Claims

1. A process for converting ammonium salts of organic acids to the particular free organic acid, characterized in that an aqueous solution of the ammonium salt is contacted with an organic extractant and the salt is dissociated at temperatures and pressures at which the aqueous solution and the extractant are in the liquid state, and a stripping medium or entraining gas is introduced in order to remove NH_3 from the aqueous solution and transfer at least a portion of the free organic acid formed to the organic extractant.

2. The process according to Claim 1, wherein the conversion is effected at pressures of 0.01 bar to 200 bar, preferably of 0.01 bar to 20 bar, more preferably of 0.1 bar to 5 bar.

3. The process according to Claim 1 or 2, wherein the salt dissociation is performed at temperatures of 5°C to 300°C, preferably of 20°C to 300°C, more preferably of 40°C to 200°C, especially preferably of 50°C to 130°C.

4. The process according to any of Claims 1 to 3, wherein the starting concentration of the ammonium salt of the organic acid in the aqueous solution used is preferably in the range from 90% by weight to 1% by weight, more preferably from 75% by weight to 5% by weight and most preferably from 60% by weight to 10% by weight.

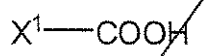
5. The process according to any of Claims 1 to 4, wherein the extractant used is a sparingly water-miscible or entirely water-immiscible solvent.

6. The process according to any of Claims 1 to 5, wherein the weight ratio of aqueous solution and organic extractant is from 1:100 to 100:1, preferably from 1:10 to 10:1, most preferably from 1:5 to 5:1.

7. The process according to any of Claims 1 to 6, wherein the organic acid is selected from the group of monocarboxylic acid, dicarboxylic acid, tricarboxylic acid, ascorbic acid, sulphonic acid, phosphonic acid, hydroxycarboxylic acid, especially alpha-hydroxycarboxlic acid or beta-hydroxycarboxylic acid.

8. The process according to any of Claims 1 to 7, wherein, after the salt dissociation has ended, the organic acid formed is obtained from the organic extractant.

9. The process according to any of Claims 1 to 8, wherein the organic acid corresponds to a carboxylic acid of the general formula **I**

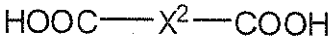


I

where X^1 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, the organic acid preferably being selected from the group of acetic acid, propionic acid, butyric acid, valeric acid, caproic acid, oenanthic acid, caprylic acid, pelargonic acid, capric acid, lauric acid, palmitic acid, stearic acid, omega-3 fatty acids such as linolenic acid, omega-6 fatty acids such as linoleic acid and arachidonic acid, omega-9 fatty acids such as oleic acid and nervonic acid, salicylic acid, benzoic acid, ferulic acid, cinnamic acid, vanillic acid, gallic acid, hydroxycinnamic acids, hydroxybenzoic acids, 3-hydroxypropionic acid.

10. The process according to any of Claims 1 to 8, wherein

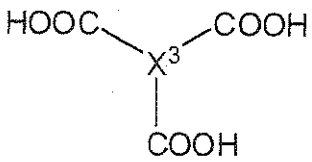
the organic acid corresponds to a dicarboxylic acid of the general formula **II**



II

where X^2 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkanediyl radicals, cycloalkanediyl radicals, alkenediyl radicals having one or more double bonds, alkynediyl radicals having one or more triple bonds, aryldiyl radicals, alkylaryldiyl radicals, arylalkanediyl radicals, arylalkenediyl radicals, alkyloxyalkanediyl radicals, hydroxyalkanediyl radicals and alkylthioalkanediyl radicals, where the organic acid is preferably selected from the group of succinic acid, oxalic acid, malonic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, fumaric acid, itaconic acid, methylmalonic acid, phthalic acid, terephthalic acid, isophthalic acid.

11. The process according to any of Claims 1 to 8, wherein the organic acid is a tricarboxylic acid of the general formula **III**

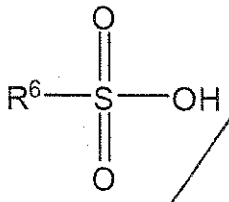


III

where X^3 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkanetriyl radicals, cycloalkanetriyl radicals, alkenetriyl radicals having one or more double bonds, alkynetriyl radicals having one or more triple bonds, aryltriyl radicals, alkylaryltriyl radicals, arylalkanetriyl radicals, arylalkenetriyl radicals, alkyloxyalkanetriyl radicals,

hydroxyalkanetriyl radicals and alkylthioalkanetriyl radicals, where the organic acid is preferably selected from the group of citric acid, cyclopentane-1,2,3-tricarboxylic acid, cyclopentane-1,2,4-tricarboxylic acid, 2-methylcyclopentane-1,2,3-tricarboxylic acid, 3-methylcyclopentane-1,2,4-tricarboxylic acid.

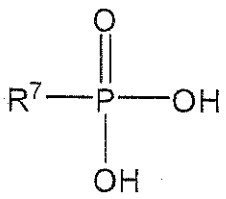
12. The process according to any of Claims 1 to 8, wherein the organic acid corresponds to a sulphonic acid of the general formula **IV**



IV

where R^6 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where the organic acid is preferably selected from the group of p-toluenesulphonic acid, camphor-10-sulphonic acid, benzenesulphonic acid, dodecylbenzenesulphonic acid, naphthalenesulphonic acids, phenolsulphonic acids.

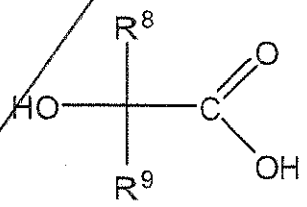
13. The process according to any of Claims 1 to 8, wherein the organic acid is a phosphonic acid of the general formula **V**



V

where R^7 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where the organic acid is preferably selected from the group 1-aminopropylphosphonic acid, aminomethylphosphonic acid, xylenephosphonic acids, phenylphosphonic acid, 1-aminopropylphosphonic acid, toluenephosphonic acid.

14. The process according to any of Claims 1 to 8, wherein the organic acid is an alpha-hydroxycarboxylic acid of the general formula **Ia**

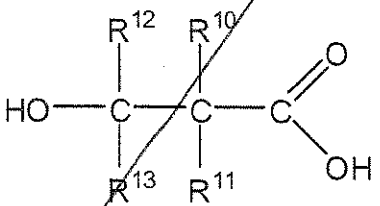


Ia

where R^8 and R^9 are each independently selected from the group comprising H, OH, OR^4, NH_2, NHR^4, NR^4R^5, Cl, Br, I, F, unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where R^4 and R^5 are each independently selected from the group comprising H, unsubstituted and mono- or polysubstituted, straight-chain and branched (C_1-C_{18})-alkyl radicals, (C_3-C_{18})-cycloalkyl radicals, (C_2-C_{26})-

alkenyl radicals having one or more double bonds, (C_6-C_{10})-aryl radicals, especially phenyl radicals, (C_1-C_{18})-alkyl-(C_6-C_{10})-aryl radicals, (C_6-C_{10})-aryl-(C_1-C_{18})-alkyl radicals, especially benzyl radicals, (C_1-C_{18})-alkyloxy-(C_1-C_{18})-alkyl radicals, (C_1-C_{18})-hydroxyalkyl radicals and (C_1-C_{18})-alkylthio-(C_1-C_{18})-alkyl radicals, where the organic acid is preferably selected from the group of 2-hydroxyisobutyric acid, 2-hydroxy-4-methylthiobutyric acid, lactic acid, glycolic acid, malic acid, tartaric acid, gluconic acid, glyceric acid.

15. The process according to any of Claims 1 to 8, wherein the organic acid is a beta-hydroxycarboxylic acid of the general formula **Ib**



Ib

where R^{10}, R^{11}, R^{12} and R^{13} are each independently selected from the group comprising H, OH, OR^4, NH_2, NHR^4, NR^4R^5, Cl, Br, I, F, unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where R^4 and R^5 are each independently selected from the group comprising H, unsubstituted and mono- or polysubstituted, straight-chain and branched (C_1-C_{18})-alkyl radicals, (C_3-C_{18})-cycloalkyl radicals, (C_2-C_{26})-alkenyl radicals having one or more double bonds, (C_6-C_{10})-aryl radicals, especially phenyl radicals, (C_1-C_{18})-alkyl-(C_6-C_{10})-aryl

radicals, (C_6-C_{10})-aryl-(C_1-C_{18})-alkyl radicals, especially benzyl radicals, (C_1-C_{18})-alkyloxy-(C_1-C_{18})-alkyl radicals, (C_1-C_{18})-hydroxyalkyl radicals and (C_1-C_{18})-alkylthio-(C_1-C_{18})-alkyl radicals, where the organic acid is preferably selected from the group of 3-hydroxypropionic acid, 3-hydroxybutyric acid, 3-hydroxyvaleric acid, 3-hydroxyhexanoic acid, 3-hydroxyoctanoic acid, 3-hydroxyisobutyric acid.

16. The process according to any of Claims 1 to 15, characterized in that the stripping medium or entraining gas used is steam, air, gases, preferably natural gas, methane, oxygen, inert gas, preferably nitrogen, helium, argon, or mixtures thereof.

17. The process according to any of Claims 1 to 16, characterized in that the amount of stripping medium or entraining gas in relation to the aqueous ammonium salt solution is between 1 l/kg and 10 000 l/kg, particularly between 10 l/kg and 500 l/kg, very particularly between 20 l/kg and 100 l/kg.

18. The process according to any of Claims 1 to 17, characterized in that the extractant used is a sparingly water-miscible or entirely water-immiscible solvent, particularly straight-chain or branched aliphatic ketones having 5 to 18 carbon atoms, heterocyclic ketones having 5 to 18 carbon atoms, straight-chain or branched aliphatic alcohols having 4 to 18 carbon atoms, heterocyclic alcohols having 5 to 18 carbon atoms, straight-chain or branched aliphatic alkanes having 5 to 18 carbon atoms, cycloalkanes having 5 to 14 carbon atoms, straight-chain or branched ethers having 4 to 18 carbon atoms, aromatics substituted by halogen atoms or hydroxyl groups, straight-chain or branched alkanes which are substituted by halogen atoms and have 1 to 18 carbon atoms, cycloalkanes which are substituted by halogen atoms and have 5 to 14 carbon atoms, preferably

isobutyl methyl ketone, isopropyl methyl ketone, ethyl methyl ketone, butyl methyl ketone, ethyl propyl ketone, methyl pentyl ketone, ethyl butyl ketone, dipropyl ketone, hexyl methyl ketone, ethyl pentyl ketone, heptyl methyl ketone, dibutyl ketone, 2-undecanone, 2-dodecanone, cyclohexanone, cyclopentanone, 1-butanol, 2-butanol, 1-pentanol, 1-hexanol, 2-hexanol, 3-hexanol, 1-heptanol, 2-heptanol, 3-heptanol, 1-octanol, 2-octanol, 3-octanol, 4-octanol, 1-nonanol, 2-nonanol, 3-nonanol, 5-nonanol, 1-decanol, 2-decanol, 1-undecanol, 2-undecanol, 1-dodecanol, 2-dodecanol, cyclopentanol, cyclohexanol, kerosene, petroleum benzine, pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane, cyclopentane, cyclohexane, cycloheptane, methyl *tert*-butyl ether, petroleum ether, dibutyl ether, diisopropyl ether, dipropyl ether, diethyl ether, ethyl *tert*-butyl ether, dipentyl ether, benzene, toluene, *o*-xylene, *m*-xylene, *p*-xylene, chlorobenzene, dichloromethane, chloroform, tetrachloromethane or mixtures thereof.

19. The process according to any of Claims 1 to 18, characterized in that the free acid is obtained from the extractant laden with the extracted acid by a separation process selected from distillation, rectification, crystallization, re-extraction, chromatography, adsorption or membrane processes.

Claims

1. A process for converting ammonium salts of organic acids to the particular free organic acid, characterized in that an aqueous solution of the ammonium salt is contacted with an organic extractant and the salt is dissociated at temperatures and pressures at which the aqueous solution and the extractant are in the liquid state, and a stripping medium or entraining gas is introduced in order to remove NH_3 from the aqueous solution and transfer at least a portion of the free organic acid formed to the organic extractant, wherein the extractant is selected from the group consisting essentially of straight-chain or branched aliphatic ketones having 5 to 18 carbon atoms, heterocyclic ketones having 5 to 18 carbon atoms, straight-chain or branched aliphatic alcohols having 4 to 18 carbon atoms, heterocyclic alcohols having 5 to 18 carbon atoms, straight-chain or branched aliphatic alkanes having 5 to 18 carbon atoms, cycloalkanes having 5 to 14 carbon atoms, straight-chain or branched ethers having 4 to 18 carbon atoms, aromatics substituted by halogen atoms or hydroxyl groups, straight-chain or branched alkanes which are substituted by halogen atoms and have 1 to 18 carbon atoms, cycloalkanes which are substituted by halogen atoms and have 5 to 14 carbon atoms, preferably isobutyl methyl ketone, isopropyl methyl ketone, ethyl methyl ketone, butyl methyl ketone, ethyl propyl ketone, methyl pentyl ketone, ethyl butyl ketone, dipropyl ketone, hexyl methyl ketone, ethyl pentyl ketone, heptyl methyl ketone, dibutyl ketone, 2-undecanone, 2-dodecanone, cyclohexanone, cyclopentanone, 1-butanol, 2-butanol, 1-pentanol, 1-hexanol, 2-hexanol, 3-hexanol, 1-heptanol, 2-heptanol, 3-heptanol, 1-octanol, 2-octanol, 3-octanol, 4-octanol, 1-nonanol, 2-nonanol, 3-nonanol,

5-nonanol, 1-decanol, 2-decanol, 1-undecanol, 2-undecanol, 1-dodecanol, 2-dodecanol, cyclopentanol, cyclohexanol, kerosene, petroleum benzine, pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane, cyclopentane, cyclohexane, cycloheptane, methyl *tert*-butyl ether, petroleum ether, dibutyl ether, diisopropyl ether, dipropyl ether, diethyl ether, ethyl *tert*-butyl ether, dipentyl ether, benzene, toluene, *o*-xylene, *m*-xylene, *p*-xylene, chlorobenzene, dichloromethane, chloroform, tetrachloromethane and mixtures thereof and wherein the process is conducted without the additional reaction steps of transamination of the ammonium salt with a secondary or tertiary amine or of ester formation with an alcohol and subsequent hydrolysis to the free acid.

2. The process according to Claim 1, wherein the conversion is effected at pressures of 0.01 bar to 200 bar, preferably of 0.01 bar to 20 bar, more preferably of 0.1 bar to 5 bar.

3. The process according to Claim 1 or 2, wherein the salt dissociation is performed at temperatures of 5°C to 300°C, preferably of 20°C to 300°C, more preferably of 40°C to 200°C, especially preferably of 50°C to 130°C.

4. The process according to any of Claims 1 to 3, wherein the starting concentration of the ammonium salt of the organic acid in the aqueous solution used is preferably in the range from 90% by weight to 1% by weight, more preferably from 75% by weight to 5% by weight and most preferably from 60% by weight to 10% by weight.

5. The process according to any of Claims 1 to 4, wherein the extractant used is isobutyl methyl ketone, isopropyl methyl ketone, ethyl methyl ketone, butyl methyl ketone, ethyl propyl ketone, methyl pentyl ketone, ethyl butyl ketone, dipropyl ketone, hexyl methyl ketone, ethyl pentyl ketone, heptyl methyl ketone, dibutyl ketone, 2-undecanone, 2-dodecanone,

cyclohexanone, cyclopentanone, 1-butanol, 2-butanol, 1-pentanol, 1-hexanol, 2-hexanol, 3-hexanol, 1-heptanol, 2-heptanol, 3-heptanol, 1-octanol, 2-octanol,3-octanol, 4-octanol, 1-nonanol, 2-nonanol, 3-nonanol, 5-nonanol, 1-decanol, 2-decanol, 1-undecanol, 2-undecanol, 1-dodecanol, 2-dodecanol, cyclopentanol, cyclohexanol, kerosene, petroleum benzine, pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane, cyclopentane, cyclohexane, cycloheptane, methyl *tert*-butyl ether, petroleum ether, dibutyl ether, diisopropyl ether, dipropyl ether, diethyl ether, ethyl *tert*-butyl ether, dipentyl ether, benzene, toluene, *o*-xylene, *m*-xylene, *p*-xylene, chlorobenzene, dichloromethane, chloroform, tetrachloromethane or mixtures thereof.

6. The process according to any of Claims 1 to 5, wherein the weight ratio of aqueous solution and organic extractant is from 1:100 to 100:1, preferably from 1:10 to 10:1, most preferably from 1:5 to 5:1.

7. The process according to any of Claims 1 to 6, wherein the organic acid is selected from the group of monocarboxylic acid, dicarboxylic acid, tricarboxylic acid, ascorbic acid, sulphonic acid, phosphonic acid, hydroxycarboxylic acid, especially alpha-hydroxycarboxylic acid or beta-hydroxycarboxylic acid.

8. The process according to any of Claims 1 to 7, wherein, after the salt dissociation has ended, the organic acid formed is obtained from the organic extractant.

9. The process according to any of Claims 1 to 8, wherein the organic acid corresponds to a carboxylic acid of the general formula I

$$X^1—COOH$$

I

where X^1 is an organic radical selected from the group

comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, the organic acid preferably being selected from the group of acetic acid, propionic acid, butyric acid, valeric acid, caproic acid, oenanthic acid, caprylic acid, pelargonic acid, capric acid, lauric acid, palmitic acid, stearic acid, omega-3 fatty acids such as linolenic acid, omega-6 fatty acids such as linoleic acid and arachidonic acid, omega-9 fatty acids such as oleic acid and nervonic acid, salicylic acid, benzoic acid, ferulic acid, cinnamic acid, vanillic acid, gallic acid, hydroxycinnamic acids, hydroxybenzoic acids, 3-hydroxypropionic acid.

10. The process according to any of Claims 1 to 8, wherein the organic acid corresponds to a dicarboxylic acid of the general formula II

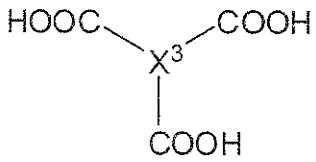
$$HOOC—X^2—COOH$$

II

where X^2 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkanediyl radicals, cycloalkanediyl radicals, alkenediyl radicals having one or more double bonds, alkynediyl radicals having one or more triple bonds, aryldiyl radicals, alkylaryldiyl radicals, arylalkanediyl radicals, arylalkenediyl radicals, alkyloxyalkanediyl radicals, hydroxyalkanediyl radicals and alkylthioalkanediyl radicals, where the organic acid is preferably selected from the group of succinic acid, oxalic acid, malonic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, fumaric acid,

itaconic acid, methylmalonic acid, phthalic acid, terephthalic acid, isophthalic acid.

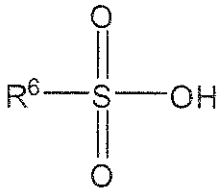
11. The process according to any of Claims 1 to 8, wherein the organic acid is a tricarboxylic acid of the general formula **III**



III

where X^3 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkanetriyl radicals, cycloalkanetriyl radicals, alkenetriyl radicals having one or more double bonds, alkynetriyl radicals having one or more triple bonds, aryltriyl radicals, alkylaryltriyl radicals, arylalkanetriyl radicals, arylalkenetriyl radicals, alkyloxyalkanetriyl radicals, hydroxyalkanetriyl radicals and alkylthioalkanetriyl radicals, where the organic acid is preferably selected from the group of citric acid, cyclopentane-1,2,3-tricarboxylic acid, cyclopentane-1,2,4-tricarboxylic acid, 2-methylcyclopentane-1,2,3-tricarboxylic acid, 3-methylcyclopentane-1,2,4-tricarboxylic acid.

12. The process according to any of Claims 1 to 8, wherein the organic acid corresponds to a sulphonic acid of the general formula **IV**

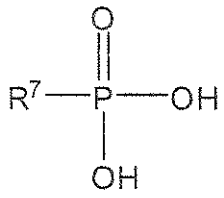


IV

where R^6 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted,

branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where the organic acid is preferably selected from the group of *p*-toluenesulphonic acid, camphor-10-sulphonic acid, benzenesulphonic acid, dodecylbenzenesulphonic acid, naphthalenesulphonic acids, phenolsulphonic acids.

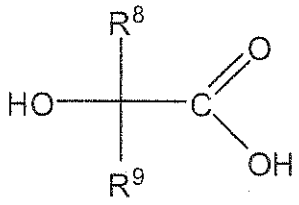
13. The process according to any of Claims 1 to 8, wherein the organic acid is a phosphonic acid of the general formula V



V

where R^7 is an organic radical selected from the group comprising unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where the organic acid is preferably selected from the group 1-aminopropylphosphonic acid, aminomethylphosphonic acid, xylenephosphonic acids, phenylphosphonic acid, 1-aminopropylphosphonic acid, toluenephosphonic acid.

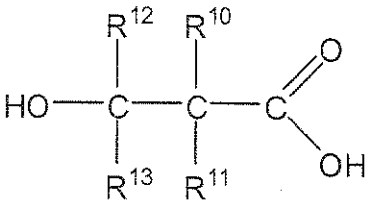
14. The process according to any of Claims 1 to 8, wherein the organic acid is an alpha-hydroxycarboxylic acid of the general formula Ia



Ia

where R^8 and R^9 are each independently selected from the group comprising H, OH, OR^4, NH_2, NHR^4, NR^4R^5, Cl, Br, I, F, unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where R^4 and R^5 are each independently selected from the group comprising H, unsubstituted and mono- or polysubstituted, straight-chain and branched $(C_1\text{-}C_{18})$-alkyl radicals, $(C_3\text{-}C_{18})$-cycloalkyl radicals, $(C_2\text{-}C_{26})$-alkenyl radicals having one or more double bonds, $(C_6\text{-}C_{10})$-aryl radicals, especially phenyl radicals, $(C_1\text{-}C_{18})$-alkyl-$(C_6\text{-}C_{10})$-aryl radicals, $(C_6\text{-}C_{10})$-aryl-$(C_1\text{-}C_{18})$-alkyl radicals, especially benzyl radicals, $(C_1\text{-}C_{18})$-alkyloxy-$(C_1\text{-}C_{18})$-alkyl radicals, $(C_1\text{-}C_{18})$-hydroxyalkyl radicals and $(C_1\text{-}C_{18})$-alkylthio-$(C_1\text{-}C_{18})$-alkyl radicals, where the organic acid is preferably selected from the group of 2-hydroxyisobutyric acid, 2-hydroxy-4-methylthiobutyric acid, lactic acid, glycolic acid, malic acid, tartaric acid, gluconic acid, glyceric acid.

15. The process according to any of Claims 1 to 8, wherein the organic acid is a beta-hydroxycarboxylic acid of the general formula Ib



Ib

where R^{10}, R^{11}, R^{12} and R^{13} are each independently selected from the group comprising H, OH, OR^4, NH_2, NHR^4, NR^4R^5, Cl, Br, I, F, unsubstituted and mono- or polysubstituted, branched and straight-chain alkyl radicals, cycloalkyl radicals, alkenyl radicals having one or more double bonds, alkynyl radicals having one or more triple bonds, aryl radicals, alkylaryl radicals, arylalkyl radicals, arylalkenyl radicals, alkyloxyalkyl radicals, hydroxyalkyl radicals and alkylthioalkyl radicals, where R^4 and R^5 are each independently selected from the group comprising H, unsubstituted and mono- or polysubstituted, straight-chain and branched (C_1-C_{18})-alkyl radicals, (C_3-C_{18})-cycloalkyl radicals, (C_2-C_{26})-alkenyl radicals having one or more double bonds, (C_6-C_{10})-aryl radicals, especially phenyl radicals, (C_1-C_{18})-alkyl-(C_6-C_{10})-aryl radicals, (C_6-C_{10})-aryl-(C_1-C_{18})-alkyl radicals, especially benzyl radicals, (C_1-C_{18})-alkyloxy-(C_1-C_{18})-alkyl radicals, (C_1-C_{18})-hydroxyalkyl radicals and (C_1-C_{18})-alkylthio-(C_1-C_{18})-alkyl radicals, where the organic acid is preferably selected from the group of 3-hydroxypropionic acid, 3-hydroxybutyric acid, 3-hydroxyvaleric acid, 3-hydroxyhexanoic acid, 3-hydroxyoctanoic acid, 3-hydroxyisobutyric acid.

16. The process according to any of Claims 1 to 15, characterized in that the stripping medium or entraining gas used is steam, air, gases, preferably natural gas, methane, oxygen, inert gas, preferably nitrogen, helium, argon, or mixtures thereof.

17. The process according to any of Claims 1 to 16,

characterized in that the amount of stripping medium or entraining gas in relation to the aqueous ammonium salt solution is between 1 l/kg and 10 000 l/kg, particularly between 10 l/kg and 500 l/kg, very particularly between 20 l/kg and 100 l/kg.

18. The process according to any of Claims 1 to 17, characterized in that the free acid is obtained from the extractant laden with the extracted acid by a separation process selected from distillation, rectification, crystallization, re-extraction, chromatography, adsorption or membrane processes.

19. The process according to any of claims 1 to 18 characterized in what the process is conducted in a countercurrent extractor.