drophobing agent necessary to obtain such hydrophobicity of the mineral binder should be reduced.

SUMMARY

These problems are solved by the present invention.

An aspect of the invention as defined in the independent claim. Some preferred features of the invention are defined in the dependent claims. The present disclosure relates to hydrophobic additives comprising a mixture of one or more inorganic carrier particles, and one or more salts of one or more carboxylic acids or one or more carboxylic acids or in the alternative both of one or more salts of one or more carboxylic acids and one or more carboxylic acids, wherein the particle size distribution (psd) D90 of the mixture measured as powder is from 8 to 150 µm.

The hydrophobic additives may be obtained by

a. reaction of a reactive metal oxide or metal hydroxide or metal carbonate with one or more carboxylic acids under formation of one or more metal salts of one or more carboxylic acids as a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or
b. mixing one or more inorganic carrier particles with one or more salts of one or more carboxylic acids at a temperature of more than 60°C under formation of a product, and milling the to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or
c. mixing one or more inorganic carrier particles with one or more carboxylic acids at a temperature of more than 10°C, e.g., more than 15°C or more than 20°C, or more than 25°C, under formation of a product, and milling the to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or

d. mixing one or more inorganic carrier particles with one or more salts of one or more carboxylic acids and one or more carboxylic acids at a temperature of more than 60°C under formation of a product, and milling the to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or

e. reaction of one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide with a triglyceride, preferably a natural, partially hydrogenated or fully hydrogenated fat or oil, preferably selected from the group consisting of cocos oil and palm kernel oil, under formation of one or more fatty acid metal salts as a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range.

The present disclosure further relates to a mineral binder comprising a hydrophobic additive. The hydrophobic additive comprises a mixture of one or more inorganic carrier particles, and one or more salts of one or more carboxylic acids or one or more carboxylic acids or in the alternative both of one or more salts of one or more carboxylic acids and one or more carboxylic acids, wherein the particle size of the mixture is from 8 to 150 µm.

The present disclosure further relates to a process for the preparation of a hydrophobic additive, wherein

a. one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide or metal carbonate are mixed and reacted with one or more carboxylic acids under formation of one or more metal salts of one or more carboxylic acids as a product, or

b. one or more inorganic carrier particles are mixed with one or more salts of one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, or

c. one or more inorganic carrier particles are mixed with one or more carboxylic acids at a temperature of more than ambient temperature under formation of a product, or

d. one or more inorganic carrier particles are mixed with one or more salts of one or more carboxylic acids and one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, or

e. reaction of one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide with a triglyceride, preferably a natural, partially hydrogenated or fully hydrogenated fat or oil, preferably selected from the group consisting of cocos oil and palm kernel oil, under formation of one or more fatty acid metal salts as a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range,

and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, wherein the product is milled with a Malvern Mastersizer 2000 to have said particle size distribution (psd) D90 measured as powder.

The present disclosure further relates to an intermediate compound comprising 0.1 to 90% by weight of a hydrophobic additive, and 10 to 99.9% of one or more compounds selected from solvents, solubilizers, fillers, further hydrophobing agents, binders, surfactants, emulsifiers, viscosity improvers, surfactants, pigments, dyes, preservatives, gelating agents, anticaking agents, pH modifiers, buffers, reaction accelerants, reaction retardants, colloids, aerating agents, dispersible polymer powders, water retainers, and combinations of two or more thereof. The hydrophobic additive comprises a mixture of one or more inorganic carrier particles, and one or more salts of one or more carboxylic acids or one or more carboxylic acids or in the alternative both of one or more salts of one or more carboxylic acids and one or more carboxylic acids, wherein the particle size in the mixture is from 8 to 150 µm.

The present disclosure further relates to the use of a hydrophobic additive as described herein or of an intermediate compound as described herein for improving the hydrophobicity of a mineral binder mixture.

The hydrophobic additives according to the present disclosure can be easily handled. In particular, they are easily wettable, which facilitates homogeneous incorporation into a construction material. Thereby, the formation of lumps can be avoided, which improves the water-repellent properties of the set component overall. The incorporation of the hydrophobing agents are improved and the homogeneity of hydrophobized mineral binding materials are increased.

The hydrophobing agents according to the present disclosure are preparable in a simple manner and inexpensively. They have a high storage stability and are suitable for a broad spectrum of applications.

When applied in mineral binders, the hydrophobicity can be increased. The water-uptake (W-value) of the mineral binder can be decreased, in particular to 10 % or less, more preferably of 8 % or less or 5 % or less according to EN 1015-18. Further, the amount of active hydrophobing agent necessary to obtain such hydrophobicity of the mineral binder can be reduced.

The core of the hydrophobing agents according to the present disclosure can provide further beneficial properties, such as fire proof and flame protection properties, without impairing their hydrophobicity.

The invention will now be described by way of example only and with reference to the accompanying figure:

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 represents the determination of the hydrophobicity of a lime-cement plaster by the Volcano test

DEFINITIONS

A “hydrophobic additive” is a compound or composition that increases the hydrophobicity of a material when incorporated therein. The “hydrophobicity” can be expressed by the amount of water uptake of a material (W-value). An increase of hydrophobicity can be determined as the decrease of water uptake. The water uptake can be determined according to EN 1015-18.

CLAIMS

1. Hydrophobic additive comprising a mixture of
    a. one or more inorganic carrier particles, wherein the inorganic carrier particles are selected from metal oxides, metal hydroxides, metal carbonates, metal silicates, metal phosphates, metal sulfates or mixtures of two or more thereof; and
    b. one or more salts of one or more carboxylic acids or one or more carboxylic acids or in the alternative both of one or more salts of one or more carboxylic acids and one or more carboxylic acids, wherein the salts of one or more carboxylic acids comprise a salt of a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more salts of carboxylic acids with 6 to 14 C-atoms, or the one or more carboxylic acids comprise a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more carboxylic acids with 6 to14 C-atoms, or both,

    wherein the particle size distribution (psd) D90 of the mixture as powder measured with a Malvern Mastersizer 2000 is from 8 to 150 µm.

2. Hydrophobic additive according to claim 1, characterized in that the inorganic carrier particles are selected from oxides, hydroxides, carbonates, silicates, phosphates, and sulfates, of Li, Na, K, Ca, Mg, Ba, Zn, Al, Ti, Si or mixtures of two or more thereof.

3. Hydrophobic additive according to any of the preceding claims, characterized in that the carboxylic acid salts are selected from salts of caprylic acid, pelargonic acid, capric acid, lauric acid, myristic acid and undecylenic acid, or the carboxylic acids are selected from salts of caprylic acid, pelargonic acid, capric acid, lauric acid, myristic acid and undecylenic acid, or both.

4. Hydrophobic additive according to any of the preceding claims, characterized in that the salts of one or more carboxylic acids comprise one or more salts of carboxylic acids with 10 to 16 C-atoms in an amount of at least 50 % by weight, or the one or more carboxylic acids comprise one or more carboxylic acids with 10 to 16 C-atoms in an amount of at least 50 % by weight, or both.

5. Hydrophobic additive according to any of the preceding claims, characterized in that it comprises 65 to 97 % by weight of inorganic carrier particles and 3 to 35% by weight of one or more salts of one or more carboxylic acids or one or more carboxylic acids or both.

6. Mineral binder, synthetic resin render or paint, comprising a hydrophobic additive according to any of claims 1 to 5.

7. Mineral binder, synthetic resin render or paint according to claim 6, characterized in that the hydrophobic additive is contained in an amount of 0.01 to 2 % by weight, preferably in an amount of from 0.04 to 0.7 % by weight, based on the total weight of the mineral binder.

8. Mineral binder, synthetic resin render or paint according to any of Claims 6 or 7, characterized in that the proportion of carboxylic acid salts of carboxylic acids having 8 to 17 carbon atoms, based on the total amount of carboxylic acid salts in the mineral binder, amounts to 20 % by weight or more than 20 % by weight, or in that the proportion of carboxylic acids 8 to 17 carbon atoms, based on the total amount of carboxylic acids in the mineral binder, amounts to 20 % by weight or more than 20 % by weight.

9. Mineral binder, synthetic resin render or paint according to any of Claims 6 to 8, characterized in that the average chain length of all of the carboxylic acid salts or of all of the carboxylic acids in the mineral binder is within a range from 12 to 16 carbon atoms.

10. Mineral binder, synthetic resin render or paint according to any of Claims 6 to 9, characterized in that the sum of the proportions of the salts of carboxylic acids with more than 16 carbon atoms in all of the carboxylic acid salts amounts to less than 50 % by weight, or the sum of the proportions of the carboxylic acids with more than 16 carbon atoms in all of the carboxylic acids amounts to less than 50 % by weight, or both.

11. Mineral binder according to any of claims 6 to 10, characterized in that it comprises 15 to 80 % of a mineral binder material,

    0.01 to 2 % of the hydrophobic additive according to any of claims 1 to 5,

    0 to 75 % of fillers,

    0 to 30 % of binders,

    0 to 25 % of at least one dispersant, emulsifier, surfactant or a combination of two or more thereof,

    0 to 25 % of colloids, and

    0 to 30 % of further additives.

12. Mineral binder according to any of claims 6 to 11, characterized in that the mineral binder prepared according to EN 1015-18 has a water uptake (W-value, 24 h) measured according to EN 1015-18 of 12 % or less, preferably of 10 % or less, more preferably of 8 % or less or 5 % or less.

13. A process for preparation of the hydrophobic additive according to any of claims 1 to 5, characterized in that the process comprises
    a) reaction of one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide or metal carbonate with one or more carboxylic acids under formation of one or more metal salts of one or more carboxylic acids as a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or
    b) mixing one or more inorganic carrier particles with one or more salts of one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or
    c) mixing one or more inorganic carrier particles with one or more carboxylic acids at a temperature of more than 10°C under formation of a product, and milling the

product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or

d) mixing one or more inorganic carrier particles with one or more salts of one or more carboxylic acids and one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, or

e) reaction of one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide with a triglyceride, preferably a natural, partially hydrogenated or fully hydrogenated fat or oil, preferably selected from the group consisting of cocos oil and palm kernel oil, under formation of one or more fatty acid metal salts as a product, and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range,

wherein the salts of one or more carboxylic acids comprise a salt of a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more salts of carboxylic acids with 6 to 14 C-atoms, or the one or more carboxylic acids comprise a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more carboxylic acids with 6 to14 C-atoms, or both,

wherein the product is milled with a Malvern Mastersizer 2000 to have said particle size distribution (psd) D90 measured as powder.

14. Process for the preparation of a hydrophobic additive according to any of claims 1 to 5, wherein the process comprises

i. one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide or metal carbonate are mixed and reacted with one or more carboxylic acids under formation of one or more metal salts of one or more carboxylic acids as a product, preferably at a temperature of more than ambient temperature, preferably more than 50°C, more preferably at 80°C to 160°C or

ii. one or more inorganic carrier particles are mixed with one or more salts of one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, preferably at a temperature of from 60 to 140°C, or

iii. one or more inorganic carrier particles are mixed with one or more carboxylic acids at a temperature of 10°C or more, or 15°C or more, or 20°C or more or 25°C or more under formation of a product, preferably at a temperature of from 60 to 140°C, or

iv. one or more inorganic carrier particles are mixed with one or more salts of one or more carboxylic acids and one or more carboxylic acids at a temperature of 60°C or more than 60°C under formation of a product, preferably at a temperature of from 60 to 140°C, or

v. reaction of one or more inorganic carrier particles selected from the group consisting of a reactive metal oxide or metal hydroxide with a triglyceride, preferably a natural, partially hydrogenated or fully hydrogenated fat or oil, preferably selected from the group consisting of cocos oil and palm kernel oil, under formation of one or more fatty acid metal salts as a product,

wherein the salts of one or more carboxylic acids comprise a salt of a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more salts of carboxylic acids with 6 to 14 C-atoms, or the one or more carboxylic acids comprise a carboxylic acid with 6 to 14 C-atoms or a mixture of two or more carboxylic acids with 6 to14 C-atoms, or both,

and milling the product to a particle size distribution D90 in a range from 8 to 150 µm if the particle size distribution of the product is outside this range, wherein the product is milled with a Malvern Mastersizer 2000 to have said particle size distribution (psd) D90 measured as powder.

15. Process according to claim 14, wherein the carboxylic acids, salts of carboxylic acids, or both, are added to the inorganic carrier particles in liquid form, dissolved in a solvent or suspended in a liquid suspension medium, and the solvent or suspension medium can be removed prior to milling.

16. Intermediate compound comprising 0.1 to 90% by weight of a hydrophobic additive according to any of claims 1 to 6, and 10 to 99.9% of one or more additives selected

from solvents, solubilizers, fillers, further hydrophobing agents, binders, surfactants, emulsifiers, viscosity improvers, surfactants, pigments, dyes, preservatives, gelating agents, anticaking agents, pH modifiers, buffers, reaction accelerants, reaction retardants, colloids, aerating agents, dispersible polymer powders, water retainers, and combinations of two or more thereof.

17. Use of a hydrophobic additive according to any of claims 1 to 5 or of an intermediate compound according to claim 16, for improving the hydrophobicity of a mineral binder.