

Description

Title of the Invention: ADMIXTURE AGENT COMPOSITION FOR
HYDRAULIC COMPOSITIONS

Field of the Invention

[0001]

The present invention relates to an admixture agent composition for hydraulic compositions, a hydraulic composition, a method for producing a hydraulic composition, and a method for producing a hardened product of a hydraulic composition.

Background of the Invention

[0002]

A hydraulic powder such as cement or blast furnace slag has the property of hardening when reacting with water, and is referred to as mortar when mixed with sand and referred to as concrete when further mixed with gravel. These materials have been used for various types of constructions because the forms thereof can be easily changed before hardening. Moreover, with the addition of chemical agents to concrete or the like before hardening, an operable period of time or workability can be improved. Surfactants, which are used in most of the chemical agents, excessively generate foam, thereby

causing a reduction in strength in some cases. Hence, most of these chemical agents contain defoamers.

[0003]

JP-A 2005-500232 discloses an admixture system for modifying hydratable cementitious compositions containing: (A) a water reducer comprising a polycarboxylic acid or salt or derivative thereof; and (B) a tertiary amine defoamer represented by a particular structural formula, wherein the average molecular weight of the tertiary amine defoamer is 100 or more and 1500 or less.

[0004]

JP-A 2000-247704 discloses a defoamer for cementitious compositions composed of an organic amine salt having an unsubstituted or hydroxyl group or halogen-substituted alkyl group or alkenyl group with 6 or more and 24 or less carbons in which an amide bond may be interposed.

Summary of the Invention

[0005]

As a dispersant for hydraulic compositions, a polycarboxylic acid-based dispersant is known. The polycarboxylic acid-based dispersant is excellent in fluidity, fluidity retention, and the like and easy to design performance. Some polycarboxylic acid-based dispersants use an acid catalyst during the manufacturing

processes. There is no problem even if the acid catalyst remains in the polycarboxylic acid-based dispersant unless the hydraulic composition is adversely affected.

On the other hand, in terms of operability or the like, it is desirable that a one-pack formulation be obtained by blending a polycarboxylic acid-based dispersant with an amine-based defoamer. In that case, it is desirable to be excellent in both storage stability and defoamability.

[0006]

However, it has been found that when a polycarboxylic acid-based dispersant using a sulfonic acid-based acid catalyst during the manufacturing process is combined with an amine-based defoamer to form a one-pack formulation, phase separation or crystal precipitation occurs and the storage stability of the resulting formulation may be impaired.

[0007]

Note that while some defoamers are ether-based ones, when an ether-based defoamer is combined with a polycarboxylic acid-based dispersant to form a one-pack formulation, the product has creaming on the top thereof and is of inferior storage stability.

[0008]

The present invention provides an admixture agent composition for hydraulic compositions excellent in storage stability and defoamability.

[0009]

The present invention relates to an admixture agent composition for hydraulic compositions containing: (A) a polycarboxylic acid-based dispersant [hereinafter, referred to as component (A)]; (B) a tertiary amine compound having one hydrocarbon group with 9 or more and 12 or less carbons and two methyl groups [hereinafter, referred to as component (B)]; and (C) sulfonic acid or a salt thereof [hereinafter, referred to as component (C)].

[0010]

In addition, the present invention relates to a hydraulic composition containing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water.

[0011]

In addition, the present invention relates to a method for producing a hydraulic composition, including mixing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water.

[0012]

In addition, the present invention relates to a method for producing a hardened product of a hydraulic composition, including: producing a hydraulic composition by mixing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic

powder, an aggregate and water; and hardening the hydraulic composition.

[0013]

According to the present invention, an admixture agent composition for hydraulic compositions excellent in storage stability and defoamability is provided. The admixture agent composition for hydraulic compositions of the present invention is excellent in storage stability especially at low temperatures.

Embodiments of the Invention

[0014]

Component (B) of the present invention is a component that mainly contributes to the exhibition of defoamability. It is assumed that component (B) improves the hydrophobicity in a basic hydraulic composition slurry system, thereby improving the orientation to a foam film to promote a foam breakage and resulting in the defoamability of component (B). From the viewpoint of this hydrophobicity (defoamability), it is preferable that the compound of component (B) should be an amine compound having a long-chain hydrocarbon group and the hydrocarbon group should have a certain number or more carbons. On the other hand, when a polycarboxylic acid-based dispersant and an amine-based defoaming agent are combined, the stability of the one-pack formulation shows a tendency to decrease due to sulfonate mixed thereinto,

for example, sulfonate used as a catalyst during the synthesis process of the polycarboxylic acid and mixed thereinto. However, in the present invention, the storage stability of the composition is improved by using component (B). It is assumed that this is because the hydrocarbon group of component (B) has a certain number or less carbons, so that the crystallization of sulfonate of component (B) is suppressed and component (B) can stably exist in the admixture agent composition. From such viewpoints, in the present invention, a tertiary amine compound having a hydrocarbon group with 9 or more and 12 or less carbons is used as component (B).

[0015]

[Admixture Agent Composition for Hydraulic Compositions]

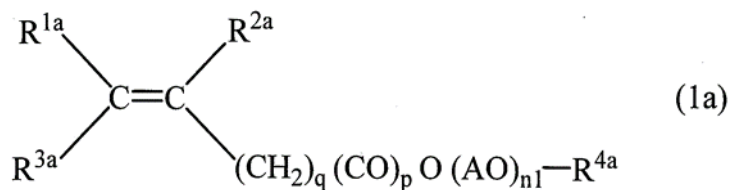
<Component (A)>

Component (A) is a polycarboxylic acid-based dispersant.

From the viewpoint of initial fluidity, the polycarboxylic acid-based dispersant is preferably a copolymer including monomer (1a) represented by the following general formula (1a) as a constitutive monomer.

The polycarboxylic acid-based dispersant is more preferably a copolymer including monomer (1a) represented by the following general formula (1a) and monomer (2a) represented by the following general formula (2a) as constitutive monomers.

[0016]



[0017]

wherein,

R^{1a} and R^{2a} may be the same or different and represent hydrogen atoms or methyl groups;

R^{3a} represents a hydrogen atom or $-\text{COO}(\text{AO})_{n1}\text{X}^1$;

R^{4a} represents a hydrogen atom or an alkyl group with 1 or more and 4 or less carbons;

AO represents a group selected from an ethyleneoxy group and a propyleneoxy group;

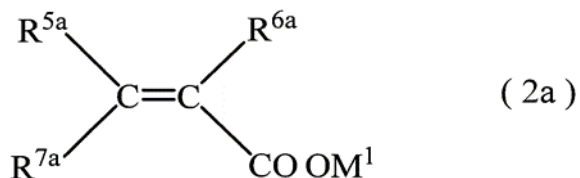
$n1$ represents the average number of added moles of AO and a number of 1 or more and 300 or less;

q represents a number of 0 or more and 2 or less;

and

p represents 0 or 1.

[0018]



[0019]

wherein,

R^{5a} , R^{6a} and R^{7a} may be the same or different and are hydrogen atoms, methyl groups or $(\text{CH}_2)_r\text{COOM}^2$, wherein

$(\text{CH}_2)_r\text{COOM}^2$ may form anhydrite with COOM^1 or another $(\text{CH}_2)_r\text{COOM}^2$, and in that case, M^1 or M^2 does not exist in those groups;

M^1 and M^2 may be the same or different and are hydrogen atoms, alkali metals, alkaline earth metals (1/2 atoms), ammonium groups, alkylammonium groups, substituted alkylammonium groups, alkyl groups, hydroalkyl groups or alkenyl groups; and

r : a number of 0 or more and 2 or less.

[0020]

In the general formula (1a), R^{1a} is preferably a hydrogen atom from the viewpoint of fluidity retention.

In the general formula (1a), R^{2a} is preferably a methyl group from the viewpoint of fluidity retention.

In the general formula (1a), R^{3a} is preferably a hydrogen atom from the viewpoint of fluidity retention.

In the general formula (1a), R^{4a} is preferably a hydrogen atom or a methyl group and more preferably a methyl group from the viewpoint of fluidity retention.

In the general formula (1a), AO is preferably an ethyleneoxy group from the viewpoint of fluidity retention. AO preferably includes an ethyleneoxy group.

In the general formula (1a), n_1 is the average number of added moles of AO , and 1 or more, preferably 5 or more and more preferably 7 or more; and 300 or less, preferably 250 or less, more preferably 200 or less, further preferably 150 or less, furthermore preferably

100 or less, furthermore preferably 70 or less, furthermore preferably 50 or less and furthermore preferably 30 or less from the viewpoint of fluidity retention.

In the general formula (1a), q is preferably 0 from the viewpoint of fluidity retention.

In the general formula (1a), p is preferably 1 from the viewpoint of fluidity retention.

[0021]

Sulfonic acid may be used as an acid catalyst when producing monomer (1a). For example, JP-A 2008-214638 discloses such a method. When producing component (A) of the present invention, a mixture including a monomer (1a) produced by such a method and sulfonic acid can be used as is unless the effect of the present invention is impaired.

[0022]

In the general formula (2a), R^{5a} is preferably a hydrogen atom from the viewpoint of fluidity retention.

In the general formula (2a), R^{6a} is preferably a methyl group from the viewpoint of fluidity retention.

In the general formula (2a), R^{7a} is preferably a hydrogen atom from the viewpoint of fluidity retention.

$(CH_2)_rCOOM^2$ may form anhydrite with $COOM^1$ or another $(CH_2)_rCOOM^2$, and in that case, M^1 or M^2 does not exist in those groups.

M^1 and M^2 may be the same or different and are hydrogen atoms, alkali metals, alkaline earth metals (1/2 atoms), ammonium groups, alkylammonium groups, substituted alkylammonium groups, alkyl groups, hydroalkyl groups or alkenyl groups.

Each of the alkyl groups, hydroalkyl groups and alkenyl groups of M^1 and M^2 has preferably 1 or more and 4 or less carbons.

M^1 and M^2 may be the same or different and are preferably hydrogen atoms, alkali metals, alkaline earth metals (1/2 atoms), ammonium groups or alkylammonium groups; more preferably hydrogen atoms, alkali metals, alkaline earth metals (1/2 atoms) or ammonium groups; further preferably hydrogen atoms, alkali metals or alkaline earth metals (1/2 atoms); and furthermore preferably hydrogen atoms or alkali metals.

r of $(CH_2)_rCOOM^2$ in the general formula (2a) is preferably 1 from the viewpoint of fluidity retention.

[0023]

In the copolymer including monomer (1a) as a constitutive monomer, the total amount of monomer (1a) in the constitutive monomers is preferably 90 mass% or more, more preferably 92 mass% or more and further preferably 95 mass% or more; and preferably 100 mass% or less from the viewpoint of fluidity retention. This total amount may be 100 mass%.

In the copolymer including monomer (1a) and monomer (2a) as constitutive monomers, the total amount of monomer (1a) and monomer (2a) in the constitutive monomers is preferably 90 mass% or more, more preferably 92 mass% or more and further preferably 95 mass% or more; and preferably 100 mass% or less from the viewpoint of fluidity retention. This total amount may be 100 mass%.
[0024]

In the copolymer including monomer (1a) and monomer (2a) as constitutive monomers, the proportion of monomer (2a) to the sum of monomer (1a) and monomer (2a) is preferably 40 mole% or more; and preferably 90 mole% or less, more preferably 85 mole% or less and further preferably 80 mole% or less from the viewpoint of the fluidity retention of the hydraulic composition.
[0025]

The weight average molecular weight of the polycarboxylic acid-based dispersant, further the copolymer including monomer (1a) as a constitutive monomer, or further the copolymer including monomer (1a) and monomer (2a) as constitutive monomers is preferably 20,000 or more, more preferably 30,000 or more and further preferably 40,000 or more; and preferably 100,000 or less, more preferably less than 100,000 and further preferably 80,000 or less from the viewpoint of the fluidity retention of the hydraulic composition.
[0026]

Each of the weight average molecular weight and the number average molecular weight of the polycarboxylic acid-based dispersant, further the copolymer including monomer (1a) as a constitutive monomer, or further the copolymer including monomer (1a) and monomer (2a) as constitutive monomers was measured by a gel permeation chromatography (GPC) under the following conditions:

*GPC Conditions

device: GPC (HLC-8320GPC) manufactured by Tosoh Corporation;

column: G4000PWXL+G2500PWXL (manufactured by Tosoh Corporation);

eluent: 0.2M phosphate buffer/CH₃CN=9/1;

flow rate: 1.0 mL/min;

column temperature: 40°C;

detection: RI;

sample size: 0.2 mg/mL; and

reference material: in terms of polyethylene glycol (monodispersed polyethylene glycol whose molecular weight is known and the molecular weight is 87,500, 250,000, 145,000, 46,000 or 24,000).

[0027]

From the viewpoint of initial fluidity and fluidity retention, the hydraulic composition of the present invention contains the polycarboxylic acid-based dispersant in an amount of preferably 0.1 parts by mass or more and more preferably 0.2 parts by mass or more;

and preferably 3.5 parts by mass or less and more preferably 2 parts by mass or less relative to 100 parts by mass of hydraulic powder.

[0028]

As the polycarboxylic acid-based dispersant, two or more dispersants of different average numbers of added moles of AO, different proportions of monomer (1a) or monomer (2a), or the like may also be used.

[0029]

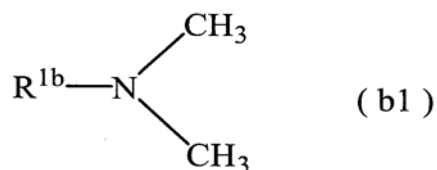
<Component (B)>

Component (B) is a tertiary amine compound having one hydrocarbon group with 9 or more and 12 or less carbons and two methyl groups. That is, in the tertiary amine compound, one of the three groups coupled to the nitrogen atom is a hydrocarbon group with 9 or more and 12 or less carbons and other two are methyl groups. Here, the hydrocarbon group has preferably 10 or more carbons. Examples of the hydrocarbon group include an alkyl group and an alkenyl group and an alkyl group is preferable.

[0030]

Component (B) is preferably a compound represented by the following general formula (b1):

[0031]



[0032]

wherein R^{1b} represents a hydrocarbon group with 9 or more and 12 or less carbons, preferably an alkyl group or an alkenyl group and more preferably an alkyl group.

[0033]

Examples of component (B) include N,N-dimethyldecylamine and N,N-dimethyldodecylamine.

In the present invention, a combination of N,N-dimethyldecylamine and N,N-dimethyldodecylamine can be used as component (B). In this case, the mass ratio of N,N-dimethyldecylamine/N,N-dimethyldodecylamine is preferably 10/90 or more and more preferably 20/80 or more; and preferably 99/1 or less and more preferably 90/10 or less.

[0034]

<Component (C)>

Component (C) is sulfonic acid or a salt thereof.

The sulfonic acid is preferably a sulfonic acid with 1 or more and 9 or less total carbons.

The sulfonic acid is preferably an aromatic sulfonic acid with 1 or more and 9 or less total carbons.

Examples of the salt include an alkali metal salt such as sodium or potassium, an alkanolamine salt, an amine salt, an ammonium salt and the like. The salt is preferably an alkali metal salt.

[0035]

Component (C) is preferably an alkylbenzenesulfonic acid having an alkyl group with 1 or more and 3 or less carbons or a salt thereof.

Component (C) is more preferably one or more compounds selected from toluenesulfonic acid, xylenesulfonic acid, cumenesulfonic acid and salts of these.

Component (C) is further preferably p-toluenesulfonic acid or a salt thereof.

Component (C) is furthermore preferably p-toluenesulfonic acid or an alkali metal salt thereof.

[0036]

<Composition, Optional Components and the Like>

The admixture agent composition for hydraulic compositions of the present invention contains component (A) in an amount of preferably 5 mass% or more, more preferably 10 mass% or more and further preferably 15 mass% or more; and preferably 60 mass% or less, more preferably 50 mass% or less and further preferably 40 mass% or less.

[0037]

The admixture agent composition for hydraulic compositions of the present invention contains component (B) in an amount of preferably 0.01 mass% or more, more preferably 0.05 mass% or more and further preferably 0.10 mass% or more; and preferably 5 mass% or less, more

preferably 4 mass% or less and further preferably 3 mass% or less.

[0038]

The admixture agent composition for hydraulic compositions of the present invention contains component (C) in an amount of preferably 0.01 mass% or more, more preferably 0.05 mass% or more and further preferably 0.10 mass% or more; and preferably 0.40 mass% or less, more preferably 0.35 mass% or less, further preferably 0.23 mass% or less, furthermore preferably 0.22 mass% or less and furthermore preferably 0.21 mass% or less.

[0039]

In the admixture agent composition for hydraulic compositions of the present invention, (A)/(B), the mass ratio of component (A) to component (B) is preferably 10 or more, more preferably 20 or more and further preferably 30 or more; and preferably 4000 or less, more preferably 3900 or less, further preferably 3800 or less, furthermore preferably 2000 or less, furthermore preferably 1000 or less, furthermore preferably 500 or less and furthermore preferably 350 or less from the viewpoint of defoamability and dispersibility.

[0040]

In the admixture agent composition for hydraulic compositions of the present invention, (A)/(C), the mass ratio of component (A) to component (C) is preferably 15 or more, more preferably 25 or more, further preferably

50 or more and furthermore preferably 100 or more; and preferably 6000 or less, more preferably 5900 or less, further preferably 5800 or less, furthermore preferably 3000 or less, furthermore preferably 2000 or less, furthermore preferably 1000 or less and furthermore preferably 500 or less from the viewpoint of dispersibility.

[0041]

In the admixture agent composition for hydraulic compositions of the present invention, (B)/(C), the mass ratio of component (B) to component (C) is preferably 0.02 or more, more preferably 0.05 or more, further preferably 0.10 or more and furthermore preferably 0.15 or more; and preferably 500 or less, more preferably 450 or less, further preferably 400 or less, furthermore preferably 200 or less, furthermore preferably 100 or less, furthermore preferably 50 or less, furthermore preferably 30 or less, furthermore preferably 10 or less and furthermore preferably 5 or less from the viewpoint of the storage stability of the one-pack formulation.

[0042]

The admixture agent composition for hydraulic compositions of the present invention can further contain (D) a polyoxyalkylene alkyl ether represented by the general formula (d1) [hereinafter referred to as component (D)]. Component (D) is a preferable component

from the viewpoint of the storage stability of the one-pack formulation and defoamability.



wherein

R^{1d} represents an alkyl group with 4 or more and 20 or less carbons;

AO represents a group selected from an ethyleneoxy group and a propyleneoxy group; and

m represents the average number of added moles of AO and a number of 1 or more and 300 or less.

[0043]

In the general formula (d1), the number of carbons of R^{1d} is preferably 6 or more and more preferably 8 or more; and preferably 22 or less and more preferably 20 or less.

In the general formula (d1), AO is preferably a copolymer of an ethyleneoxy group and a propyleneoxy group. AO preferably includes a propyleneoxy group.

In the general formula (d1), m is the average number of added moles of AO and a number of preferably 5 or more and more preferably 10 or more; and preferably 40 or less and more preferably 35 or less.

[0044]

When the admixture agent composition for hydraulic compositions of the present invention contains component (D), the composition contains component (D) in an amount of preferably 0.001 mass% or more and more preferably

0.01 mass% or more; and preferably 1 mass% or less and more preferably 0.1 mass% or less.

[0045]

The admixture agent composition for hydraulic compositions of the present invention can contain components such as water-soluble polymer compounds, air entraining agents, cement humectants, expanding materials, waterproofing agents, retardants, quick setting agents, thickeners, flocculants, dry shrinkage reducing agents, strength enhancers, curing accelerators and preservatives [those corresponding to components (A) to (D) are excluded therefrom] and the like as optional components.

[0046]

The admixture agent composition for hydraulic compositions of the present invention preferably contains water. Water is a component which constitutes the balance of the composition and used in an amount that makes the sum of water, components (A), (B) and (C), and optional components 100 mass%.

[0047]

When the admixture agent composition for hydraulic compositions of the present invention contains water, the pH at 20°C can be selected from 1 or more, 2 or more, 3 or more, 4 or more or 5 or more; and 10 or less, 9 or less, 8 or less, 7 or less or 6 or less. The pH is preferably 1 or more and more preferably 2 or more; and

preferably 6 or less from the viewpoint of the storage stability of the admixture agent composition for hydraulic compositions. It is assumed that, when the pH of the admixture agent composition for hydraulic compositions is adjusted to the acidic side (pH 6 or less), the hydrogen ion concentration in the composition is increased and the degree of dissociation of component (C) in acid dissociation equilibrium is reduced, and consequently, it becomes difficult to form a salt with component (B), so that the storage stability of the composition is further enhanced.

[0048]

The present invention provides a method for producing an admixture agent composition for hydraulic compositions, including:

obtaining a mixture containing (A) a polycarboxylic acid-based dispersant and (C) sulfonic acid or a salt thereof by reacting monomers including the above-mentioned monomer (1a), further monomers including the above-mentioned monomer (1a) and the above-mentioned monomer (2a) in the presence of (C) sulfonic acid or a salt thereof; and

obtaining an admixture agent composition for hydraulic compositions by mixing the mixture and (B) a tertiary amine compound having one hydrocarbon group with 9 or more and 12 or less carbons and two methyl groups. The reactions in this producing method can be carried out

according to publicly-known methods, for example, methods for synthesizing polycarboxylic acid-based dispersants described in JP-B 3221399, JP-B 3184698, JP-B 3600100, JP-B 2774445 and the like. The matters mentioned in the admixture agent composition for hydraulic compositions of the present invention can be appropriately applied to this producing method. At that time, a content in the composition can be replaced with a mixed amount or a blended amount and applied.

[0049]

[Hydraulic Composition]

The hydraulic composition of the present invention is a hydraulic composition containing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water. The hydraulic composition of the present invention is a hydraulic composition formed by blending the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water.

[0050]

The preferred aspects of components (A), (B) and (C) used for the hydraulic composition of the present invention are the same as in the admixture agent composition of the present invention.

[0051]

Examples of the aggregate include aggregates selected from fine aggregates and coarse aggregates. Examples of the fine aggregates include those prescribed in No. 2311 in JIS A0203-2014. Examples of the fine aggregates include river sand, land sand, pit sand, sea sand, lime sand, silica sand, and crushed sands thereof, blast furnace slag fine aggregate, ferronickel slag fine aggregate, light-weight fine aggregate (artificial and natural), recycled fine aggregate, and the like. Further, examples of the coarse aggregates include those prescribed in No. 2312 in JIS A0203-2014. Examples of the coarse aggregates include river gravel, land gravel, pit gravel, sea gravel, lime gravel, and crushed stones thereof, blast furnace slag coarse aggregate, ferronickel slag coarse aggregate, light-weight coarse aggregate (artificial and natural), recycled coarse aggregate, and the like. A mixture of different kinds of fine aggregates or coarse aggregates may be used, or a single kind thereof may be used.

[0052]

Each of (A)/(B), the mass ratio of component (A) to component (B), (A)/(C), the mass ratio of component (A) to component (C) and (B)/(C), the mass ratio of component (B) to component (C) in the hydraulic composition of the present invention can be selected from the ranges mentioned in the admixture agent composition for hydraulic compositions of the present invention.

[0053]

The hydraulic composition of the present invention contains component (A) in an amount of preferably 0.01 parts by mass or more, more preferably 0.05 parts by mass or more and further preferably 0.10 parts by mass or more; and preferably 10 parts by mass or less, more preferably 5 parts by mass or less and further preferably 2 parts by mass or less relative to 100 parts by mass of hydraulic powder from the viewpoint of dispersibility and the exhibition of strength.

[0054]

The hydraulic composition of the present invention contains component (B) in an amount of preferably 0.0001 parts by mass or more, more preferably 0.0003 parts by mass or more and further preferably 0.0007 parts by mass or more; and preferably 0.5 parts by mass or less, more preferably 0.25 parts by mass or less and further preferably 0.10 parts by mass or less relative to 100 parts by mass of hydraulic powder from the viewpoint of dispersibility and defoamability.

[0055]

The hydraulic composition of the present invention contains component (C) in an amount of preferably 0.0001 parts by mass or more, more preferably 0.0003 parts by mass or more and further preferably 0.0007 parts by mass or more; and preferably 0.020 parts by mass or less, more preferably 0.015 parts by mass or less and further

preferably 0.01 parts by mass or less relative to 100 parts by mass of hydraulic powder from the viewpoint of dispersibility and the storage stability of the one-pack formulation.

[0056]

In addition, in the hydraulic composition of the present invention, from the viewpoint of constructibility, the ratio (mass ratio) of water/hydraulic powder is preferably 0.15 or more and more preferably 0.2 or more; and preferably 2 or less and more preferably 1 or less.

[0057]

When the hydraulic composition is concrete, from the viewpoint of exhibiting the strength of the hydraulic composition, reducing the amount of a hydraulic powder such as cement used therein, and improving the mold filling performance, the amount of coarse aggregate used therein is preferably 50% or more, more preferably 55% or more and further preferably 60% or more; and preferably 100% or less, more preferably 90% or less and further preferably 80% or less by bulk volume. The bulk volume is the proportion of the volume of coarse aggregate (including gaps) per m^3 of concrete.

In addition, when the hydraulic composition is concrete, the amount of fine aggregate used therein is preferably 500 kg/m^3 or more, more preferably 600 kg/m^3 or more and further preferably 700 kg/m^3 or more; and

preferably 1,000 kg/m³ or less and more preferably 900 kg/m³ or less from the viewpoint of improving the mold filling performance.

When the hydraulic composition is mortar, the amount of fine aggregate used therein is preferably 800 kg/m³ or more, more preferably 900 kg/m³ or more and further preferably 1,000 kg/m³ or more; and preferably 2,000 kg/m³ or less, more preferably 1,800 kg/m³ or less and further preferably 1,700 kg/m³ or less.

[0058]

The hydraulic composition of the present invention can contain retardants, curing accelerators, AE agents, expanding agents, foaming agents, thickeners, fluidizing agents, blowing agents, waterproofing agents and the like as optional components.

[0059]

[Method for Producing Hydraulic Composition]

The method for producing a hydraulic composition of the present invention is a method for producing a hydraulic composition including mixing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water. Those components can be mixed using publicly-known techniques.

[0060]

The preferred aspects of components (A), (B), (C), a hydraulic powder and an aggregate used for the method for

producing a hydraulic composition of the present invention are the same as those in the admixture agent composition of the present invention.

[0061]

In the method for producing a hydraulic composition of the present invention, components (A), (B) and (C) can be mixed such that each of (A)/(B), the mass ratio of component (A) to component (B), (A)/(C), the mass ratio of component (A) to component (C) and (B)/(C), the mass ratio of component (B) to component (C) is in the range mentioned in the admixture agent composition for hydraulic compositions of the present invention.

[0062]

In the method for producing a hydraulic composition of the present invention, each of components (A), (B) and (C) can be mixed to a hydraulic powder so as to be in the range mentioned in the hydraulic composition of the present invention.

[0063]

In addition, in the method for producing a hydraulic composition of the present invention, from the viewpoint of constructibility, water and a hydraulic powder are blended such that the ratio (mass ratio) of water/hydraulic composition is preferably 0.15 or more and more preferably 0.2 or more; and preferably 2 or less and more preferably 1 or less.

[0064]

When the hydraulic composition is concrete, from the viewpoint of exhibiting the strength of the hydraulic composition, reducing the amount of a hydraulic powder such as cement used therein, and improving the mold filling performance, the amount of coarse aggregate used therein is preferably 50% or more, more preferably 55% or more and further preferably 60% or more; and preferably 100% or less, more preferably 90% or less and further preferably 80% or less by bulk volume. The bulk volume is the proportion of the volume of coarse aggregate (including gaps) per m^3 of concrete.

In addition, when the hydraulic composition is concrete, the amount of fine aggregate used therein is preferably 500 kg/m^3 or more, more preferably 600 kg/m^3 or more and further preferably 700 kg/m^3 or more; and preferably $1,000 \text{ kg/m}^3$ or less and more preferably 900 kg/m^3 or less from the viewpoint of improving the mold filling performance.

When the hydraulic composition is mortar, the amount of fine aggregate used therein is preferably 800 kg/m^3 or more, more preferably 900 kg/m^3 or more and further preferably $1,000 \text{ kg/m}^3$ or more; and preferably $2,000 \text{ kg/m}^3$ or less, more preferably $1,800 \text{ kg/m}^3$ or less and further preferably $1,700 \text{ kg/m}^3$ or less.

[0065]

[Method for Producing Hardened Product of Hydraulic Composition]

A method for producing a hardened product of a hydraulic composition of the present invention is a method for producing a hardened product of a hydraulic composition including: producing a hydraulic composition by mixing the admixture agent composition for hydraulic compositions of the present invention, a hydraulic powder, an aggregate and water; and hardening the hydraulic composition.

For the process of producing a hydraulic composition, the method for producing a hydraulic composition of the present invention can be adopted. The preferred aspects mentioned in the method for producing a hydraulic composition of the present invention can be appropriately applied to this process.

For the process of hardening the hydraulic composition, a publicly-known method for hardening a hydraulic composition can be adopted. The process of hardening the hydraulic composition can be performed taking the purpose and shape of the hardened product or the like into account.

Examples

[0066]

<Examples 1 to 4 and Comparative Example 1>

(1) Preparation of Admixture Agent Composition

Tap water, the following components (A), (B) and (C), and as necessary, the following component (D) were

blended so as to be of the contents of tables (the balance was tap water) and stirred with a magnetic stirrer at 20°C for 10 minutes to prepare admixture agent compositions. More specifically, components (A), (B) and (C) were fed into a Maruemu screw bottle No. 7 and stirred hard with a magnetic stirrer for 5 minutes, thereby preparing the admixture agent compositions of Tables 1 to 7. In addition, the pH values of the admixture agent compositions were measured at 20°C according to 8.3 of JIS K 3362: 2008, and as necessary, adjusted with a 48% sodium hydroxide solution (manufactured by FUJIFILM Wako Pure Chemical Corporation) and 2 mol/L hydrochloric acid (manufactured by FUJIFILM Wako Pure Chemical Corporation). Taking a synthesizing method of a copolymer into account, component (C) was added such that the content in a final admixture agent composition was as shown in the tables. Note that any of the contents of the components in the tables is represented by mass% based on the active components (the same applies hereinafter).

[0067]

<Component (A)>

·Copolymer 1: methacrylic acid/methoxy polyethylene glycol (the average number of added moles: 25)
monomethacrylate=75 mol/25 mol, the weight-average molecular weight=50,000

·Copolymer 2: acrylic acid/polyethylene glycol (the average number of added moles: 50) isoprenyl ether=75 mol/25 mol, the weight-average molecular weight=60,000

·Copolymer 3: methacrylic acid/methoxy polyethylene glycol (the average number of added moles: 10) monomethacrylate=50 mol/50 mol, the weight-average molecular weight=50,000

·Copolymer 4: methacrylic acid/methoxy polyethylene glycol (the average number of added moles: 120) monomethacrylate=80 mol/20 mol, the weight-average molecular weight=50,000

The copolymers 1, 3 and 4 were synthesized referring to a method described in JP-B 3184698 as necessary. For the copolymers 1 and 3, a monomer produced by using sodium p-toluenesulfonate was used.

In addition, the copolymer 2 was synthesized referring to a method described in JP-B 3683176 as necessary. For the copolymer 2, a monomer produced without using sodium p-toluenesulfonate was used. The copolymer 2 was also used for the evaluation for checking the effect of the content of sodium p-toluenesulfonate.

[0068]

<Component (B)>

·N,N-dimethyldecylamine, manufactured by Kao Corporation

·N,N-dimethyldodecylamine, manufactured by Kao Corporation

[0069]

<Component (B') (Comparative Compound of Component (B))>

·N,N-dimethyloctylamine, manufactured by Kao Corporation

·N,N-dimethyltetradecylamine, manufactured by TOKYO KASEI
KOGYO CO., LTD.

[0070]

<Component (C)>

·Sodium p-toluenesulfonate, manufactured by TOKYO KASEI
KOGYO CO., LTD.

[0071]

<Component (D)>

·d-1: polyoxypropylene (the average number of added
moles: 5) alkyl (the number of carbons: 12 to 14) ether,
manufactured by Kao Corporation

·d-2: polyoxyethylene (the average number of added moles:
2) polyoxypropylene (the average number of added moles:
6) alkyl (the number of carbons: 18) ether, manufactured
by Kao Corporation

[0072]

(2) Storage Stability Testing

50 g of an admixture agent composition was sampled
in a Maruemu screw bottle No. 7 and stored at 5°C. The
appearance of the admixture agent composition was
visually observed over time and a period during which a
homogeneous state can be maintained was measured. After
the storage, the evaluation was performed until 6 months
passed and if the homogeneous state was maintained at
that time, "6 months or more" was entered in the tables.

[0073]

[Table 1]

		Content in admixture agent composition (mass%)							pH of admixture agent composition (20°C)	Storage stability
		(A)				(B)	(B')	(C)		
		Copolymer 1	Copolymer 2	Copolymer 3	Copolymer 4	N,N-dimethyldodecylamine	N,N-dimethyltetradecylamine	Sodium p-toluenesulfonate		
Example	1-1	25	-	-		0.15	-	0.23	5.80	6 months or more
	1-2	25	-	-		0.2	-	0.23	5.82	6 months or more
	1-3	25	-	-		0.25	-	0.23	5.85	6 months or more
	1-4	-	25	-		0.15	-	0.12	5.29	6 months or more
	1-5	-	-	25		0.15	-	0.16	6.04	6 months or more
	1-6	35	-	-	-	0.21	-	0.32	2.30	6 months or more
	1-7	35	-	-	-	0.21	-	0.32	5.75	5 months
	1-8	40	-	-	-	0.24	-	0.37	2.41	6 months or more
	1-9	40	-	-	-	0.24	-	0.37	5.81	5 months
	1-10	-	-	-	25	0.15	-	0.25	2.17	4 months
	1-11	-	-	-	30	0.18	-	0.30	2.16	4 months
	1-12	-	-	-	30	0.18	-	0.30	3.13	4 months
	1-13	-	-	-	30	0.18	-	0.30	4.16	3 months
Comparative example	1-1	25	-	-		-	0.15	0.23	5.79	1 day (white precipitate deposition)

[0074]

It can be seen that the admixture agent compositions obtained by combining component (B) of the present invention with components (A) and (C) as in Examples are excellent in storage stability. On the other hand, it can be seen that the storage stability is significantly reduced in Comparative Example 1-1 in which component (B') was used instead of component (B).

[0075]

[Table 2]

		Content in admixture agent composition (mass%)				Storage stability
		(A)	(B)		(C)	
		Copolymer 1	N,N-dimethyldecylamine/N,N-dimethyldodecylamine		Sodium p-toluenesulfonate	
			Mass ratio	Total contents		
Example	2-1	25	90 / 10	0.25	0.23	6 months or more
	2-2	25	80 / 20	0.12	0.23	6 months or more
	2-3	25		0.25	0.23	6 months or more
	2-4	25		0.50	0.23	6 months or more
	2-5	25		0.75	0.23	6 months or more
	2-6	25	70 / 30	0.12	0.23	6 months or more
	2-7	25		0.25	0.23	6 months or more
	2-8	25		0.50	0.23	6 months or more
	2-9	25	60 / 40	0.12	0.23	6 months or more
	2-10	25		0.25	0.23	6 months or more
	2-11	25		0.50	0.23	6 months or more

[0076]

[Table 3]

		Content in admixture agent composition (mass%)			Storage stability
		(A)	(B)	(C)	
		Copolymer 2	N,N-dimethyldecylamine	Sodium p-toluenesulfonate	
Example	3-1	25	0.15	0.06	6 months or more
	1-4	25	0.15	0.12	6 months or more
	3-2	25	0.15	0.18	6 months or more

[0077]

[Table 4]

		Content in admixture agent composition (mass%)					Storage stability
		(A)	(B)		(C)	(D)	
		Copolymer 1	N,N-dimethyldodecylamine	N,N-dimethyldodecylamine	Sodium p-toluenesulfonate	d-1	
Example	4-1	25	1.125	0.125	0.23	0.20	6 months or more
	4-2	25	1.000	0.250	0.23	0.20	6 months or more
	4-3	25	0.600	0.150	0.23	0.20	6 months or more
	4-4	25	0.700	0.300	0.23	0.20	6 months or more
	4-5	25	0.525	0.225	0.23	0.20	6 months or more
	4-6	25	0.625	0.625	0.23	0.20	6 months or more
	4-7	25	0.500	0.500	0.23	0.20	6 months or more
	4-8	25	0.375	0.375	0.23	0.20	6 months or more
	4-9	25	0.400	0.600	0.23	0.20	6 months or more

[0078]

<Example 5 and Comparative Example 5>

(1) Preparation of Mortar

Mortars were prepared at 20°C with the following mortar formulation. Using a mortar mixer prescribed in JIS R 5201, a mortar was prepared as follows: about half the amount of a fine aggregate, a cement, and the rest of the fine aggregate were charged into the mortar mixer in this order, and thereafter dry-mixed (at 60 rpm for 10 seconds); and a homogeneous mixture of an admixture agent composition prepared beforehand and tap water was added thereto and kneaded (at 60 rpm for 120 seconds). All materials used for testing were those stored at 20°C.

[0079]

<Mortar Formulation>

•Cement: 400 g (a 1:1 mixture of an ordinary Portland cement manufactured by TAIHEIYO CEMENT CORPORATION and

that of SUMITOMO OSAKA CEMENT Co., Ltd., the specific gravity: 3.16)

•Fine aggregate: 700 g (sand, from Joyo, Kyoto prefecture, Japan, the surface-dry condition, the specific gravity in the saturated surface-dry condition: 2.50)

•Admixture agent compositions: those prepared at the proportions shown in Table 5 and in the manner described in Example 1 and the like (the same components as those in Example 1 and the like were used)

•Tap water: 160 g (the total mass with an admixture agent composition mentioned above)

[0080]

(2) Evaluation of Fluidity of Mortar

A mortar prepared in (1) immediately after kneading was filled into a flow cone described in JIS R 5201 (70 mm in upper diameter×100 mm in lower diameter×60 mm in height), and the mortar flow was measured and used as an indicator of the mortar fluidity. The results are shown in Table 5.

[0081]

(3) Measurement of Air Content in Mortar

Using a steel container 400 mL in capacity and referring to JIS A 1171: 2000 (a testing method for polymer cement mortar), the air content in a mortar prepared in (1) immediately after kneading was tested and used as an indicator of the air content in the mortar.

The results are shown in Table 5. This air content is an indicator of defoamability and a smaller numerical value suggests that the mortar is more excellent in defoamability.

[0082]

Note that the storage stability of the admixture agent composition was evaluated in the same manner as in Example 1 and the like. The results are shown in Table 5.

[0083]

[Table 5]

Admixture agent composition														
Content (mass%)										Amount added (parts by mass ⁻¹)		Mortar flow (mm)	Air content in mortar (%)	Storage stability
(A)		(B)		(B)		(C)	(D)							
Copolymer 1	Copolymer 3	N,N'- dimethylethylenediamine	N,N'- dimethyldodecylamine	N,N'- dimethyldodecylamine	N,N'- dimethylethylenediamine	Sodium p- toluenesulfonate	d-1	d-2						
5-1	25	-	0.225	0.525	-	0.23	-	-	0.61	207	1.7	6 months or more		
5-2	25	-	0.225	0.525	-	0.23	0.100	-		203	1.7	6 months or more		
5-3	25	-	0.225	0.525	-	0.23	0.150	-		209	1.8	6 months or more		
5-4	25	-	0.125	-	-	0.23	-	-		201	3.3	6 months or more		
5-5	25	-	0.200	-	-	0.23	-	-		207	2.5	6 months or more		
5-6	25	-	0.250	-	-	0.23	-	-		231	2.1	6 months or more		
5-7	25	-	0.500	-	-	0.23	-	-	0.95	184	2.5	6 months or more		
5-8	-	25	0.050	-	-	0.16	-	-		162	3.1	6 months or more		
5-9	-	25	0.100	-	-	0.16	-	-		164	1.5	6 months or more		
5-1	25	-	-	-	-	0.23	-	-	0.61	195	6.6	6 months or more		
5-2	25	-	-	-	-	0.23	-	0.700		205	2.9	3 months (phase separation)		
5-3	25	-	-	-	0.250	0.23	-	-		202	6.5	6 months or more		
5-4		25	-	-	-	0.16	-	0.300	0.95	156	2.0	3 months (phase separation)		

[0084]

*1 amount added: an amount added relative to 100 parts by mass of cement (the same applies hereinafter)

[0085]

As shown in Table 5, it can be seen that the admixture agent composition of the present invention is excellent in storage stability, and the air content in the mortar is small, that is, the composition is excellent in defoamability. On the other hand, it can be seen that Comparative Examples 5-2 and 5-4 which do not contain component (B) but contain component (D) corresponding to an ether-based defoaming agent are of inferior storage stability.

[0086]

<Example 6 and Comparative Example 6>

(1) Preparation of Concrete

Concretes were prepared at 20°C with the following concrete formulation. A coarse aggregate, about half the amount of a fine aggregate, a cement, a calcium carbonate fine powder, and the rest of the fine aggregate were charged into a double shaft forced action mixer (manufactured by KYC Machine Industry Co., Ltd.) in this order and dry-mixed for 10 seconds. Next, a homogeneous mixture of an admixture agent composition prepared beforehand and tap water with an air entrained agent blended therewith as necessary was added thereto and kneaded for 120 seconds, thereby obtaining a concrete. All materials used for testing were those stored at 20°C.

[0087]

<Concrete Formulation (30 L/bat)>

- Cement: 12.7 kg (a 1:1 mixture of an ordinary Portland cement manufactured by TAIHEIYO CEMENT CORPORATION and that of SUMITOMO OSAKA CEMENT Co., Ltd., the specific gravity: 3.16)

- Calcium carbonate fine powder: 5.4 kg (manufactured by SHIMIZU INDUSTRIAL, CO, LTD., the specific gravity: 2.71)

- Fine aggregate: 20.0 kg (sand, from Joyo, Kyoto prefecture, Japan, the surface-dry condition, the specific gravity in the saturated surface-dry condition: 2.50)

- Coarse aggregate: 25.7 kg (gravel, from Nishijima, Hyogo prefecture, Japan, the surface-dry condition, the specific gravity in the saturated surface-dry condition: 2.63)

- Admixture agent compositions: those prepared at the proportions shown in Table 6 and in the manner described in Example 1 and the like (the same components as those in Example 1 and the like were used)

- Air entraining agent: MIGHTY AE-03 manufactured by Kao Corporation (an amount added shown in Table 6 (relative to 100 parts by mass of cement) was added to tap water and used)

- Tap water: 5.0 kg (the total mass with any of the admixture agent compositions and the air entraining agent)

[0088]

(2) Evaluation of Fluidity of Concrete

The concrete slump flow was measured and evaluated based on JIS A 1101 and JIS A 1150 for a concrete prepared in (1) immediately after kneading. The results are shown in Table 6.

[0089]

(3) Measurement of Air Content in Concrete

The air content in a concrete prepared in (1) immediately after kneading was measured based on JIS A 1128 upon re-kneading the concrete with a scoop just before the measurement. The results are shown in Table 6. This air content is an indicator of defoamability and a smaller numerical value suggests that the concrete is more excellent in defoamability.

[0090]

Note that the storage stability of the admixture agent composition was evaluated in the same manner as in Example 1 and the like. The results are shown in Table 6.

[0091]

[Table 6]

	Admixture agent composition								Amount of air entraining agent added (parts by mass)	Slump flow of concrete (mm)	Air content in concrete (%)	Storage stability
	Content (mass%)						Amount added (parts by mass)					
	(A)	(B)		(C)	(D)							
		N,N'-dimethyldodecylamine	N,N'-dimethyldodecylamine		d-1	d-2						
Example	6-1	25	0.300	0.700	0.23	0.200	-	0.900	-	655	0.8	6 months or more
	6-2	25	0.150	-	0.23	-	-	0.900	-	615	1.1	6 months or more
	6-3	25	0.150	-	0.23	-	-	0.900	0.048	600	5.3	6 months or more
	6-4	25	0.150	-	0.23	-	-	0.900	0.032	605	3.5	6 months or more
Comparative example	6-1	25	-	-	0.23	-	0.700	0.900	-	635	1.0	3 months (phase separation)
	6-2	25	-	-	0.23	-	0.700	0.900	0.032	600	4.3	3 months (phase separation)

[0092]

From Examples 6-2 to 6-4, it can be seen that the air content can be adjusted by adjusting the amount of

the air-entraining agent added. Therefore, Example 6-2 is easy to change the design when the air content needs to be secured.

On the other hand, it can be seen that Comparative Examples 6-1 and 6-2 which do not contain component (B) but contain component (D) corresponding to an ether-based defoaming agent are of inferior storage stability.

[0093]

<Example 7 and Comparative Example 7>

(1) Preparation of Concrete

Concretes were prepared at 20°C with the following concrete formulation. A coarse aggregate, about half the amount of a fine aggregate, a cement, and the rest of the fine aggregate were charged into a double shaft forced action mixer (manufactured by KYC Machine Industry Co., Ltd.) in this order and dry-mixed for 10 seconds. Next, a homogeneous mixture of an admixture agent composition prepared beforehand and tap water with an air entraining agent blended therewith as necessary was added thereto and kneaded for 90 seconds, thereby obtaining a concrete. All materials used for testing were those stored at 20°C.

[0094]

<Concrete Formulation (30 L/bat)>

•Cement: 10.2 kg (a 1:1 mixture of an ordinary Portland cement manufactured by TAIHEIYO CEMENT CORPORATION and that of SUMITOMO OSAKA CEMENT Co., Ltd., the specific gravity: 3.16)

- Fine aggregate: 24.9 kg (sand, from Joyo, Kyoto prefecture, Japan, the surface-dry condition, the specific gravity in the saturated surface-dry condition: 2.50)
- Coarse aggregate: 27.8 kg (gravel, the surface-dry condition, the specific gravity in the saturated surface-dry condition: 2.63)
- Admixture agent compositions: those prepared at the proportions shown in Table 7 and in the manner described in Example 1 and the like (the same components as those in Example 1 and the like were used)
- Air entraining agent: MIGHTY AE-03 manufactured by Kao Corporation (an amount added shown in Table 7 (relative to 100 parts by mass of cement) was added to tap water and used)
- Tap water: 5.1 kg (the total mass with any of the admixture agent compositions and the air entraining agent)

[0095]

(2) Evaluation of Fluidity and Fluidity Retention of Concrete

The concrete slump was measured based on JIS A 1101 and JIS A 1150 for a concrete prepared in (1) immediately after kneading. In addition, the concrete after the evaluation was covered with a vinyl sheet in order to prevent it from drying and left in a dark place at 20°C for 20 minutes, 40 minutes, and 60 minutes after

kneading. At each point of time, the concrete was re-kneaded with a scoop just before measurement and the concrete slump was measured and evaluated in the same manner as described above. The results are shown in Table 7.

[0096]

(3) Evaluation of Air Content in Concrete

The air content in a concrete prepared in (1) was measured immediately after kneading, and at points of time when 20 minutes, 40 minutes, and 60 minutes passed after kneading while the concrete was left in a dark place at 20°C, based on JIS A 1128 upon re-kneading the concrete with a scoop just before the measurements. The results are shown in Table 7. This air content is an indicator of defoamability and a smaller numerical value suggests that the concrete is more excellent in defoamability.

[0097]

Note that the storage stability of the admixture agent composition was evaluated in the same manner as in Example 1 and the like. The results are shown in Table 7.

[0098]

[Table 7]

	Admixture agent composition					Amount of air entraining agent added (parts by mass)	Slump of concrete (mm)				Air content in concrete (%)				Storage stability
	Content (mass%)						immediately after kneading	20 minutes later	40 minutes later	60 minutes later	immediately after kneading	20 minutes later	40 minutes later	60 minutes later	
	(A)	(B)	(C)	(D)	Amount added (parts by mass)										
Example	Copolymer 3	N,N- dimethyldicylamine	Sodium p- toluenesulfonate	d-1	-	-	21.5	22.0	21.5	22.0	5.0	4.8	4.8	5.2	6 months or more
	25	0.085	0.16	-	0.650	-	21.0	21.0	21.0	21.0	6.5	6.0	6.0	5.9	6 months or more
	25	0.085	0.16	-	0.650	-	21.5	21.5	21.5	21.0	6.5	5.5	5.5	5.8	3 months (phase separation)
Comparative example	25	-	0.16	0.030	0.650	0.005	21.5	21.5	21.5	21.0	6.5	5.5	5.5	5.8	3 months (phase separation)

[0099]

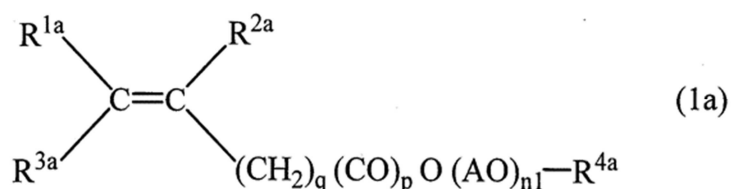
As shown in Table 7, it can be ascertained that the admixture agent composition of the present invention is

not only excellent in defoamability immediately after kneading of concrete, but also excellent in defoamability at a point of time when a certain period of time has passed after kneading, i.e., foam suppressing property. On the other hand, Comparative Example 7-1 which does not contain component (B) but contains component (D) corresponding to an ether-based defoaming agent is found to be of inferior storage stability.

CLAIMS

1. An admixture agent composition for hydraulic compositions comprising: (A) a polycarboxylic acid-based dispersant [hereinafter, referred to as a component (A)]; (B) a tertiary amine compound having one hydrocarbon group with 9 or more and 12 or less carbons and two methyl groups [hereinafter, referred to as a component (B)]; and (C) sulfonic acid or a salt thereof [hereinafter, referred to as a component (C)],

wherein the component (A) is a copolymer including a monomer (1a) represented by the following general formula (1a) and a monomer (2a) represented by the following general formula (2a) as constitutive monomers:



wherein,

R^{1a} and R^{2a} may be the same or different and represent hydrogen atoms or methyl groups;

R^{3a} represents a hydrogen atom or $-\text{COO}(\text{AO})_{n1}\text{X}^1$;

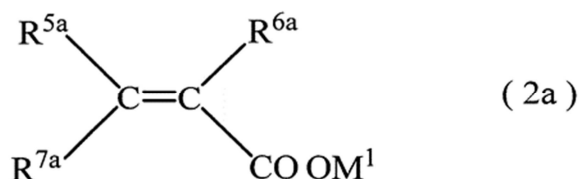
R^{4a} represents a hydrogen atom or an alkyl group with 1 or more and 4 or less carbons;

AO represents a group selected from an ethyleneoxy group and a propyleneoxy group;

n1 represents an average number of added moles of AO and a number of 1 or more and 300 or less;

q represents a number of 0 or more and 2 or less; and

p represents 1,



wherein,

R^{5a} , R^{6a} and R^{7a} may be the same or different and are hydrogen atoms, methyl groups or $(\text{CH}_2)_r\text{COOM}^2$, wherein $(\text{CH}_2)_r\text{COOM}^2$ may form anhydrite with COOM^1 or another $(\text{CH}_2)_r\text{COOM}^2$, and in that case, M^1 and M^2 do not exist in those groups;

M^1 and M^2 may be the same or different and are hydrogen atoms, alkali metals, alkaline earth metals (1/2 atoms), ammonium groups, alkylammonium groups, substituted alkylammonium groups, alkyl groups, hydroalkyl groups or alkenyl groups; and

r represents a number of 0 or more and 2 or less.

2. The admixture agent composition for hydraulic compositions according to claim 1, wherein, in the copolymer, a total amount of the monomer (1a) and the monomer (2a) in the constitutive monomers is 90 mass% or more and 100 mass% or less.

3. The admixture agent composition for hydraulic compositions according to claim 1 or 2, wherein, in the copolymer, a proportion of the monomer (2a) to the total of the monomer (1a) and the monomer (2a) is 40 mole% or more and 90 mole% or less.

4. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 3, comprising the component (A) in an amount of 5 mass% or more and 60 mass% or less.

5. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 4, comprising the component (B) in an amount of 0.01 mass% or more and 5 mass% or less.

6. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 5, wherein the component (C) is an alkylbenzenesulfonic acid having an alkyl group with 1 or more and 3 or less carbons or a salt thereof.

7. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 6, wherein the component (C) is one or more compounds

selected from toluenesulfonic acid, xylenesulfonic acid, cumenesulfonic acid and salts of these.

8. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 7, wherein the component (C) is p-toluenesulfonic acid or a salt thereof.

9. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 8, comprising the component (C) in an amount of 0.01 mass% or more and 0.40 mass% or less.

10. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 9, wherein $(A)/(B)$, a mass ratio of the component (A) to the component (B) is 10 or more and 4,000 or less.

11. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 10, wherein $(A)/(C)$, a mass ratio of the component (A) to the component (C) is 15 or more and 6,000 or less.

12. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 11, wherein $(B)/(C)$, a mass ratio of the component (B) to the component (C) is 0.02 or more and 500 or less.

13. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 12, further comprising (D) a polyoxyalkylene alkyl ether represented by the general formula (d1):



wherein

R^{1d} represents an alkyl group with 4 or more and 20 or less carbons;

AO represents a group selected from an ethyleneoxy group and a propyleneoxy group; and

m represents an average number of added moles of AO and a number of 1 or more and 300 or less.

14. The admixture agent composition for hydraulic compositions according to any one of claims 1 to 13, wherein pH at 20°C is 1 or more and 10 or less.

15. A hydraulic composition comprising the admixture agent composition for hydraulic compositions according to any one of claims 1 to 14, a hydraulic powder, an aggregate and water.

16. A method for producing a hydraulic composition, comprising mixing the admixture agent composition for hydraulic compositions according to any one of claims 1 to 14, a hydraulic powder, an aggregate and water.

17. A method for producing a hardened product of a hydraulic composition, comprising: producing a hydraulic composition by mixing the admixture agent composition for hydraulic compositions according to any one of claims 1 to 14, a hydraulic powder, an aggregate and water; and hardening the hydraulic composition.