mixtures thereof improve the coating properties of coating compositions, in particular of coating compositions, namely whitening resistance, water-uptake and flexibility of the coating without deteriorating other properties such as blocking resistance and surface hardness. Moreover, the monomers M1 can be – at least with regard to their alkanol part - obtained from biological sources and thus allow for reducing the demand of fossil carbon in the production of the polymer latexes.

In one aspect, there is provided an aqueous polymer latex of a film-forming copolymer obtainable by aqueous emulsion polymerisation of ethylenically unsaturated monomers M, which comprise

- 20 to 90% by weight, based on the total amount of monomers M, of at least one monomer M1, which is selected from isobutyl acrylate, 2-methylbutyl acrylate and isoamyl acrylate and mixtures thereof;
- 0 to 55% by weight, based on the total amount of monomers M, of at least one monomer M2, which is selected from ethyl acrylate, n-propyl acrylate, n-butyl acrylate, n-pentyl acrylate, C_6-C_{20}-alkyl esters of acrylic acid and C_5-C_{20}-alkyl esters of methacrylic acidand mixtures thereof;
- 5 to 50% by weight, based on the total amount of monomers M, of at least one monomer M3, which is selected from tert-butyl acrylate, C_1-C_4-alkyl esters of methacrylic acid, C_5-C_{20}-cycloalkyl esters of acrylic acid, C_5-C_{20}-cycloalkyl esters of methacrylic acid, C_5-C_{20}-cycloalkylmethyl esters of acrylic acid, C_5-C_{20}-cycloalkylmethyl esters of methacrylic acid, where cycloalkyl in the aforementioned monomers is mono-, bi- or tricyclic and where 1 or 2 nonadjacent CH_2 moieties of cycloalkyl may be replaced by oxygen atoms and where cycloalkyl may be unsubstituted or carry 1, 2, 3 or 4 methyl groups, and monovinyl aromatic monomers and mixtures thereof, wherein the monomer M3 comprises methyl methacrylate;
- 0.05 to 4% by weight, based on the total amount of monomers M, of least one monomer M4, which is selected from monoethylenically unsaturated monomers having an acidic group;

where the total amount of monomers M1 and M2 is in the range from 45 to 94.95% by weight, based on the total amount of ethylenically unsaturated monomers M, and where the total amount of monomers M1, M2 and M3 is at least 90% by weight, based on the total amount of ethylenically unsaturated monomers M.

The present disclosure therefore relates to aqueous polymer latexes of film-forming copolymers obtainable by aqueous emulsion polymerisation of ethylenically unsaturated monomers M, which comprise

- 20 to 90% by weight, in particular 25 to 90% by weight, especially 30 to 85% by weight, based on the total amount of monomers M, of at least one monomer M1,

Claims

1. An aqueous polymer latex of a film-forming copolymer obtainable by aqueous emulsion polymerisation of ethylenically unsaturated monomers M, which comprise
   - 20 to 90% by weight, based on the total amount of monomers M, of at least one monomer M1, which is selected from isobutyl acrylate, 2-methylbutyl acrylate and isoamyl acrylate and mixtures thereof;
   - 0 to 55% by weight, based on the total amount of monomers M, of at least one monomer M2, which is selected from ethyl acrylate, n-propyl acrylate, n-butyl acrylate, n-pentyl acrylate, C_6-C_{20}-alkyl esters of acrylic acid and C_5-C_{20}-alkyl esters of methacrylic acidand mixtures thereof;
   - 5 to 50% by weight, based on the total amount of monomers M, of at least one monomer M3, which is selected from tert-butyl acrylate, C_1-C_4-alkyl esters of methacrylic acid, C_5-C_{20}-cycloalkyl esters of acrylic acid, C_5-C_{20}-cycloalkyl esters of methacrylic acid, C_5-C_{20}-cycloalkylmethyl esters of acrylic acid, C_5-C_{20}-cycloalkylmethyl esters of methacrylic acid, where cycloalkyl in the aforementioned monomers is mono-, bi- or tricyclic and where 1 or 2 nonadjacent CH_2 moieties of cycloalkyl may be replaced by oxygen atoms and where cycloalkyl may be unsubstituted or carry 1, 2, 3 or 4 methyl groups, and monovinyl aromatic monomers and mixtures thereof, wherein the monomer M3 comprises methyl methacrylate;
   - 0.05 to 4% by weight, based on the total amount of monomers M, of least one monomer M4, which is selected from monoethylenically unsaturated monomers having an acidic group;

   where the total amount of monomers M1 and M2 is in the range from 45 to 94.95% by weight, based on the total amount of ethylenically unsaturated monomers M, and where the total amount of monomers M1, M2 and M3 is at least 90% by weight, based on the total amount of ethylenically unsaturated monomers M.

2. The aqueous polymer latex of claim 1, wherein the monomer M1 is isobutyl acrylate.

3. The aqueous polymer latex of claim 1, wherein the monomer M1 is isoamyl acrylate or a mixture comprising isoamyl acrylate and 2-methylbutyl

acrylate in an amount of at least 80 %, based on the total amount of monomers M1.

4. The aqueous polymer latex of any one of the preceding claims, which has at least one of the following features 4.1 to 4.5:
   - 4.1 at least the carbon atoms of the isobutyl group, the 2-methylbutyl group and the isoamyl group in the monomers M1 are of biological origin;
   - 4.2 the monomer M2 is selected from the group consisting of n-butyl acrylate and 2-ethylhexyl acrylate and mixtures thereof;
   - 4.3 the monomer M3 is selected from methyl methacrylate and combinations of methyl methacrylate and at least one further monomer M3, selected from tert-butyl acrylate, n-butyl methacrylate, cyclohexylmethacrylate, isobornylmethacrylate and styrene;
   - 4.4 the monomers M4 are selected from acrylic acid, methacrylic acid, itaconic acid and combinations thereof;
   - 4.5 the monomers M further comprise at least one monoethylenically unsaturated, non-ionic monomer M5, which has a solubility in deionized water at 20° C and 1 bar of at least 60 g/L, which is selected from the group consisting of non-ionic monoethylenically unsaturated monomers which have a functional group selected from the group consisting of hydroxyalkyl groups, a primary carboxamide group, urea groups and keto groups and combinations thereof.

5. The aqueous polymer latex of any one of the preceding claims, where the monomers M consist of:
   - i. 25 to 90% by weight, based on the total amount of monomers M, of isobutyl acrylate as a monomer M1
   - ii. 0 to 50% by weight, based on the total amount of monomers M, of at least one monomer M2, which is selected from ethyl acrylate, n-propyl acrylate, n-butyl acrylate, C_5-C_{20}-alkyl esters of acrylic acid and C_5-C_{20}-alkyl esters of methacrylic acid;
   - iii. 10 to 45% by weight, based on the total amount of monomers M, of at least one monomer M3, which is selected from tert-butyl acrylate, C_1-C_4-alkyl esters of methacrylic acid, C_5-C_{20}-cycloalkyl esters of acrylic acid, C_5-C_{20}-cycloalkyl esters of methacrylic acid, C_5-C_{20}-cycloalkylmethyl esters of acrylic acid, C_5-C_{20}-cycloalkylmethyl esters of methacrylic acid, where cycloalkyl in the aforementioned monomers is mono-, bi- or tricyclic and where 1 or 2 nonadjacent CH_2 moieties of

cycloalkyl may be replaced by oxygen atoms and where cycloalkyl may be unsubstituted or carry 1, 2, 3 or 4 methyl groups, and monovinyl aromatic monomers;

iv. 0.05 to 4% by weight, based on the total amount of monomers M, of one or more monoethylenically unsaturated monomers M4;

0 to 9.95% by weight, based on the total weight of the monomers M, of one or more non-ionic monomers M5,

or where the monomers M comprise or consist of:

i. 50 to 70% by weight, based on the total amount of monomers M, of isobutyl acrylate as a monomer M1

iii. 30 to 50% by weight, based on the total amount of monomers M, of methyl methacrylate as monomer M3;

iv. 0.1 to 4% by weight, based on the total amount of monomers M, of a monoethylenically unsaturated carboxylic acid as monomer M4;

v. 0 to 5% by weight, based on the total amount of monomers M, of a monoethylenically unsaturated carboxylic acid amide as monomer M5a

vi. 0 to 10% by weight, based on the total weight of the monomers M, of one or more ethylenically unsaturated non-ionic monomers different from the monomers M1, M3, M4 and M5a.

6. The aqueous polymer latex of any one of the preceding claims, which has at least one of the following features 6.1 or 6.2:

6.1 wherein the particles of the copolymer contained in the polymer latex have a Z-average particle diameter in the range from 30 to 500 nm, in particular in the range from 40 to 350 nm, as determined by quasi-elastic light scattering;

6.2 the polymer particles comprise a polymer phase, which has a glass transition temperature Tg in the range from -25 to +40° C.

7. The aqueous polymer latex of any one of the preceding claims, where the polymer particles comprise a polymer phase (1), which has a glass transition temperature Tg(1) in the range from -25 to +40° C and another polymer phase (2), which has a glass transition temperature Tg(2) in the range from +50 to +150° C, and where at least 75% by weight of the monomer M1, based on the total amount of the monomer M1 present in the monomers M, are present in the polymer phase (1).

8. A process for producing an aqueous polymer latex of any one of the preceding claims, which comprises performing an aqueous emulsion polymerisation of the monomers M.

9. The process of claim 8, where the aqueous emulsion polymerization is performed by a monomer feed process, where at least 90% of the monomers M to be polymerized are feed to a polymerisation vessel as an aqueous emulsion of the monomers.

10. The use of an aqueous polymer latex as defined in any one of the claims 1 to 7 as a binder in waterborne coating composition.

11. A waterborne coating composition which contains

a) a binder polymer in the form of the aqueous polymer latex as defined in any one of the claims 1 to 7; and
b) at least one further ingredient, which is conventionally used in waterborne coating compositions and which is not a binder.

12. The waterborne coating composition of claim 11, which is a latex paint, in particular a latex paint for architectural coatings, a wood coating or wood staining composition or a latex paint for interior coatings.

13. The waterborne coating composition of any one of claims 11 or 12, which contains a titanium dioxide pigment.

14. The waterborne coating composition of claim 13, wherein the weight ratio of the polymer of the polymer latex to the titanium dioxide pigment is in the range of
0.1 : 5.0 to 5.0 : 0.1.

15. The use of an aqueous polymer latex as defined in any one of the claims 1 to 7 for improving the resistance to water or humidity of coatings obtained from waterborne coating composition or for improving the flexibility of a coating obtained from waterborne coating composition.