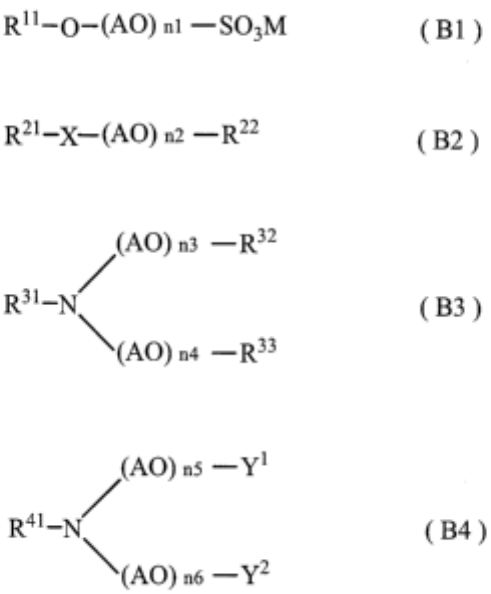
Claims

1. A dispersant composition for hydraulic compositions for centrifugal molding, comprising:
(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and
(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4), wherein (A) is a formaldehyde naphthalenesulfonate condensate or a salt thereof,
[Chemical formula 1]



(B1)

(B2)

(B3)

(B4)

wherein
R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion.

2. The dispersant composition for hydraulic compositions for centrifugal molding according to Claim 1, wherein (A) is a dispersant for hydraulic powders composed of a high-molecular compound having an aromatic ring-containing monomer unit.

3. The dispersant composition for hydraulic compositions for centrifugal molding according to Claim 1 or 2, wherein a content ratio of (B) is 3 mass% or more and 60 mass% or less relative to a total content of (A) and (B).

4. The dispersant composition for hydraulic compositions for centrifugal molding according to any one of Claims 1 to 3, wherein the composition contains, in a solid content thereof, (A) in an amount of 1 mass% or more and 99 mass% or less.

5. The dispersant composition for hydraulic compositions for centrifugal molding according to any one of Claims 1 to 4, further comprising (C) a polycarboxylic acid-based copolymer.

6. The dispersant composition for hydraulic compositions for centrifugal molding according to Claim 5, wherein the composition is in the form of a liquid containing water; a content of (A) in the composition is 1 mass% or more and 32 mass% or less; and a total content of (A) and (C) in the composition is 4 mass% or more and 50 mass% or less.

7. The dispersant composition for hydraulic compositions for centrifugal molding according to Claim 5, wherein a mass ratio of (C) to (A), (C)/(A), is over 0/100 and 50/50 or less.

8. A hydraulic composition for centrifugal molding comprising the dispersant composition for hydraulic compositions for centrifugal molding according to any one of Claims 1 to 7, a hydraulic powder, an aggregate and water, wherein a ratio of water/hydraulic powder is 10 mass% or more and 25 mass% or less.

9. The hydraulic composition for centrifugal molding according to Claim 8, wherein (A) is contained in an amount of 0.001 parts by mass or more and 5 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

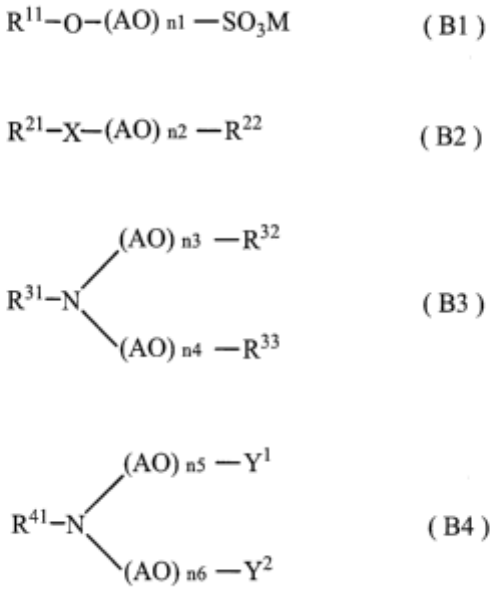
10. The hydraulic composition for centrifugal molding according to Claim 8 or 9, wherein (B) is contained in an amount of

0.0001 parts by mass or more and 5 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

11. The hydraulic composition for centrifugal molding according to any one of Claims 8 to 10, wherein the composition contains (A) and (B) in total in an amount of 0.1 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

12. A dispersant composition for hydraulic compositions for steam curing, comprising:
(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and
(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4),
wherein (A) is a formaldehyde naphthalenesulfonate condensate or a salt thereof, and a content ratio of (B) is 1 mass% or more and 60 mass% or less relative to a total content of (A) and (B),

[Chemical Formula 2]



wherein

R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion.

13. The dispersant composition for hydraulic compositions for steam curing according to Claim 12, wherein, as (B), one or more compounds selected from compound (B1), compound (B2) and compound (B3) are contained.

14. The dispersant composition for hydraulic compositions for steam curing according to Claim 12 or 13, wherein the composition contains, in a solid content thereof, (A) in an amount of 1 mass% or more and 99 mass% or less.

15. The dispersant composition for hydraulic compositions for steam curing according to any one of Claims 12 to 14, further comprising (C) a polycarboxylic acid-based copolymer.

16. The dispersant composition for hydraulic compositions for steam curing according to Claim 15, wherein the composition is in the form of a liquid containing water; a content of (A) in the composition is 1 mass% or more and 32 mass% or less; and a total content of (A) and (C) in the composition is 4 mass% or more and 50 mass% or less.

17. The dispersant composition for hydraulic compositions for

steam curing according to Claim 15, wherein a mass ratio of (C) to (A), (C)/(A), is over 0/100 and 50/50 or less.

18. A hydraulic composition for steam curing comprising the dispersant composition for hydraulic compositions for steam curing according to any one of Claims 12 to 17, a hydraulic powder, an aggregate and water, wherein a ratio of water/hydraulic powder is 10 mass% or more and 53 mass% or less, and a total content of (A) and (B) is 0.25 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

19. The hydraulic composition for steam curing according to Claim 18, wherein (A) is contained in an amount of 0.15 parts by mass or more and 9.9 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

20. The hydraulic composition for steam curing according to Claim 18 or 19, wherein (B) is contained in an amount of 0.0025 parts by mass or more and 6 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

21. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1: mixing water, a hydraulic powder, an aggregate and the dispersant composition for hydraulic compositions for centrifugal molding according to any one of Claims 1 to 7 to prepare a hydraulic composition having a water/hydraulic powder ratio of 10 mass% or more and 25 mass% or less;
step 2: filling the hydraulic composition obtained in step 1 into a mold;
step 3: compacting the hydraulic composition filled into the mold in step 2 by applying a centrifugal force; and

step 4: setting, in the mold, the hydraulic composition compacted in step 3.

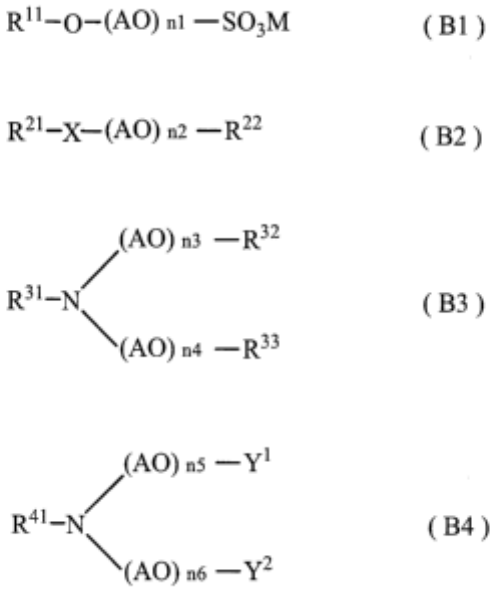
22. The method for producing a hardened product of a hydraulic composition according to Claim 21, comprising the following step 5 after step 4,
step 5: steam curing, in the mold, the hydraulic composition set in step 4.

23. The method for producing a hardened product of a hydraulic composition according to Claim 21 or 22, wherein, in step 1, the dispersant composition for hydraulic compositions for centrifugal molding is mixed so that a total mixing amount of (A) and (B) is 0.1 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

24. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1': mixing water, a hydraulic powder, an aggregate and the dispersant composition for hydraulic compositions for steam curing according to any one of Claims 12 to 17 to prepare a hydraulic composition having a water/hydraulic powder ratio of 10 mass% or more and 53 mass% or less, wherein the dispersant composition for hydraulic compositions for steam curing is mixed so that a ratio of a mixing amount of (B) is 1 mass% or more and 60 mass% or less relative to a total mixing amount of (A) and (B) and the total mixing amount of (A) and (B) is 0.25 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder;
step 2': filling the hydraulic composition obtained in step 1' into a mold; and
step 5': steam curing, in the mold, the hydraulic composition filled into the mold in step 2'.

25. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1: mixing water, a hydraulic powder, the following (A), the following (B) and an aggregate to prepare a hydraulic composition for centrifugal molding having a water/hydraulic powder ratio of 10 mass% or more and 25 mass% or less, wherein
(A) is a formaldehyde naphthalenesulfonate condensate or a salt thereof;
step 2: filling the hydraulic composition obtained in step 1 into a mold;
step 3: compacting the hydraulic composition filled into the mold in step 2 by applying a centrifugal force; and
step 4: setting, in the mold, the hydraulic composition compacted in step 3,
(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and
(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4),

[Chemical Formula 3]



wherein

R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion.

26. The method for producing a hardened product of a hydraulic composition according to Claim 25, comprising the following step 5 after step 4,
step 5: steam curing, in the mold, the hydraulic composition set in step 4.

27. The method for producing a hardened product of a hydraulic composition according to Claim 25 or 26, wherein, in step 1, (A) and (B) are mixed so that a ratio of a mixing amount of (B) is 3 mass% or more and 60 mass% or less relative to a total mixing amount of (A) and (B) and the total mixing amount of (A) and (B) is 0.1 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

28. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1': mixing water, a hydraulic powder, the following (A), the following (B) and an aggregate to prepare a hydraulic composition for steam curing having a water/hydraulic powder ratio of 10 mass% or more and 53 mass% or less, wherein (A) is a formaldehyde naphthalenesulfonate condensate or a salt thereof, (A) and (B) are mixed so that a ratio of a mixing

amount of (B) is 1 mass% or more and 60 mass% or less relative to a total mixing amount of (A) and (B) and the total mixing amount of (A) and (B) is 0.25 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder;

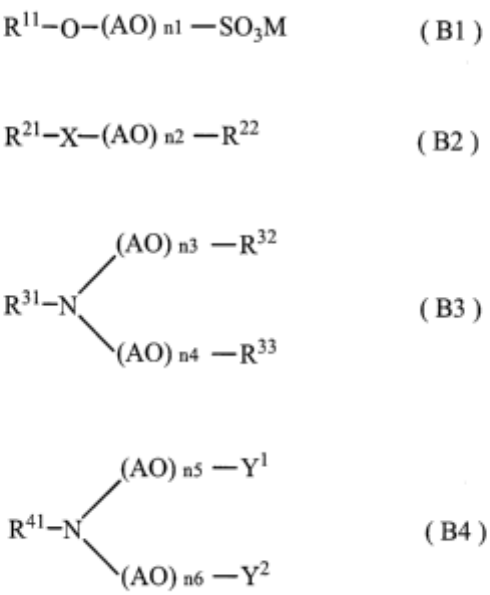
step 2': filling the hydraulic composition obtained in step 1' into a mold; and

step 5': steam curing, in the mold, the hydraulic composition filled into the mold in step 2'

(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and

(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4),

[Chemical Formula 4]



(B1)

(B2)

(B3)

(B4)

wherein

R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion.

29. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1: mixing water, a hydraulic powder, the following (A), the following (B), the following (C) and an aggregate to prepare a hydraulic composition having a water/hydraulic powder ratio of 10 mass% or more and 25 mass% or less, wherein (A) is

a formaldehyde naphthalenesulfonate condensate or a salt thereof;

step 2: filling the hydraulic composition obtained in step 1 into a mold;

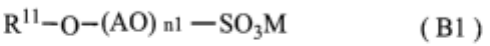
step 3: compacting the hydraulic composition filled into the mold in step 2 by applying a centrifugal force; and

step 4: setting, in the mold, the hydraulic composition compacted in step 3,

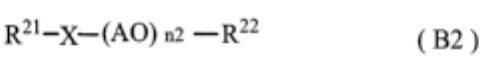
(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and

(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4),

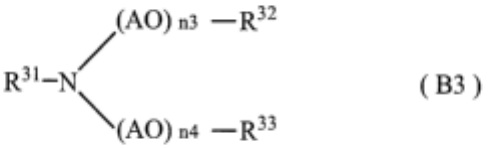
[Chemical Formula 5]



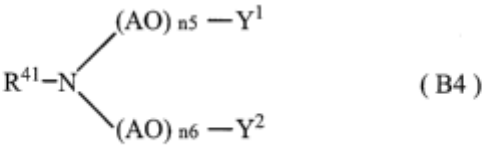
(B1)



(B2)



(B3)



(B4)

wherein

R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion; and

(C): a polycarboxylic acid-based copolymer.

30. The method for producing a hardened product of a hydraulic composition according to Claim 29, comprising the following step 5 after step 4,

step 5: steam curing, in the mold, the hydraulic composition set in step 4.

31. The method for producing a hardened product of a hydraulic composition according to Claim 29 or 30, wherein, in step 1, (A) and (B) are mixed so that a ratio of a mixing amount of (B) is 3 mass% or more and 60 mass% or less relative to a total mixing amount of (A) and (B) and the total mixing amount of (A) and (B) is 0.1 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder.

32. The method for producing a hardened product of a hydraulic composition according to any one of Claims 29 to 31, wherein, in step 1, the dispersant composition for hydraulic compositions for centrifugal molding according to Claim 5 is used.

33. The method for producing a hardened product of a hydraulic composition according to any one of Claims 29 to 31, wherein, in step 1, (A) and (C) are mixed so that a mass ratio of (C) to (A), (C)/(A), is over 0/100 and 50/50 or less.

34. A method for producing a hardened product of a hydraulic composition, the method comprising the steps of:
step 1': mixing water, a hydraulic powder, the following (A), the following (B), the following (C) and an aggregate to prepare a hydraulic composition having a water/hydraulic powder ratio of 10 mass% or more and 53 mass% or less, wherein (A) is a formaldehyde naphthalenesulfonate condensate or a salt thereof, (A) and (B) are mixed so that a ratio of a mixing amount of (B) is 1 mass% or more and 60 mass% or less relative to a total mixing amount of (A) and (B) and the total mixing amount of (A) and (B) is 0.25 parts by mass or more and 10 parts by mass or less relative to 100 parts by mass of the hydraulic powder;

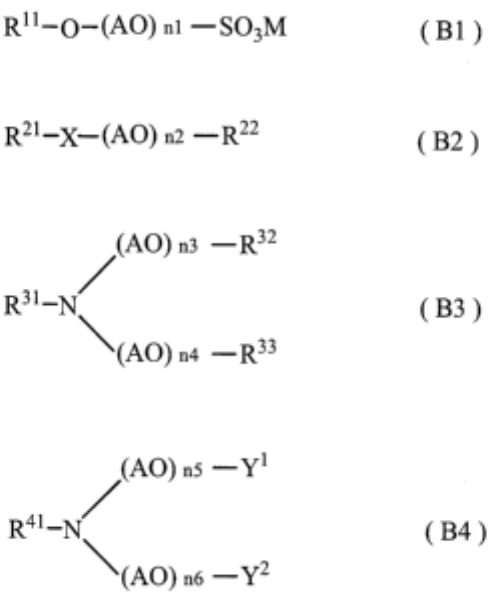
step 2': filling the hydraulic composition obtained in step 1' into a mold; and

step 5': steam curing, in the mold, the hydraulic composition filled into the mold in step 2',

(A) a dispersant for hydraulic powders composed of an aromatic ring-containing high-molecular compound; and

(B) one or more compounds selected from compounds represented by the following general formula (B1), compounds represented by the following general formula (B2), compounds represented by the following general formula (B3) and compounds represented by the following general formula (B4),

[Chemical Formula 6]



wherein

R^{11}, R^{21}, R^{31} and R^{41} each independently represent a hydrocarbon group having a carbon number of 4 or more and 27 or less;

R^{22} represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

R^{32} and R^{33} are the same or different, and each represents a hydrogen atom or an alkyl group having a carbon number of 1 or more and 3 or less;

X represents O or COO;

AO represents an alkyleneoxy group having a carbon number of 2 or more and 4 or less;

n_1 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_2 represents an average number of moles of added AO and is 1 or more and 200 or less;

n_3 and n_4 are the same or different, and each represents an average number of moles of added AO and is 0 or more, and the total of n_3 and n_4 is 1 or more and 200 or less;

Y^1 and Y^2 are the same or different, and each represents a hydrogen atom or SO_3M, and at least one of Y^1 and Y^2 is SO_3M;

n_5 and n_6 are the same or different; each represents an average number of moles of added AO and is 0 or more; the total of n_5 and n_6 is 1 or more and 200 or less; when n_5 is 0, Y^1 is a hydrogen atom; and when n_6 is 0, Y^2 is a hydrogen atom; and

M is a counter ion; and

(C): a polycarboxylic acid-based copolymer.

35. The method for producing a hardened product of a hydraulic composition according to Claim 34, wherein, in step 1', the dispersant composition for hydraulic compositions for steam curing according to Claim 16 is used.

36. The method for producing a hardened product of a hydraulic composition according to Claim 34, wherein, in step 1', (A) and (C) are mixed so that a mass ratio of (C) to (A), (C)/(A), is over 0/100 and 50/50 or less.