Combination E: propionic acid, lactic acid, acetic acid, sodium benzoate

Combination F: tartaric acid, propionic acid, acetic acid, lactic acid, sodium benzoate.

[0057] Particularly preferred embodiments of the concentrate according to the invention are the following compositions:

Concentrates	[%]	[%]	[%]	[%]	[%]
Lactic acid	15	—	—		1
Tartaric acid	—	—	6		—
Acetic acid	15	15	15	30	5
Propionic acid	15	15	15	30	15
Sodium benzoate	6	13	—	6	13
Sodium acetate	—	—	—		
Propylene glycol	10	12	10	10	10
Hexyl carbitol	10	14	10	10	10
Demineralized water	29	31	44	13.5	46
Linear alcohol ethoxylate*				0.5	—

*Marlipal 1618/25, nonionic surfactant manufactured by Sasol Germany GmbH

[0058] The disinfectant according to the invention preferably has a pH of 1.0 to 7.0, particularly preferably ≥2.0-≤6.0. The pH can be adjusted by addition of low amounts of pH regulators, such as strong bases or strong acids, for example sulfuric acid, potassium hydroxide, sodium sulfite. Preferably, the use of a pH regulator is dispensed with.

[0059] The disinfectant concentrates according to the invention can contain, as auxiliaries, solubilizers and/or pH regulators and/or surfactants. Suitable solubilizers are, for example, diethylene glycol mono-n-hexyl ether (hexyl carbitol) and/or 1,2-propanediol (propylene glycol), as well as methyl carbitol, butyl carbitol, monoethylene glycol. Further auxiliaries, which are less preferred according to the invention, are corrosion inhibitors, foam regulators, dispersants, dyes, perfume or mixtures thereof.

[0060] Hexyl carbitol and/or propylene glycol are preferably used at a weakly acidic pH in aqueous disinfectants containing sodium benzoate. The quantity ratio of sodium benzoate to hexyl carbitol is preferably between 4:1 and 1:4, particularly preferably 3:1. If propylene glycol is used, the quantity ratio of sodium benzoate to propylene glycol is between 4:1 and 1:4, particularly preferably 1:1.5. Particularly preferably, the combination of hexyl carbitol with propylene glycol in the presence of sodium benzoate is in a preferred ratio of sodium benzoate:hexyl carbitol:propylene glycol=3/1/5 or 3/5/5. Further solubilizers which can be used at pH<7.0 are: methyl carbitol, butyl carbitol, monoethylene glycol and combinations of these.

[0061] Preferably, the disinfectants according to the invention and the disinfectant concentrates according to the invention contain, as solubilizers, glycols selected from propylene glycol and monoethylene glycol and/or glycol ethers selected from methyl carbitol, butyl carbitol and hexyl carbitol, particularly preferably a combination of propylene glycol and hexyl carbitol.

[0062] Preferably, the disinfectants according to the invention and the disinfectant concentrates according to the invention contain, as sole antimicrobial active ingredient, organic acids and no further antimicrobial active ingredients. Particularly preferably, the disinfectants according to the invention contain no quaternary ammonium compounds, no aldehydes, no guanidines, no active chlorine, no amines, no oxygen-releasing agents, no monohydric alcohols, no aromatic alcohols, no metal ions and no combinations of these antimicrobial active ingredients.

[0063] Surprisingly, it is possible using the disinfectant according to the invention to already achieve, just through addition of organic acids without further antimicrobial active ingredients, a sufficient microbicidal efficacy against a broad spectrum of microorganisms after two minutes, five minutes or 15 minutes. Moreover, the combination of multiple organic acids that is in accordance with the invention represents, surprisingly, a synergistic composition owing to differently combined mechanisms of action and allows a sufficient, pathogen-killing action.

[0064] The list of organic acids suitable as active ingredients of disinfection compositions comprises:

formic acid, ascorbic acid, benzoic acid, dehydroacetic acid, acetic acid, fumaric acid, glycolic acid, lactic acid, mandelic acid, phenylacetic acid, propionic acid, salicylic acid, tartaric acid, zinc stearic acid, citric acid, present in each case as free acid, salt and in any combination, preferably acetic acid, lactic acid, propionic acid, tartaric acid, sodium benzoate/benzoic acid or mixtures thereof.

[0065] Preferably, the disinfectant concentrates according to the invention contain organic acids having 2 to 8 carbon atoms, preferably 3 to 7 carbon atoms.

[0066] In one embodiment, the disinfectants according to the invention and the disinfectant concentrates according to the invention additionally contain nonionic surfactants, cationic surfactants, amphoteric surfactants, or a combination of these, and preferably no anionic surfactants.

[0067] There are many compounds which belong to the group of organic acids and which can differ in structure and mode of action. One way of characterizing organic acids is the degree of dissociation in the aqueous medium. The dissociation constant of an organic acid (Ka) decreases with increasing chain length; the acid dissociates more weakly.

[0068] Organic acids can have an antimicrobial action owing to their acid function and their structure. Thus, a long-chain fatty acid can, owing to its hydrophilic and hydrophobic moiety, also have an antimicrobial character as surface-active substance, comparable to surfactants, whereas a short-chain acid can act through the lowering of pH. The acidity can be deduced from the pKa value. The pKa corresponds to the negative common logarithm of the acid constant Ka and provides information about the equilibrium position of an acid which reacts with water. The pKa therefore serves as a measure of the strength of an acid, with a small value meaning a strong acid.

[0069] Preferably, the disinfectant according to the invention and the disinfectant concentrate according to the invention comprise, as antimicrobial active ingredient (active component), exclusively organic acids having a pKa between 2 and 6, preferably having a pKa between 3 and 5.

[0070] The organic acids preferred according to the invention have the following pKa values (at 20° C.)

pKa tartaric acid: 3.04

pKa lactic acid: 3.87

pKa benzoic acid: 4.17

pKa acetic acid: 4.76

pKa propionic acid: 4.88.

[0071] Surprisingly, the organic acids in combination can be used effectively according to the invention against microorganisms, since the following mechanisms of action apparently accumulate synergistically: