compositions prepared therefrom result in coatings having good wet adhesion and good hardness.

WO 2014/07595 describes the use of polymer latexes comprising at least two different monomers, whose homopolymers have a theoretical glass transition temperature of at least 25°C and at least two different monomers, whose homopolymers have a theoretical glass transition temperature of below 25°C as a binder for improving the color retention of the exterior coating.

WO 2016/042116 describes polymer dispersions prepared by two-stage emulsion polymerization in the presence of a copolymerizable emulsifier and the use thereof as a binder in waterborne coating compositions for wood coating. The coating compositions prepared therefrom result in coatings having good water resistance and good hardness.

Despite the progress made in many respects, it remains a challenging task to provide polymer dispersions with a balanced application profile, as not only the application properties but also the stability of the polymer dispersion have to be considered. In particular, it is difficult to reconcile the different coating property requirements at the same time through the binder. As a rule, the attempt to improve one property of the coating through changes in the polymer composition of the binder leads to other properties of the coating deteriorating significantly.

While the polymer dispersions described in the above references have particular advantages in one or more aspects, they do not always have a well balanced application profile. Apart from that, they are solely based on monomers, which are prepared from fossil sources. In view of the ongoing discussion about the impact of CO_2 emission, there is a demand of reducing fossil carbon in the production of the polymer latexes.

It is therefore an object of the present disclosure to provide a polymer latex which has a well balanced application profile, which allows for using the polymer latex as a binder or co-binder in water-borne coating compositions, in particular in waterborne coating compositions for exterior application. Yet, the demand of fossil carbon should also be reduced.

It was surprisingly found that polymer latexes based on acrylate monomers, methacrylate monomers and/or monovinyl aromatic monomers which contain a certain quantity of monomers M1 selected from isobutyl acrylate and isoamyl acrylate and

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;
- 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,

which is selected from isobutyl acrylate, 2-methylbutyl acrylate and isoamyl acrylate and mixtures thereof;

- 0 to 55% by weight, e.g. 5 to 55% by weight, in particular 0 to 50% by weight or 5 to 50% by weight, especially 0 to 40% by weight or 5 to 40% 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 acid and mixtures thereof;
- 5 to 50% by weight, in particular 10 to 45% by weight, especially 15 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 CH_2 moieties of cycloalkyl may be replaced by O and where cycloalkyl may be unsubstituted or carry 1, 2, 3 or 4 methyl groups, and monovinyl aromatic monomers and mixtures thereof;
- 0.05 to 4% by weight, preferably from 0.05 to 3.5% by weight, in particular from 0.1 to 4% by weight or from 0.1 to 3% by weight, especially from 0.2 to 3% by weight or from 0.5 to 3% by weight or from 0.5 to 2% by weight, based on the total weight of the 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 or 45 to 94.9% by weight or 45 to 94.8% by weight or 45 to 94.5% by weight, in particular 50 to 89.95% by weight or 50 to 94.9% by weight or 50 to 94.8% by weight or 50 to 94.5% by weight, especially 55 to 84.95% by weight or 55 to 94.9% by weight or 55 to 94.8% by weight or 55 to 94.5% 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, in particular at least 92% by weight, especially at least 95% by weight, based on the total amount of ethylenically unsaturated monomers M.

In another aspect, there is provided a process for producing an aqueous polymer latex as described above, which comprises performing an aqueous emulsion polymerisation of the monomers M.

The present disclosure also relates to a process for producing the aqueous polymer latexes of the present disclosure. The process comprises performing an aqueous emulsion polymerisation of the monomers M.

In another aspect, there is provided a use of an aqueous polymer latex as defined above as a binder in waterborne coating composition.

The present disclosure also relates to the use of these polymer latexes as binders or co-binders in waterborne coating compositions, in particular in waterborne compositions for wood coating, such as waterborne wood stain formulations, waterborne wood paint formulations and waterborne clearcoat formulations for wooden surfaces, but also for waterborne architectural coatings. The present disclosure also relates to the use of the aqueous polymer latexes described herein for improving the resistance of coatings obtained from waterborne coating composition as described herein to water or humidity.

In another aspect, the present disclosure relates to waterborne coating compositions which contain

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

In another aspect, there is provided a use of an aqueous polymer latex as defined above 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.

The present disclosure is associated with several benefits.

- The polymer latexes are stable and provide a good and well balanced application profile to waterborne coating compositions.

- Since the polymer latexes contain considerable amounts of monomers M1, which can be obtained from biological sources, they allow for a significant reduction in the need of fossil carbon, in particular by at least 10%, especially at least 15% or even at least 20%.
- Waterborne coating compositions containing a polymer latex of the disclosure as a binder or co-binder have improved flexibility.
- Waterborne coating compositions containing a polymer latex of the disclsoure as a binder or co-binder show a very good blocking resistance.
- Waterborne coating compositions containing a polymer latex of the disclosure as a binder or co-binder have good weathering resistance, in particular against moisture and UV radiation, in particular improved whitening resistance.

- Waterborne coating compositions containing a polymer latex of the disclosure show improved scrub resistance, improved gloss and improved thickening efficiency at high and low shear rates, reduced dirt pick-up as well as comparable opacity, adhesion and stain resistance.
- Due to their well balanced application profile, the polymer latexes are particularly useful as binders or co-binders in waterborne wood coatings, and have beneficial properties both in waterborne primers and in water-borne top coat formulations.

Here and throughout the specification, the term “(meth)acryl” includes both acryl and methacryl groups. Hence, the term “(meth)acrylate” includes acrylate and methacrylate and the term “(meth)acrylamide” includes acrylamide and methacrylamide.

Here and throughout the specification, the term “waterborne coating composition” means a liquid aqueous coating composition containing water as the continuous phase in an amount sufficient to achieve flowability.

Here and throughout the specification, the terms “wt.-%” and “% by weight (% b.w.)” are used synonymously.

Here and throughout the specification, the term “pphm” means parts by weight per 100 parts of monomers and corresponds to the relative amount in % by weight of a certain substance based on the total amount of monomers M.

Here and throughout the specification, the term "ethylenically unsaturated monomer" is understood that the monomer has at least one C=C double bond, e.g. 1, 2, 3 or 4 C=C double bonds, which are radically polymerizable, i.e. which under the conditions of an aqueous radical emulsion polymerization process are polymerized to obtain a polymer having a backbone of carbon atoms. Here and throughout the specification, the term “monoethylenically unsaturated” is understood that the monomer has a single C=C double bond, which is susceptible to radical polymerization under conditions of an aqueous radical emulsion polymerization.

Here and throughout the specification, the terms “ethoxylated” and “polyethoxylated” are used synonymously and refer to compounds having an oligo- or polyoxyethylene group, which is formed by repeating units O-CH_2CH_2. In this context, the term “degree of ethoxylation” relates to the number average of repeating units O-CH_2CH_2 in these compounds.