salts of fatty acids;

the anionic surfactant (A) is preferably one or more selected from the group consisting of alkylbenzenesulfonic acids, alkali metal salts of alkylbenzenesulfonic acids, fatty acids and alkali metal salts of fatty acids;

the defoaming agent (B) is one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) is 0.1 or more, preferably 0.5 or more and more preferably 0.8 or more, and then 5 or less, preferably 3 or less and more preferably 2 or less.

(A) is component (A), and (B) is component (B), and the above-mentioned respective preferable forms can be applied.

[0052]

The present invention provides a method for producing a defoaming agent composition for hydraulic compositions, including mixing the following component (A) and the following component (B).

The present invention further provides a method for producing a defoaming agent composition for hydraulic compositions, including mixing the following component (A), the following component (B) and water.

Component (A): an anionic surfactant being a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt

Component (B): a defoaming agent

Preferable forms of component (A) and component (B) to be used in the method for producing a defoaming agent composition for hydraulic compositions according to the present invention are the same as those in the defoaming agent composition according to the present invention. By mixing component (B) with component (A) being unneutralized, or being an amine salt, an ammonium salt or an alkali metal salt, there is obtained a defoaming agent composition which stably retains the solubilized

state of component (B) and is excellent in storage stability.

[0053]

In the present invention, the matters having been described for the defoaming agent composition for hydraulic compositions can be applied, as they are or on permissible changes and modifications as understood by those skilled in the art, to the following aspects of the present invention: a hydraulic composition, a method for producing a hydraulic composition, a method for producing a hardened product of a hydraulic composition, use as a defoaming agent for hydraulic compositions, and a method for solubilizing a defoaming agent.

[0054]

[Admixture composition for hydraulic compositions]

The admixture for hydraulic compositions according to the present invention contains the defoaming agent composition for hydraulic compositions according to the present invention, and a dispersant for hydraulic powders.

That is, the admixture composition for hydraulic compositions according to the present invention is an admixture composition for hydraulic compositions, containing an anionic surfactant (A), a defoaming agent (B) and a dispersant for hydraulic powders, wherein the (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt.

[0055]

Preferable forms of component (A) and component (B) to be used in the admixture composition for hydraulic compositions according to the present invention are the same as those in the defoaming agent composition according to the present invention.

[0056]

The dispersant for hydraulic powders includes dispersants for common hydraulic powders, for example, for cement, such as naphthalenesulfonic acid-based dispersants, polycarboxylic acid-based dispersants, lignin-based dispersants, melamine-based dispersants, polystyrenesulfonic acid-based dispersants, acetone-based dispersants and aminosulfonic acid-based dispersants.

[0057]

The mass ratio (A)/(B) of component (A) to component (B) in the admixture composition for hydraulic compositions according to the present invention is, from the viewpoint of storage stability, preferably 0.1 or more, more preferably 0.5 or more and furthermore preferably 0.8 or more, and then preferably 5 or less, more preferably 3 or less and furthermore preferably 2 or less.

[0058]

Then, the content of component (A) in the admixture composition for hydraulic compositions according to the present invention is, from the viewpoint of defoamability

and storage stability, preferably 0.001% by mass or more and more preferably 0.01% by mass or more, and then preferably 15% by mass or less and more preferably 5% by mass or less.

[0059]

Then, the content of component (B) in the admixture composition for hydraulic compositions according to the present invention is, from the viewpoint of defoamability, preferably 0.01% by mass or more and more preferably 0.05% by mass or more, and then preferably 3% by mass or less and more preferably 1% by mass or less.

[0060]

Then, the content of the dispersant for hydraulic powders in the admixture composition for hydraulic compositions according to the present invention is, from the viewpoint of viscosity and storage stability, preferably 5% by mass or more and more preferably 10% by mass or more, and then preferably 60% by mass or less and more preferably 50% by mass or less.

[0061]

It is preferable that the admixture composition for hydraulic compositions according to the present invention contain water. Water is a component constituting the rest of the composition, and is used in an amount such that the total amount thereof with component (A), component (B), the dispersant for hydraulic powders, and optional components becomes 100% by mass.

[0062]

In a case where the admixture composition for hydraulic compositions according to the present invention contains water, the pH at 20°C is preferably 1 or more and more preferably 3 or more, and then preferably 14 or less and more preferably 10 or less.

[0063]

The admixture composition for hydraulic compositions according to the present invention can contain, as optional components, a retarder, a hardening accelerator, an AE agent, an expansive additive, a foaming agent, a thickener, a superplasticizer, a blowing agent, a waterproofing agent and the like.

[0064]

In the admixture composition for hydraulic compositions according to the present invention, it is preferable that:

the anionic surfactant (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

the defoaming agent (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters,

polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) be 0.1 or more, further 0.5 or more and further 0.8 or more, and then 5 or less, further 3 or less and further 2 or less.

[0065]

The present invention provides a method for producing an admixture composition for hydraulic compositions, including mixing the following component (A), the following component (B) and a dispersant for hydraulic powders.

The present invention further provides a method for producing an admixture composition for hydraulic compositions, including mixing the following component (A), the following component (B), a dispersant for hydraulic powders and water.

Component (A): an anionic surfactant being a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt

Component (B): a defoaming agent

Preferable forms of component (A) and component (B) to be used in the method for producing an admixture composition for hydraulic compositions according to the present invention are the same as those in the defoaming

agent composition according to the present invention. A preferable form of the dispersant for hydraulic powders to be used in the method for producing an admixture composition for hydraulic compositions according to the present invention is the same as that in the admixture composition for hydraulic compositions. By mixing component (B) with component (A) being unneutralized or being an amine salt, an ammonium salt or an alkali metal salt, there is obtained an admixture composition for hydraulic compositions which stably retains the solubilized state of component (B) and is excellent in storage stability.

[0066]

In the method for producing an admixture composition for hydraulic compositions according to the present invention, it is preferable that:

the anionic surfactant (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

the defoaming agent (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene

alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the method include mixing so that the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) becomes 0.1 or more, further 0.5 or more and further 0.8 or more, and then 5 or less, further 3 or less and further 2 or less.

[0067]

[Hydraulic composition]

The hydraulic composition according to the present invention is prepared by compounding the defoaming agent composition for hydraulic compositions according to the present invention, a dispersant for hydraulic powders, a hydraulic powder, an aggregate and water.

That is, the hydraulic composition according to the present invention is a hydraulic composition prepared by compounding an anionic surfactant (A), a defoaming agent (B), a dispersant for hydraulic powders, a hydraulic powder, an aggregate and water, wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt.

[0068]

Preferable forms of component (A) and component (B) to be used in the hydraulic composition according to the present invention are the same as those in the defoaming agent composition according to the present invention.

Further, a preferable form of the dispersant for hydraulic powders to be used in the hydraulic composition according to the present invention is the same as that in the admixture composition for hydraulic compositions according to the present invention.

[0069]

The aggregate includes one selected from a fine aggregate and a coarse aggregate. The fine aggregate includes one specified in No. 2311 in JIS A0203-2014. The fine aggregate includes river sand, pit sand, mountain sand, sea sand, lime sand and silica sand, crushed sand thereof, blast furnace slag fine aggregate, ferronickel slag fine aggregate, light-weight fine aggregate (artificial and natural) and reclaimed fine aggregate. Then, the coarse aggregate includes one specified in No. 2312 in JIS A0203-2014. Examples of the coarse aggregate include river gravel, pit gravel, mountain gravel, sea gravel and lime gravel, crushed stone thereof, blast furnace slag coarse aggregate, ferronickel slag coarse aggregate, light-weight coarse aggregate (artificial and natural) and reclaimed coarse aggregate. The fine aggregate and the coarse aggregate may be used by mixing different kinds thereof or may be used in a single kind thereof.

[0070]

The mass ratio (A)/(B) of component (A) to component (B) in the hydraulic composition according to the present

invention is, from the viewpoint of storage stability, preferably 0.1 or more, more preferably 0.5 or more and further preferably 0.8 or more, and then preferably 5 or less, more preferably 3 or less and further preferably 2 or less.

[0071]

In the hydraulic composition according to the present invention, from the viewpoint of foamability and storage stability, component (A) is compounded, per 100 parts by mass of the hydraulic powder, preferably in 0.00000017 parts by mass or more and more preferably in 0.000001 parts by mass or more, and then preferably in 0.1 parts by mass or less and more preferably in 0.01 parts by mass or less.

[0072]

Further, in the hydraulic composition according to the present invention, from the viewpoint of defoamability, component (B) is compounded, per 100 parts by mass of the hydraulic powder, preferably in 0.0000017 parts by mass or more and more preferably in 0.00001 parts by mass or more, and then preferably in 3 parts by mass or less and more preferably in 1 part by mass or less.

[0073]

Further, in the hydraulic composition according to the present invention, from the viewpoint of workability, the dispersant for hydraulic powders is compounded, per

100 parts by mass of the hydraulic powder, preferably in 0.01 parts by mass or more and more preferably in 0.05 parts by mass or more, and then preferably in 5 parts by mass or less and more preferably in 3 parts by mass or less.

[0074]

Further in the hydraulic composition according to the present invention, from the viewpoint of workability, the ratio (mass ratio) of water/hydraulic powder is preferably 0.15 or more and more preferably 0.2 or more, and then preferably 2 or less and more preferably 1 or less.

[0075]

In a case where the hydraulic composition is a concrete, the amount of coarse aggregate to be used is, from the viewpoint of development of the strength of the hydraulic composition, reduction of the amount of a hydraulic powder such as a cement to be used, and improvement of fillability into formwork or the like, in bulk volume, preferably 50% or more, more preferably 55% or more and further preferably 60% or more, and then preferably 100% or less, more preferably 90% or less and further preferably 80% or less. The bulk volume is a proportion of the volume (including voids) of coarse aggregate in 1 m³ of the concrete.

In a case where the hydraulic composition is a concrete, the amount of fine aggregate to be used is,

from the viewpoint of improvement of fillability into formwork or the like, preferably 500 kg/m³ or more, more preferably 600 kg/m³ or more and further preferably 700 kg/m³ or more, and then preferably 1,000 kg/m³ or less and more preferably 900 kg/m³ or less.

In a case where the hydraulic composition is a mortar, the amount of fine aggregate to be used is preferably 800 kg/m³ or more, more preferably 900 kg/m³ or more and further preferably 1,000 kg/m³ or more, and then preferably 2,000 kg/m³ or less, more preferably 1,800 kg/m³ or less and further preferably 1,700 kg/m³ or less.

[0076]

The hydraulic composition according to the present invention can contain, as optional components, a retarder, a hardening accelerator, an AE agent, an expansive additive, a foaming agent, a thickener, a superplasticizer, a blowing agent, a waterproofing agent and the like.

[0077]

In the hydraulic composition according to the present invention, it is preferable that:

the anionic surfactant (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

the defoaming agent (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) be 0.1 or more, further 0.5 or more and further 0.8 or more, and then 5 or less, further 3 or less and further 2 or less.

[0078]

[Method for producing a hydraulic composition]

The method for producing a hydraulic composition according to the present invention includes a step of compounding the defoaming agent composition for hydraulic compositions according to the present invention.

Specifically, the method for producing a hydraulic composition according to the present invention includes a step of mixing the defoaming agent composition for hydraulic compositions according to the present invention, a dispersant for hydraulic powders, a hydraulic powder, an aggregate and water. The mixing of these components can be carried out by a known method.

[0079]

Preferable forms of component (A) and component (B) to be used in the method for producing a hydraulic composition according to the present invention are the same as those in the defoaming agent composition according to the present invention. Then, a preferable form of the dispersant for hydraulic powders to be used in the method for producing a hydraulic composition according to the present invention is the same as that in the admixture composition for hydraulic compositions according to the present invention. Further a preferable form of the aggregate to be used in the method for producing a hydraulic composition according to the present invention is the same as that in the hydraulic composition according to the present invention.

[0080]

In the method for producing a hydraulic composition according to the present invention, from the viewpoint of defoamability, component (A) and component (B) are compounded so that the mass ratio (A)/(B) becomes preferably 0.1 or more, more preferably 0.5 or more and furthermore preferably 0.8 or more, and then preferably 5 or less, more preferably 3 or less and furthermore preferably 2 or less.

[0081]

Further, in the method for producing a hydraulic composition according to the present invention, from the viewpoint of foamability and storage stability, component

(A) is compounded, per 100 parts by mass of the hydraulic powder, preferably in 0.00000017 parts by mass or more and more preferably in 0.000001 parts by mass or more, and then preferably in 0.1 parts by mass or less and more preferably in 0.01 parts by mass or less.

[0082]

Further in the method for producing a hydraulic composition according to the present invention, from the viewpoint of defoamability, component (B) is compounded, per 100 parts by mass of the hydraulic powder, preferably in 0.00000017 parts by mass or more and more preferably in 0.000001 parts by mass or more, and then preferably in 3 parts by mass or less and more preferably in 1 part by mass or less.

[0083]

Further, in the method for producing a hydraulic composition according to the present invention, from the viewpoint of workability, the dispersant for hydraulic powders is compounded, per 100 parts by mass of the hydraulic powder, preferably in 0.01 parts by mass or more and more preferably in 0.05 parts by mass or more, and then preferably in 5 parts by mass or less and more preferably in 3 parts by mass or less.

[0084]

Further, in the method for producing a hydraulic composition according to the present invention, from the viewpoint of workability, water and the hydraulic powder

are compounded so that the ratio (mass ratio) of water/hydraulic composition is preferably 0.15 or more and more preferably 0.2 or more, and then preferably 2 or less and more preferably 1 or less.

[0085]

In a case where the hydraulic composition is a concrete, the amount of coarse aggregate to be used is, from the viewpoint of development of the strength of the hydraulic composition, reduction of the amount of a hydraulic powder such as a cement to be used, and improvement of fillability into formwork or the like, in bulk volume, preferably 50% or more, more preferably 55% or more and further preferably 60% or more, and then preferably 100% or less, more preferably 90% or less and further preferably 80% or less. The bulk volume is a proportion of the volume (including voids) of coarse aggregate in 1 m³ of the concrete.

Further, in a case where the hydraulic composition is a concrete, the amount of fine aggregate to be used is, from the viewpoint of improvement of fillability into formwork or the like, preferably 500 kg/m³ or more, more preferably 600 kg/m³ or more and further preferably 700 kg/m³ or more, and then preferably 1,000 kg/m³ or less and more preferably 900 kg/m³ or less.

In a case where the hydraulic composition is a mortar, the amount of fine aggregate to be used is preferably 800 kg/m³ or more, more preferably 900 kg/m³

or more and further preferably 1,000 kg/m³ or more, and then preferably 2,000 kg/m³ or less, more preferably 1,800 kg/m³ or less and further preferably 1,700 kg/m³ or less.

[0086]

In the method for producing a hydraulic composition according to the present invention, it is preferable that:

the anionic surfactant (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

the defoaming agent (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the defoaming agent composition for hydraulic compositions according to the present invention be compounded so that the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) becomes 0.1 or more, further 0.5 or more and further 0.8 or more, and then 5 or less, further 3 or less and further 2 or less.

[0087]

[Method for producing a hardened product of a hydraulic composition]

The method for producing a hardened product of a hydraulic composition according to the present invention includes a step of compounding the defoaming agent composition for hydraulic compositions according to the present invention to thereby prepare a hydraulic composition, and a step of hardening the hydraulic composition.

The step of preparing the hydraulic composition can adopt the method for producing a hydraulic composition according to the present invention. To this step, the preferable forms described in the method for producing a hydraulic composition according to the present invention can suitably be applied.

The step of hardening the hydraulic composition can adopt a known method of hardening hydraulic compositions. The step of hardening the hydraulic composition can be carried out in consideration of applications, the shape and the like of the hardened product.

[0088]

In the method for producing a hardened product of a hydraulic composition according to the present invention, it is preferable that:

the anionic surfactant (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids,

alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof;

the defoaming agent (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the defoaming agent composition for hydraulic compositions according to the present invention be compounded so that the mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) becomes 0.1 or more, further 0.5 or more and further 0.8 or more, and then 5 or less, further 3 or less and further 2 or less.
[0089]

[Use as a defoaming agent composition for hydraulic compositions]

The present invention is related to use, as a defoaming agent for hydraulic compositions, of a composition containing an anionic surfactant (A) and a defoaming agent (B), wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt. Preferable forms

of component (A) and component (B) to be used in the use according to the present invention are the same as those in the defoaming agent composition according to the present invention.

[0090]

In the use according to the present invention, from the viewpoint of low foamability when component (A) is added to a hydraulic composition, component (A) is preferably an anionic surfactant wherein a Ca salt-type compound of component (A) has a Krafft point of 40°C or more. That is, it is preferable that component (A) have a Krafft point of 40°C or more provided that the anionic group thereof is replaced by a calcium salt [a Ca salt-type compound of component (A)]. The Ca salt-type compound of component (A) has a Krafft point of, from the viewpoint of low foamability when it is added to a hydraulic composition, preferably 50°C or more and more preferably 60°C or more.

[0091]

Further in the use according to the present invention, it is preferable that the composition be transparent.

[0092]

Further, in the use according to the present invention, it is preferable that component (A) be one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic

acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof. It is more preferable that component (A) be one or more selected from the group consisting of laurylbenzenesulfonic acid, myristylbenzenesulfonic acid, lauryl sulfuric acid, myristic acid and oleic acid, and ammonium salts and alkali metal salts thereof.

[0093]

Further, in the use according to the present invention, it is preferable that component (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols. It is more preferable that component (B) be one or more selected from the group consisting of polysiloxane, polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols.

[0094]

In the use according to the present invention, the mass ratio (A)/(B) of component (A) to component (B) in the composition is, from the viewpoint of storage stability, preferably 0.1 or more, more preferably 0.5 or more and furthermore preferably 0.8 or more, and then preferably 5 or less, more preferably 3 or less and furthermore preferably 2 or less.

[0095]

In the use according to the present invention, it is preferable that the composition contain water. Water is a component constituting the rest of the composition, and is used in an amount such that the total amount thereof with component (A), component (B) and optional components becomes 100% by mass.

[0096]

[Method for solubilizing a defoaming agent]

The present invention relates to a method for solubilizing a defoaming agent for hydraulic compositions with an anionic surfactant (A). In detail, the present invention relates to a method for solubilizing, with the anionic surfactant (A), a defoaming agent for hydraulic compositions in a composition containing. It is preferable that the anionic surfactant (A) be component (A) according to the present invention. That is, it is preferable that the anionic surfactant (A) be a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an

alkali metal salt. It is preferable that the defoaming agent be component (B) according to the present invention. Preferable forms of component (A) and component (B) to be used in the method according to the present invention are the same as those in the defoaming agent composition according to the present invention.

Examples

[0097]

(1) Storage stability test

There were prepared defoaming agent compositions each containing component (A), component (B) and water in ratios corresponding to amounts added indicated in Table 1. The content of the total of component (A) and component (B) in the defoaming agent composition was 10% by mass (the balance was water).

There were further prepared admixture compositions each containing a dispersant for hydraulic powders, component (A), component (B) and water in ratios corresponding to amounts added indicated in Table 1. The content of the total of the dispersant for hydraulic powders, component (A) and component (B) in the admixture composition was 0.1% by mass (the rest was water).

The obtained defoaming agent compositions or admixture compositions were each put in a glass-made sample bottle; and there was observed their appearance when they were allowed to stand still in a

thermohygrostatic chamber at 40°C for 1 month and the storage stability was checked from the presence/absence of separation and the turbidity. The results are shown in Table 1.

Here, the turbidity of the defoaming agent composition was measured by the following method.

The measurement of the turbidity used a portable turbidimeter TN100IR (manufactured by Nikko Hansen & Co., Ltd.).

Any of the defoaming agent compositions of the Examples exhibited no separation after storage, and had a turbidity of 5 NTU, which was judged to be transparent.

[0098]

There are further shown in Table 1 the results by visual observation of the appearances of 1% by mass aqueous solutions of component (A) and 1% by mass aqueous solutions of Ca salt-type compounds of component (A) when their temperatures were made 40°C.

[0099]

The dispersants for hydraulic powders are the following.

- Dispersant A: a formalin condensate of Na naphthalenesulfonate, having a weight-average molecular weight of 15,000
- Dispersant B: a formalin condensate of K naphthalenesulfonate, having a weight-average molecular weight of 15,000

- Dispersant C: a copolymer of Na methacrylate/monomethoxy polyethylene glycol methacrylate (average number of moles of added ethylene oxide: 23) = 73/27 (in molar ratio), having a weight-average molecular weight of 50,000
- [0100]

Then, components (B) are the following.

- Defoaming agent X: a mixture of a polypropylene glycol (average number of added moles: 5) lauryl ether and a polypropylene glycol (average number of added moles: 5) myristyl ether in 1:1 (in mass ratio)
 - Defoaming agent Y: Foamlex 797 (manufactured by Nicca Chemical Co., Ltd., a defoaming agent having a polyoxypropylene group)
- [0101]

(2) Mortar test

(2-1) Preparation of a mortar

Cement (C) and fine aggregate (S) were charged in a mortar mixer (manufactured by Dalton Corp., a universal mixing-stirring machine, model: 5DM-03-γ), and dry kneaded at a low-speed rotation (63 rpm) of the mortar mixer for 10 sec; and there was added water (W) containing an admixture composition for hydraulic compositions containing a dispersant for hydraulic powders, component (A) and component (B). The water was added so that a combination of each component and the amount thereof added became as indicated in Table 1.

Then, the mixtures were each regularly mixed and kneaded at a low-speed rotation (63 rpm) of the mortar mixer for 180 sec to thereby prepare mortars. The compounding conditions of the mortars were such that the cement was 400 g; the fine aggregate, 700 g; and the water/cement ratio (W/C), 37.5% by mass. The components used are the following.

- Water (W): tap water (water temperature: 20°C)
- Cement (C): a normal portland cement (two cements were mixed: Taiheiyo Cement Corp./Sumitomo Osaka Cement Co., Ltd. = 1/1 in mass ratio), having a density of 3.16 g/cm³
- Fine aggregate (S): a mountain sand quarried at Joyo, having a density of 2.55 g/cm³

[0102]

(2-3) Formwork-filling and curing step

Based on JIS A 1132, the mortars were each filled in three sets of formwork of a cylindrical plastic disposal mold (diameter of its bottom surface: 5 cm, its height: 10 cm) in a two-layer packing manner, and cured in air (20°C) in a room at 20°C to thereby harden the mortars. Each hardened test sample was removed from the formwork after 18 hours from the mortar preparation to thereby obtain test samples. Three test samples out of these were used for a measurement of compression strength after 18 hours.

The 18-hour strengths of the test samples were measured based on JIS A1108, and the average value of the

three test samples was determined. The results are shown in Table 1.

[0103]

[Table 1]

		Dispersant for Hydraulic Powder		Component (A)				Component (B)		(A)/(B) (mass ratio)	Total Amount Added ² (parts by mass)	Amount (%) of Air	Storage Stability		Compression Strength [N/mm ²] after 18 hours
				kind	amount added ¹ (parts by mass)	kind	amount added ¹ (parts by mass)	Defoaming Agent Composition	Admixture Composition						
		kind	amount added ¹ (parts by mass)										kind	amount added ¹ (parts by mass)	
Examples	1-1	dispersant A	0.55	sodium lauryl sulfate	transparent	cloudiness/precipitation	0.0015	defoaming agent X	0.0020	0.75	0.5535	2.0	no separation, turbidity: 5 NTU	no separation	16.0
	1-2		0.55	sodium lauryl sulfate	transparent	cloudiness/precipitation	0.0008	defoaming agent Y	0.0010	0.8	0.5518	2.1	no separation, turbidity: 5 NTU	no separation	15.8
	1-3	dispersant B	0.55	potassium myristate	transparent	cloudiness/precipitation	0.0010	defoaming agent Y	0.0010	1.0	0.5520	1.1	no separation, turbidity: 5 NTU	no separation	17.1
	1-4	dispersant A	0.55	sodium oleate	transparent	cloudiness/precipitation	0.0012	defoaming agent Y	0.0010	1.2	0.5522	2.3	no separation, turbidity: 5 NTU	no separation	14.9
	1-5		0.55	sodium dodecylbenzenesulfonate	transparent	cloudiness/precipitation	0.0010	defoaming agent Y	0.0010	1.0	0.5520	0.8	no separation, turbidity: 5 NTU	no separation	19.9
	1-6		0.55	sodium mixed-alkyl (having 10 to 14 carbon atoms)benzenesulfonate	transparent	cloudiness/precipitation	0.0010	defoaming agent Y	0.0010	1.0	0.5520	0.7	no separation, turbidity: 5 NTU	no separation	20.1
	1-7	dispersant C	0.20	sodium mixed-alkyl (having 10 to 14 carbon atoms)benzenesulfonate	transparent	cloudiness/precipitation	0.0010	defoaming agent Y	0.0010	1.0	0.2020	0.7	no separation, turbidity: 5 NTU	no separation	19.8
Comparative Examples	1-1	dispersant A	0.55	—	—	—	—	—	—	—	0.5500	3.7	—	no separation	14.3
	1-2	dispersant C	0.20	—	—	—	—	—	—	—	0.2000	4.5	—	no separation	12.5
	1-3	dispersant A	0.55	—	—	—	—	defoaming agent X	0.0010	0	0.5510	1.1	separation	separation	17.2
	1-4	dispersant C	0.20	—	—	—	—	defoaming agent X	0.0010	0	0.2010	1.0	separation	separation	17.5
	1-5	dispersant A	0.55	—	—	—	—	defoaming agent Y	0.0010	0	0.5510	1.2	no separation, turbidity: more than 100 NTU	separation	17.0
	1-6	dispersant C	0.20	—	—	—	—	defoaming agent Y	0.0010	0	0.2010	1.1	no separation, turbidity: more than 100 NTU	separation	17.5
	1-7	dispersant A	0.55	calcium mixed-alkyl (having 10 to 14 carbon atoms)benzenesulfonate	—	cloudiness/precipitation	0.0010	defoaming agent Y	0.0010	0	0.5520	0.8	separation, turbidity: more than 100 NTU	separation	20.0

[0104]

*1: the amount added is parts by mass of each component to 100 parts by mass of a cement.

*2: the total amount added is parts by mass of the total of a dispersant for hydraulic powders, component (A) and component (B) to 100 parts by mass of a cement.

CLAIMS

1. A defoaming agent composition for hydraulic compositions, comprising an anionic surfactant (A) and a defoaming agent (B), wherein:

the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt;

the defoaming agent (B) is one or more selected from the group consisting of polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the composition is 0.1 or more and 5 or less.

2. The defoaming agent composition for hydraulic compositions according to claim 1, wherein the anionic surfactant (A) has a Krafft point of 40°C or more provided that the anionic group thereof is replaced by a calcium salt.

3. The defoaming agent composition for hydraulic compositions according to claim 1 or 2, wherein the defoaming agent composition is transparent.

4. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 3, wherein the anionic surfactant (A) is one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof.

5. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 4, wherein the anionic surfactant (A) is one or more selected from the group consisting of laurylbenzenesulfonic acid, myristylbenzenesulfonic acid, lauryl sulfuric acid, myristic acid and oleic acid, and ammonium salts and alkali metal salts thereof.

6. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 5, wherein the defoaming agent (B) is one or more selected from the group consisting of polyoxyethylene polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters,

polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols.

7. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 6, wherein a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the defoaming agent composition is 0.1 or more and 2 or less.

8. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 6, wherein a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the defoaming agent composition is 0.5 or more and 5 or less.

9. The defoaming agent composition for hydraulic compositions according to any one of claims 1 to 8, comprising water.

10. An admixture composition for hydraulic compositions, comprising: a defoaming agent composition for hydraulic compositions according to any one of claims 1 to 9; and a dispersant for hydraulic powders.

11. The admixture composition for hydraulic compositions according to claim 10, comprising water.

12. A hydraulic composition, prepared by compounding a defoaming agent composition for hydraulic compositions according to any one of claims 1 to 9, a dispersant for hydraulic powders, a hydraulic powder, an aggregate and water.

13. A method for producing a hydraulic composition, comprising a step of compounding a defoaming agent composition for hydraulic compositions according to any one of claims 1 to 9.

14. A method for producing a hardened product of a hydraulic composition, comprising: a step of compounding a defoaming agent composition for hydraulic compositions according to any one of claims 1 to 9 to prepare a hydraulic composition; and a step of hardening the hydraulic composition.

15. Use, as a defoaming agent for hydraulic compositions, of a composition comprising an anionic surfactant (A) and a defoaming agent (B), wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt;

the defoaming agent (B) is one or more selected from the group consisting of polyoxyethylene polyoxypropylene,

polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the composition is 0.1 or more and 5 or less.

16. The use according to claim 15, wherein the anionic surfactant (A) has a Krafft point of 40°C or more provided that the anionic group thereof is replaced by a calcium salt.

17. The use according to claim 15 or 16, wherein the composition is transparent.

18. The use according to any one of claims 15 to 17, wherein the anionic surfactant (A) is one or more selected from the group consisting of alkylbenzenesulfonic acids, alkyl sulfates, alkylsulfonic acids and fatty acids, and amine salts, ammonium salts and alkali metal salts thereof.

19. The use according to any one of claims 15 to 18, wherein the anionic surfactant (A) is one or more selected from the group consisting of

laurylbenzenesulfonic acid, myristylbenzenesulfonic acid, lauryl sulfuric acid, myristic acid and oleic acid, and ammonium salts and alkali metal salts thereof.

20. The use according to any one of claims 15 to 19, wherein the defoaming agent (B) is one or more selected from the group consisting of polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, propylene oxide adducts of acetylene glycol, polyoxypropylene fatty acid esters, polyoxypropylene alkyl ethers, polyoxypropylene alkylamides, trialkyl phosphates, alkylamines and alcohols.

21. The use according to any one of claims 15 to 20, wherein a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the composition is 0.1 or more and 2 or less.

22. The use according to any one of claims 15 to 20, wherein a mass ratio (A)/(B) of the anionic surfactant (A) to the defoaming agent (B) in the composition is 0.5 or more and 5 or less.

23. The use according to any one of claims 15 to 22, wherein the composition comprises water.

24. A method for solubilizing a defoaming agent for hydraulic compositions with an anionic surfactant (A);

wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt;

the defoaming agent is one or more selected from the group consisting of polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether, acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the anionic surfactant (A) is used such that a mass ratio of (A) to the defoaming agent, (A)/defoaming agent, is 0.1 or more and 5 or less.

25. A method for solubilizing, with an anionic surfactant (A), a defoaming agent for hydraulic compositions in a composition comprising water;

wherein the anionic surfactant (A) is a compound whose anionic group is unneutralized, or a compound whose anionic group is an amine salt, an ammonium salt or an alkali metal salt;

the defoaming agent is one or more selected from the group consisting of polyoxyethylene polyoxypropylene, polyoxypropylene, polyoxypropylene glyceryl ether,

acetylene glycol, alkylene oxide adducts of acetylene glycol, polyoxyalkylene fatty acid esters, polyoxyalkylene alkyl ethers, polyoxyalkylene alkylamides, trialkyl phosphates, alkylamines and alcohols; and

the anionic surfactant (A) is used such that a mass ratio of (A) to the defoaming agent, (A)/defoaming agent, is 0.1 or more and 5 or less.