

Claims

1. Aqueous polymer dispersion comprising
- 5 a) 10 to 55 % by weight based on the dispersion of at least one polymer P obtainable by the reaction of reactive monomers M, wherein the reactive monomers M comprise
- 10 - 50 to 100 % by weight of at least one monomer M1 of the general formula (I)
- $$\text{H}_2\text{C}=\text{CH}-\text{C}(\text{O})\text{OR (I)}$$
- 15 wherein R is an unbranched alkyl chain comprising from 18 to 22 carbon atoms; and
- 0 to 50 % by weight of at least one monomer M2, which is different from monomer M1;
- 20 wherein the amounts of the monomers M1 and M2 are each based on the total amount of all reactive monomers M used in the reaction,
- wherein the polymer P has a weight-average molecular weight M_w of 20,000 to 150,000 g/mol according to DIN 55672-1:1995-02; and
- 25 wherein the polymer P is present in the form of particles having an average particle size d_{50} of from 75 nm to 400 nm effected by Column Hydrodynamic Chromatography;
- 30 b) 0 to 24.5 % by weight based on the total amount of the aqueous polymer dispersion of at least one with water miscible solvent,
- c) 0 to 30 % by weight based on the total amount of the aqueous polymer dispersion of at least one hydrophobic organic solvent,
- 35 d) 10 to 30 % by weight based on the total amount of monomers M of at least one protective colloid; and
- 40 e) 0 to 5 % by weight based on the total amount of the aqueous polymer dispersion of at least one surfactant.

2. Dispersion according to claim 1, wherein the at least one monomer M1 is a mixture, comprising
- 5 - 40 to 55 % by weight, based on the total amount of monomers M1, of monomers M1 of formula (I), wherein R is an unbranched alkyl chain comprising 18 carbon atoms;
- 10 to 15 % by weight, based on the total amount of monomers M1, of monomers M1 of formula (I), wherein R is an unbranched alkyl chain comprising 20 carbon atoms;
- 10 and
- 35 to 45 % by weight, based on the total amount of monomers M1, of monomers M1 of formula (I), wherein R is an unbranched alkyl chain comprising 22 carbon atoms.
- 15 3. Dispersion according to claim 1 or 2, wherein the amount of the at least one monomer M2 is from 4 to 10 % by weight based on the total amount of all reactive monomers M.
4. Dispersion according to any one of claims 1 to 3, wherein the at least one monomer M2 is selected from the group consisting of acrylate monomers of the general formula (II),
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$$\text{H}_2\text{C}=\text{CH}-\text{C}(\text{O})\text{OR}^3 \text{ (II)},$$
- wherein R³ is a branched or unbranched alkyl chain comprising from 1 to 10 carbon atoms;
- 25 methacrylate monomers of the general formula (III)
- $$\text{H}_2\text{C}=\text{C}(\text{CH}_3)-\text{C}(\text{O})\text{OR}^4 \text{ (III)},$$
- 30 wherein R⁴ is a branched or unbranched alkyl chain comprising from 1 to 10 carbon atoms; and
- styrene monomers.
- 35 5. Dispersion according to any one of claims 1 to 4, wherein the at least one monomer M2 is butyl acrylate or 2-ethyl hexylacrylate.
6. Dispersion according to any one of claims 1 to 5, wherein the at least one with water miscible solvent is 1,2-propylene glycol.
- 40 7. Dispersion according to any one of claims 1 to 6, wherein the at least one protective colloid is a polymer obtained by the reaction of

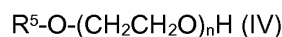
- 15 to 30 % by weight of acrylic acid, methacrylic acid, or a mixture thereof; and
- 70 to 85 % by weight of methyl methacrylate, n-butyl acrylate, 2-ethylhexyl acrylate, styrene, alpha-methyl styrene, or a mixture of two or more thereof, in polymerized form,

wherein the given amounts are each based on the total amount of the at least one protective colloid.

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8. Dispersion according to any one of claims 1 to 7, wherein the at least one hydrophobic organic solvent is an aromatic or aliphatic hydrocarbon or a mixture thereof.
9. Dispersion according to any one of claims 1 to 8, wherein the at least one surfactant is a nonionic surfactant of the general formula (IV)

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wherein

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R^5 is a branched or unbranched alkyl radical having 12 to 22 carbon atoms; and
 n is 5 to 30.

10. Dispersion according to any one of claims 1 to 9, wherein the polymer P has a weight-average molecular weight M_w of 20 000 to 100 000 g/mol.

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11. Method for the preparation of the aqueous polymer dispersion according to any one of claims 1 to 10, comprising the steps of

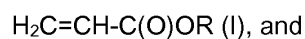
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a) preparation of an aqueous monomer dispersion comprising

a1) 10 to 55 % by weight based on the total amount of the resulting aqueous polymer dispersion of reactive monomers M, wherein the reactive monomers M comprise

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- 50 to 100 % by weight based on the total amount of the reactive monomers M of at least one monomer M1 of the general formula (I)



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- 0 to 50 % by weight based on the total amount of the reactive monomers M of at least one monomer M2, which is different from monomer M1,

wherein the amounts of the monomers M1 and M2 are each based on the total amount of all reactive monomers M;

- 5 a2) 0 to 30 % by weight based on the total amount of the resulting aqueous polymer dispersion of at least one hydrophobic organic solvent;
- a3) 10 to 30 % by weight based on the total amount of reactive monomers M of at least one protective colloid;
- 10 a4) 0 to 24.5 % by weight based on the total amount of the resulting aqueous polymer dispersion of at least one with water miscible solvent;
- a5) 0 to 5 % by weight based on the total amount of the resulting aqueous polymer dispersion of at least one surfactant; and
- 15 b) ultrasonic processing or homogenization of the aqueous monomer dispersion of step a);
- c) addition of at least one polymerization initiator.
- 20 12. Method according to claim 11, wherein the mixture obtained in step a) is treated with ultrasound for at least 10 minutes.
13. Method according to claim 11 or 12, wherein after step b) the aqueous monomer dispersion is obtained in form of a miniemulsion.
- 25 14. Aqueous polymer dispersion obtained by a method according to any one of claims 11 to 13.
15. Use of the aqueous dispersion according to any one of claims 1 to 10 or 14 as pour point depressant for crude oil, petroleum, and petroleum products.
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