Claims

1. A long-chain composition (preferably for use in fermentation), comprising at least one long-chain alkane selected from the group consisting of C9-18 linear or branched (preferably linear) alkanes (preferably at least one long-chain alkane selected from the group consisting of n-dodecane, n-tetradecane and n-hexadecane, particularly n-dodecane) and at least one long-chain carboxylic acid selected from the group consisting of C9-18 linear or branched (preferably linear), saturated or unsaturated (preferably saturated) aliphatic monocarboxylic acids (preferably at least one long-chain carboxylic acid selected from the group consisting of lauric acid, myristic acid and palmitic acid, particularly lauric acid), wherein the mass ratio of the long-chain alkane to the long-chain carboxylic acid ranges from 1 : 1 to 40 : 1 (preferably from 2 : 1 to 20 : 1 or from 5 : 1 to 10 : 1).

2. The long-chain composition of claim 1, further comprising water, wherein the mass of the water is 0.5 to 10 times (preferably 1 to 5 times or 1 to 3 times) the sum of the mass of the long-chain alkane and the mass of the long-chain carboxylic acid.

3. The long-chain composition of claim 1, which has a pH ranging from 5 to 12 (preferably from 7 to 10, from 7.5 to 9, or from 7.5 to 8.0), and/or is present in the form of a liquid or a solid-liquid mixture (preferably in the form of a liquid, particularly an aqueous liquid) at 32 °C, and/or, the long-chain alkane and the long-chain carboxylic acid have the same number of carbon atoms.

4. A set of long-chain compositions, comprising n long-chain compositions according to any one of claims 1-3 present independently of each other (e.g. packaged or separated independently of each other), wherein n is a positive integer ranging from 2 to 40 (preferably from 4 to 20 or from 5 to 10), and where the mass ratio of long-chain alkane to long-chain carboxylic acid in the i-th (wherein i represents an arbitrary positive integer in the range from 2 to n) long-chain composition is R_i, the mass ratio of long-chain alkane to long-chain carboxylic acid in the first long-chain composition is R_1, and the mass ratio of long-chain alkane to long-chain carboxylic acid in the n-th long-chain composition is R_n, then $R_{i-1}/R_i \geq 1$ (preferably R_{i-1}/R_i = 1-20, R_{i-1}/R_i = 1.0001-10, R_{i-1}/R_i = 1.001-10, R_{i-1}/R_i = 1.01-10, R_{i-1}/R_i = 1.1-5, or R_{i-1}/R_i = 1.5-2), and $R_1/R_n > 1$ (preferably R_1/R_n = 1.0001-30, R_1/R_n = 1.001-20, R_1/R_n = 1.01-10, R_1/R_n = 1.1-5, or R_1/R_n = 1.5-2).

5. The set of long-chain compositions of claim 4, wherein the n long-chain compositions are produced separately, and/or the weight ratios between any two of the n long-chain compositions (calculated on the basis of the amount of long-chain composition) are the same or different (preferably the same or substantially the same), and/or the weight ratios between any two of the n long-chain compositions (calculated on the basis of the amount of long-chain alkane) are the same or substantially the same.

6. A method for producing a long-chain composition, preferably for use in fermentation, comprising at least one long-chain alkane selected from the group consisting of C9-18 linear or branched (preferably linear) alkanes (preferably at least one long-chain alkane selected from the group consisting of n-dodecane, n-tetradecane and n-hexadecane, particularly n-dodecane), and at least one long-chain carboxylic acid selected from the group consisting of C9-18 linear or branched (preferably linear), saturated or unsaturated (preferably saturated) aliphatic monocarboxylic acids (preferably at least one long-chain carboxylic acid selected from the group consisting of lauric acid,

myristic acid and palmitic acid, particularly lauric acid), wherein the mass ratio of the long-chain alkane to the long-chain carboxylic acid ranges from 1 : 1 to 40 : 1 (preferably from 2 : 1 to 20 : 1 or from 5 : 1 to 10 : 1), said method comprising at least a mixing step of: mixing (preferably till uniform) the long-chain alkane and the long-chain carboxylic acid at said mass ratio, optionally under heating (preferably at a heating temperature of 45-70 °C or 50-60 °C) and stirring (preferably at a stirring speed of 50-250 rpm or 150-250 rpm), to obtain the long-chain composition.

7. The method of claim 6, wherein water and a pH controlling agent (such as a base, particularly at least one selected from sodium hydroxide and potassium hydroxide) are further added in the mixing step, and/or the method further comprises a step of adding water and a pH controlling agent (such as a base, particularly at least one selected from sodium hydroxide and potassium hydroxide) to the long-chain composition, optionally under heating (preferably at a heating temperature of 45-70 °C or 50-60 °C) and stirring (preferably at a stirring speed of 50-250 rpm or 150-250 rpm), wherein the mass of the water is 0.5 to 10 times (preferably 1 to 5 times or 1 to 3 times) the sum of the mass of the long-chain alkane and the mass of the long-chain carboxylic acid, and the pH controlling agent is used in such an amount that the long-chain composition has a pH ranging from 5 to 12 (preferably from 7 to 10, from 7.5 to 9, or from 7.5 to 8.0).

8. A method for producing a long-chain dibasic acid, wherein the long-chain dibasic acid is at least one long-chain dibasic acid selected from the group consisting of C9-18 linear or branched (preferably linear), saturated or unsaturated (preferably saturated) aliphatic dicarboxylic acids (preferably at least one long-chain dibasic acid selected from the group consisting of dodecanedioic acid, tetradecanedioic acid and hexadecanedioic acid, particularly dodecanedioic acid),

the method comprising the steps of:

(1) producing a long-chain composition according to the method of claim 6, providing the long-chain composition of claim 1, or providing the long-chain composition set of claim 4, which are collectively referred to as long-chain composition, which further comprises water and has a pH ranging from 5 to 12 (preferably from 7 to 10, from 7.5 to 9, or from 7.5 to 8.0);

(2) fermenting the long-chain composition in the presence of zymophyte and a fermentation medium to convert the long-chain composition into the long-chain dibasic acid.

9. The method according to claim 8, wherein the zymophyte is a yeast having a complete α, ω-oxidation pathway (preferably at least one yeast selected from the group consisting of Candida, Cryptococcus, Neurospora, Hansenula, Pichia, Rhodotorula, Torulopsis, and Trichosporon, more preferably at least one yeast selected from candida, particularly Candida tropicalis, more particularly Candida tropicalis mutant strain PF-UV-56 (preserved at China General Microbiological Culture Collection Center with a collection number of CGMCC No. 0356), and/or the fermentation medium comprises: 20 to 28g/L of sucrose, 0.8 to 1.5g/L of corn steep liquor, 2.0 to 4.0g/L of yeast extract, 0.8 to 1.2g/L of sodium chloride, 3.0 to 3.5g/L of potassium dihydrogen phosphate, 1.2 to 1.8g/L of magnesium sulfate, 1.2 to 4.8g/L of urea, 1.5 to 2g/L of ammonium sulfate and 1.5 to 1.8g/L of sodium acetate.

10. The method of claim 8, wherein the fermenting comprises the steps of:

a preliminary step of: mixing the zymophyte and the fermentation medium, fermenting for 5-60 hours (preferably 10-40 hours, more preferably 20-30 hours or 24 hours) to obtain a fermentation

base solution,

a conversion step of: adding the long-chain composition into the fermentation base solution, and fermenting for 60-400 hours (preferably 100-300 hours, more preferably 100-160 hours or 100-140 hours) to convert the long-chain composition into the long-chain dibasic acid.

11. The method of claim 8, wherein the zymophyte seed broth is added in an amount (by volume) of 2-30% (preferably 5-20% or 10-15%) of the total liquid-holding volume, and/or the fermentation reaction is conducted at a reaction temperature of 25-37 °C, preferably 28-32 °C, and/or the fermentation reaction is conducted at a stirring speed of 100-1000 rpm (preferably 120-500 rpm or 150-300 rpm), and/or the fermentation reaction is conducted at an aeration rate of 0.2-10.0 VVM (preferably 0.2-2.0 VVM or 0.5-1.0 VVM), and/or the fermentation reaction is conducted at a reaction time of 65 hours or more (preferably more than 120 hours, more preferably 130-400 hours, 130-300 hours, 130-200 hours, or 138-160 hours), and/or the long-chain composition is added in an amount of 100-1000 g/L total liquid-holding volume (preferably 100-500 g/L total liquid-holding volume or 150-250 g/L total liquid-holding volume), and/or the fermentation medium is added in an amount of 12-80 g/L total liquid-holding volume (preferably 32-50 g/L total liquid-holding volume, 35-45 g/L total liquid-holding volume, or 37-42 g/L total liquid-holding volume).

12. The method of claim 10, wherein in the preliminary step (preferably within 24 hours from the start of the preliminary step), the long-chain composition is not added and the pH of the fermentation reaction is in an autogenous state (i.e. no pH control is performed) and/or, at the start of the conversion step (preferably 24 hours after the start of the preliminary step), the pH of the fermentation reaction is adjusted to between 6.0 and 7.5 (preferably between 6.8 and 7.0) and subsequently increased by 0.05 to 0.4 (preferably 0.1 to 0.3) at intervals of 5-60 hours (preferably at intervals of 10-40 hours or at intervals of 20-30 hours or at intervals of 24 hours) till the end of the fermentation reaction.

13. The method of claim 10, wherein in the conversion step, the long-chain composition is added in n batches, and the time intervals between two adjacent batches may be the same or different (preferably being 5-60 hours, 10-40 hours, 20-30 hours, or 24 hours), wherein n is a positive integer ranging from 2 to 40 (preferably from 4 to 20 or from 5 to 10), or the long-chain composition is continuously added according to the reaction time.

14. The method of claim 13, wherein the set of long-chain compositions of claim 4 is used, and the n long-chain compositions are added separately in n batches (preferably in order from the first long-chain composition to the n-th long-chain composition), or continuously according to a function $R = f(t)$, wherein R is the mass ratio of the long-chain alkane to the long-chain carboxylic acid, t is the reaction time of the conversion step, and f() represents an arbitrary non-increasing function (preferably an arbitrary decreasing function, an arbitrary monotonically decreasing function, or an arbitrary linearly decreasing function).

15. The method of claim 8, further comprising a step of separating the long-chain dibasic acid from the reaction product of the fermentation reaction.