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Zur Erklärung der Zweibuchstaben-Codes, und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

(54) Title: DISINFECTANTS

(54) Bezeichnung: DESINFEKTIONSMITTEL

(57) Abstract: The invention relates to disinfectants having *N,N*-bis(3-aminopropyl)octylamine as active substance. The novel disinfectants are characterized by good activity also against mycobacteria, low efficiency loss under protein load and little foaming. Said disinfectants are particularly useful for disinfecting surfaces, containers and pipelines, for instance, in the food industry, and for disinfecting instruments, especially automatic instrument disinfection at low temperatures.

(57) Zusammenfassung: Beschrieben werden Desinfektionsmittel mit *N,N*-Bis(3-aminopropyl)octylamin als Wirkstoff. Die erfindungsgemässen Desinfektionsmittel zeichnen sich durch gute Wirksamkeit auch gegen Mykobakterien, geringen Wirkungsverlust unter Eiweissbelastung sowie geringe Schaumbildung aus. Sie eignen sich insbesondere zur Desinfektion von Flächen, Behältern und rohrleitungen, beipielsweise in der Nahrungsmittelindustrie, sowie zur Instrumentendesinfektion, insbesondere in der automatischen Instrumentendesinfektion bei niedrigen Temperaturen.

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Disinfectants

The invention relates to disinfectants based on *N,N*-bis(3-aminopropyl)octylamine of the formula

$$n\text{-}C_8H_{17}\text{-}N[(CH_2)_3\text{-}NH_2]_2.$$

It is known that *N,N*-bis(3-aminopropyl)dodecylamine (tradename: LONZABAC®12) has good microbicidal activity and is also active in particular against mycobacteria. This compound is also distinguished by good compatibility with surfactants, and low corrosivity. However, as with many other microbicidal active substances, the activity in the presence of proteins and/or hard water markedly decreases and turbidity or even precipitants occur. In addition, formulations containing *N,N*-bis(3-aminopropyl)dodecylamine have a strong foaming tendency, which makes them unsuitable for some applications or requires special measures.

It is therefore an object of the present invention to provide disinfectants which, for a comparable spectrum of activity, have low foaming and low loss of activity in the presence of the proteins.

According to the invention, this object is achieved by the use of *N,N*-bis(3-aminopropyl)octylamine as claimed in claim 1 and the disinfectant as claimed in claim 2.

It has surprisingly been found that the compound *N,N*-bis(3-aminopropyl)octylamine (EP-A-0 080 137), which is known as an intermediate in the synthesis of surfactants, has good antibacterial activity, in particular against mycobacteria also, which remains virtually unchanged even in the presence of proteins. In addition, this compound has low foaming tendency.

The inventive disinfectants expediently comprise from 0.1 to 30.0% of *N,N*-bis(3-aminopropyl)octylamine and at least one aid which is selected from the group consisting of solvents, surfactants, complexing agents, colorants, fragrances, acids or bases for setting pH, inorganic and organic salts (for example borates silicates, carbonates, rhodanides).

Preferably, the inventive disinfectants comprise water as solvent.

In a preferred embodiment, the inventive disinfectants comprise, as additional active compound, an amine oxide. Suitable amine oxides are, for example, *N,N*-di-C_{1-4}-alkyl-C_{6-22}-alkylamine oxides, preferably *N,N*-dimethyl-C_{8-18}-alkylamine oxides. Amino oxides of this type are obtainable, for example, under the name BARLOX® from Lonza AG.

The inventive disinfectants are suitable, in particular, for use in CIP systems (cleaning in place), for disinfecting containers, surfaces and pipelines in the food industry, for preventing microbial contamination of closed water circuits, for example in the paper industry or in the cooling towers, and for disinfecting surfaces in hospitals, for disinfecting instruments, for disinfecting recirculating toilets, for water treatment (for example in swimming pools) and for wood preservation.

A particularly preferred use is automatic disinfection of instruments at temperatures of less than 60°C, in particular in automatic apparatuses, for example for disinfecting endoscopes.

The discussion of the background to the invention herein is included to explain the context of the invention. This is not to be taken as an admission that any of the material referred to was published, known or part of the common general knowledge in Australia as at the priority date of any of the claims.

Throughout the description and claims of the specification the word "comprise" and variations of the word, such as "comprising" and "comprises", is not intended to exclude other additives, components, integers or steps.

The examples below illustrate the inventive procedure, without a limitation to be seen therein. Unless otherwise stated, all percentages are percentages by weight.

Example 1/Comparative Example 1
Determination of Foaming

Method:
A 250 ml mixing cylinder was filled with 100 ml of solution. After any foam formed in the course of this had disappeared, the sealed cylinder was shaken vigorously vertically for 15 s (approximately 15 x) and then placed on a flat support. The volume of the resultant foam was read off at regular time intervals.

Results:
With a solution of 250 ppm of *N,N*-bis(3-aminopropyl)octylamine in demineralized water at 20°C after 10 s 20 ml of foam was observed, the volume of which decreased to half that in a further 10 s. After 60 s the foam had virtually completely disappeared. As a comparison, the same test was carried out using *N,N*-bis(3-aminopropyl)dodecylamine. The foam volume after 10 s was 140 ml and after 60 s was still 120 ml.

Example 2/Comparative Example 2
Quantitative suspension test (EN 1276)

As specified by standard EN 1276, the efficacy of *N,N*-bis(3-aminopropyl)octylamine (according to the invention) and *N,N*-bis(3-aminopropyl)dodecylamine (comparison) was determined in the presence of albumin for various test microorganisms. The results are summarized in Table 1 below.

Contact time:	5 min
Water hardness (as $CaCO_3$):	300 mg/kg
Temperature:	20°C
Log. reduction:	> 5

Table 1

	0.03% albumin		0.3% albumin	
Test micro-organism	According to the invention	Comparison	According to the invention	Comparison
Pseudomonas aeruginosa ATCC 15442	0.05%	0.025%	0.10%	0.50%
Staphylococcus aureus ATCC 6538	0.10%	0.05%	0.10%	0.10%
Escherichia coli ATCC 10536	0.05%	0.025%	0.05%	0.025%
Enterococcus hirae ATCC 8043	0.10%	0.05%	0.05%	0.05%

A significantly smaller fall in activity in the presence of 0.3% albumin was found, in particular towards *P. aeruginosa*.

Example 3/Comparison Example 3
Formulation containing nonionic surfactant

A liquid formulation was prepared from

10.0% N,N-bis(3-aminopropyl)octylamine
2.5% Trilon® A (nitrilotriacetic acid, sodium salt; 40% strength aqueous solution)
10.0% Genapol® PF 10 (ethylene oxide-propylene oxide block polymer containing approximately 10% ethylene oxide
77.5% water.

A formulation containing the same amount of *N,N*-bis(3-aminopropyl)dodecylamine instead of *N,N*-bis(3-aminopropyl)octylamine, otherwise having the same composition, served as comparison. Foaming was

determined for both formulations by the method described in Example 1. The foam volume for the inventive formulation was, after 10 s, 50 ml, and, after 60 s, 30 ml. In the case of the comparison formulation, the foam volume after 10 s was 150 ml and after 60 s was still 100 ml.

Example 4
Formulation containing anionic surfactant

A liquid formulation was prepared from

10.0% *N,N*-bis(3-aminopropyl)octylamine
2.5% Trilon® A (40% strength aqueous solution)
10.0% Genapol® LRO (C_{12}/C_{14}-alkyl diglycol ether sulfate, Na salt; surfactant substance approximately 27%)
77.5% water.

Example 5
Formulation containing cationic surfactant

A liquid formulation was prepared from
10.0% *N,N*-bis(3-aminopropyl)octylamine
2.5% Trilon® A (40% strength aqueous solution)
10.0% BARDAC® 22-40 (didecyldimethylammonium chloride, 40% strength aqueous solution)
77.5% water.

Example 6
Formulation containing amphoteric surfactant

A liquid formulation was prepared from
10.0% *N,N*-bis(3-aminopropyl)octylamine
2.5% Trilon® A (40% strength aqueous solution)
10.0% Amphoterge®K-2 (cocoimidazoline dicarboxylate; Lonza AG)
77.5% water.

Example 7
Formulation containing amine oxide

A liquid formulation was prepared from
10.0% *N,N*-bis(3-aminopropyl)octylamine
2.5% Trilon® A (40% strength aqueous solution)
10.0% BARLOX®12 (lauryl dimethyl amine oxide)
77.5% water.

Example 8
Quantitative suspension test using *Mycobacterium terrae*

Using the method described in *Hygiene & Medizin* **1997**, *22*, pp. 278-283, the activity of *N,N*-bis(3-aminopropyl)octylamine against *Mycobacterium terrae* ATCC 15755 was determined under differing organic loads. The concentration of active compound was in each case 0.3%, the temperature 20°C and the contact time 15 min. The common logarithmic reduction in bacterial count was determined each time. The results were as follows:

Load	**Log reduction**
None	4.33
0.3% albumin	4.09
0.5% sheep's blood	4.48

Example 9
Formulation containing amine oxide/quantitative suspension test using *M. terrae*

A liquid formulation (concentrate) was prepared from
10.0% *N,N*-bis(3-aminopropyl)octylamine
4.5% Trilon®BS (ethylenediaminetetraacetic acid, solid)
2.0% BARLOX®12i(isododecyldimethylamine oxide)
83.5% Water

The formulation was a clear and storage-stable yellow solution having a pH of 9.6. A 1% strength dilution in the mains water had a pH of 9.2 and, in the test performed by the method described in Example 1, after 20 s a foam volume of 0 ml was found.

The bactericidal activity of the formulation was determined in the DGHM suspension test using *Mycobacterium terrae* ATCC 15755 as test microorganism at 38°C. The bacterial content of the initial suspension was $10^{10.21}$/ml. The results of the test are summarized in table 2 below. The data reported in each case are the concentration (dilution) of the formulation in % (concentrate: 100%) and the common logarithmic reduction factors in bacterial counts found after in each case 2½, 5 and 10 minutes of exposure time and the common logarithmic values of absolute bacterial counts in control samples (without disinfectant) at 20°C and 38°C.

Table 2

c[%]	2½ min	5 min	10 min
1.0%	3.81	4.31	≥6.06
0.5%	2.95	3.30	4.23
0.1%	0.78	1.07	1.34
Control (20°C)	7.24	7.10	7.06
Control (38°C)	7.16	7.01	7.00

The claims defining the invention are as follows:

1. The use of *N,N*-bis(3-aminopropyl)octylamine as microbiocide.

2. A disinfectant characterized in that it comprises from 0.1% to 30% of *N,N*-bis(3-aminopropyl)octylamine and at least one aid selected from the group consisting of solvents, surfactants, complexing agents, colorants, fragrances, acids, bases, inorganic salts and organic salts.

3. A disinfectant as claimed in claim 2 characterized in that it comprises water as solvent.

4. A disinfectant as claimed in claim 2 or 3, characterized in that it contains at least one amine oxide as additional active compound.

5. The use of the disinfectant as claimed in one of claims 2 to 4 for disinfecting containers and pipelines in the food industry.

6. The use of the disinfectant as claimed in one of claims 2 to 4 for disinfecting instruments.

7. The use as claimed in claim 6, characterized in that the disinfectant is carried out at a temperature below 60°C.

8. The use as claimed in claim 6 or 7, characterized in that the disinfectant is carried out in an automatic apparatus.

9. A use according to any one of claims 1, or 5 to 8, substantially as hereinbefore described with reference to any of the examples.

10. A disinfectant accordance to claim 2 substantially as hereinbefore described with reference to any of the examples.

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