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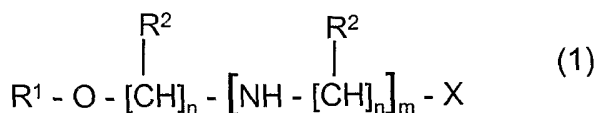
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(54) Title: ETHERAMINES AND THEIR NITRILES AS BIOCIDES FOR WATER TREATMENT



(57) Abstract: This invention relates to the use of a compound of the formula (1); wherein R¹ is a linear or branched C₆-C₃₀ saturated or unsaturated hydrocarbyl group, R² is H, CH₃, CH₂CH₃ or (CH₂)₂CH₃, n is 1, 2, 3, 4 or 5, m is 0, 1, 2, 3 or 4, and X is NH₂ or CN in a biocidal composition.

Description

ETHERAMINES AND THEIR NITRILES AS BIOCIDES FOR WATER TREATMENT

5 FIELD OF THE INVENTION

This invention is concerned with the control of oilfield biofouling in order to reduce or inhibit corrosion and the presence of sulfate-reducing bacteria, general aerobic bacteria (GAB), slime formers and Gallionella that may be present in storage tanks, flowlines and pipelines and petroleum production facilities.

10

BACKGROUND OF THE INVENTION

Such micro-organisms may cause serious problems in oilfield systems such as, but not limited to, corrosion of steel, plugging and mal-functioning of equipment and processes such as injection wells, storage tanks, flow lines, pipelines and petroleum production facilities and in general souring (biogenesis of H₂S) of the facilities. Souring increases the cost of oil production, accelerating corrosion rates and decreasing efficiency of secondary oil recovery due to plugging of the reservoir by sulphate reducing bacteria biomass and precipitated metal sulphides and presents serious ESHA consequences due to its highly toxic nature.

20

Probably the most troublesome micro-organisms are sulphate reducing bacteria (SRB) due their involvement in souring phenomena, and their capacity to form biofilms, complex structure of cells attached on surfaces, that renders them very resistant to biocide action. SRB are a wide group of strict anaerobes which use hydrogen or simple organic acid or even hydrocarbons in petroleum as electron donors for sulphate reduction. Another anaerobic bacteria like methanogenic, fermentative bacteria, nitrate and iron-reducing bacteria are also found in petroleum reservoirs.

25

Hydrogen sulfide is frequently detected in oilfield brines as a consequence of the activities of sulfate-reducing bacteria (SRB). The presence of hydrogen sulfide can present a series of problems in oilfields due its odor, toxicity and corrosive nature. General aerobic bacteria (GAB) like *Pseudomonads* and *Flavobacterium* or slime

30

formers are capable to produce dense biomasses on solid surfaces that harbour anaerobic groups like SRB. The iron bacteria, as *Gallionella* also initiates an ecological succession, creating an anaerobic environment that enables SRB to grow. In similar way, other micro-organisms like algae and diatoms can be found
5 in these environments and can cause problems such as those detailed above.

The petroleum companies treat these problems in different physical or chemical ways but the most common method is by the injection of biocides either continuously or as a batch treatment.

10

The microbial treatment has been completed with good results, for example, products such as quaternary ammonium compounds, glutaraldehyde, isothiazolone derivatives, formaldehyde, acrolein, sodium hypochlorite, tetrakis-hydroxymethyl-phosphonium sulfate (THPS) or tetrakis-hydroxymethyl-
15 phosphonium chloride (THPC) or combinations of any two or more have been use to control SRB. The success of these products depends on the killing efficiency of the product and the ability of the biocide to penetrate biofilms and act against the SRB, GAB and other oilfield bacteria.

20 We have discovered that etheramines, etherdiamines, ethertriamines, ether-tetramines and ethernitriles with a fatty chain substituent, optionally neutralized with an organic or inorganic acid in combination with alkylhydroxyethyltrimethylammonium chloride and alkyltrimethylbenzylammonium chloride are good biocides against sulfate-reducing bacteria (SRB) and other
25 bacteria present in water in the petroleum industry.

DETAILED DESCRIPTION OF THE INVENTION

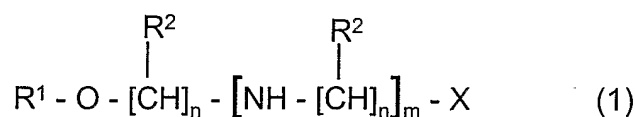
This invention relates to a novel, environmentally friendly biocide and to its use as a bactericide to inhibit and control the growth of sulfate-reducing bacteria and
30 other bacteria present in the waters used and processed in the petroleum industry.

More particularly, the invention relates to a biocide composition with use and application to improve the protection of facilities of petroleum production, storage

tanks, pipe-lines and distillation columns in refineries against corrosion caused by sulfate-reducing bacteria.

The biocide composition of this invention is further characterized by a wide
5 bactericidal spectrum, including but not limited to sulfate-reducing bacteria.

Object of this invention is a biocide composition, comprising a compound of the formula 1



10

wherein

R^1 is a linear or branched C_6 - C_{30} saturated or unsaturated hydrocarbyl group,

R^2 is H, CH_3 , CH_2CH_3 or $(CH_2)_2CH_3$,

n is 1, 2, 3, 4 or 5,

15 m is 0, 1, 2, 3 or 4, and

X is NH_2 or CN .

R^1 may be an alkyl, alkenyl or alkynyl group. In a preferred embodiment of the invention R^1 has from 6 to 24, particularly 8 to 20 and especially 10 to 18 carbon
20 atoms.

This invention further relates to the use or the compounds of formula 1 in biocidal compositions.

25 This invention further relates to a method for treating a water system susceptible to infection by aquatic microorganisms in order to inhibit the growth of the latter, which method comprises adding to said water system at least one compound of formula 1.

30 This invention further relates to a method for treating a water system susceptible to corrosion provoked by aquatic microorganisms, which method comprises

adding to said water system at least one compound of formula 1.

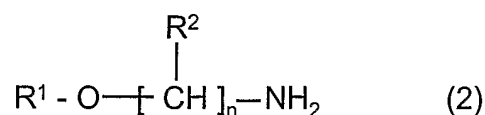
The compounds of formula 1 are preferably added in an amount from 1 to 2,000ppm, but particularly between 5 and 500 parts per million of the water to be
5 treated.

The water system may contain industrial cooling or process water. The water may come from a power station, chemical plant, steel or paper mill or brewery. The water system may contain injection water for oil fields or produced water in oil
10 flowlines and water handling and disposal systems.

The water system may also contain water selected from geothermal water and water in central heating systems, air conditioning systems, and for use in hydrostatic testing, swimming baths and as cooling water for ships and marine
15 engines.

The biocide composition of this invention preferably may be composed of, as an active ingredient, at least one of the following compounds:

20 a) etheramines



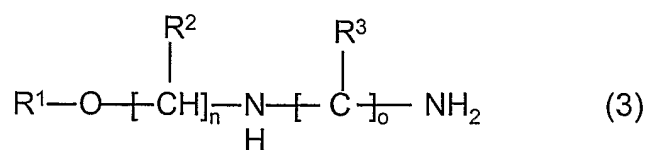
wherein

R¹ is a linear or branched C₆-C₃₀ saturated or unsaturated group, such as an alkyl,
25 alkenyl, or alkynyl group,

R² is H, CH₃, CH₂CH₃ or (CH₂)₂CH₃,

n is 1, 2, 3, 4 or 5;

b) etherdiamines



wherein

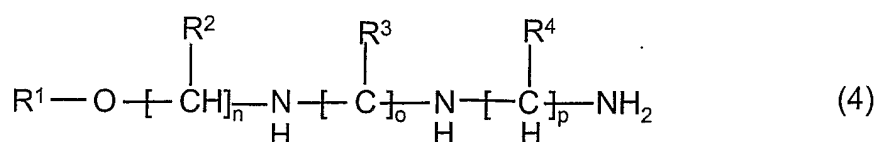
R^1 is a linear or branched C_6-C_{30} saturated or unsaturated group, such as an
5 alkyl, alkenyl, or alkynyl group,

R^2, R^3 are H or CH_3 , CH_2CH_3 or $(\text{CH}_2)_2\text{CH}_3$,

n, o are 1, 2, 3, 4 or 5;

c) ethertriamines

10



wherein

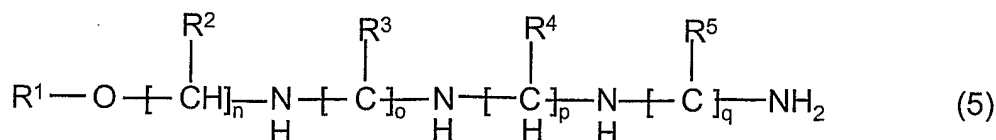
R^1 is a linear or branched C_6-C_{30} saturated or unsaturated group, such as an
15 alkyl, alkenyl, or alkynyl group,

R^2, R^3, R^4 are H, CH_3 , CH_2CH_3 or $(\text{CH}_2)_2\text{CH}_3$,

n, o, p are 1, 2, 3, 4 or 5;

d) ethertetramines,

20



wherein

R^1 is a linear or branched C_6-C_{30} saturated or unsaturated group, such as an
25 alkyl, alkenyl, or alkynyl group,

R^2, R^3, R^4, R^5 are H, CH_3 , CH_2CH_3 or $(\text{CH}_2)_2\text{CH}_3$,

n, o, p, q are 1, 2, 3, 4 or 5.

or salts therefrom with either acetic acid, acrylic acid, citric acid, nitric acid,
phosphoric acid, carbonic acid, phosphorous acid, hydrochloric acid or sulfuric
5 acid.

In the above-shown formulae 2 - 5, the terminal NH₂ group may be replaced by
CN. Such compounds are also within the scope of the invention.

10 The biocidal composition includes blends with one or more of the following: a
quaternary ammonium compound and condensation reaction products of
etheramines and formaldehyde, paraformaldehyde, glyoxal and, or glutaraldehyde.
The mixing ratio may be from 1:99 to 99:1, preferably from 10:90 to 90:10,
particularly from 25:75 to 75:25.

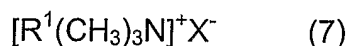
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The biocide composition of this invention may comprise a quaternary ammonium
compound, amine, or salt thereof. Suitable quaternary ammonium compounds
include, but are not limited to, those having the formula:



wherein R¹, R², R³, and R⁴ independently are linear, branched, cyclic or any
combination thereof, saturated or unsaturated groups, and X is an anion. The sum
of the number of carbon atoms in R¹, R², R³, and R⁴ broadly ranges from about 6
25 to about 30. R¹, R², R³, and R⁴ may be alkyl, alkenyl, alkynyl, cycloalkyl, aryl, or
any combination of any of the foregoing. X may be chloride, carbonate,
bicarbonate, nitrate, bromide, acetate, carboxylates, sulphate or methoxylated
sulphate.

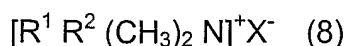
30 A preferred quaternary ammonium compound has the formula



wherein R^1 is a linear or branched C_6 - C_{20} saturated or unsaturated group, such as alkyl, alkenyl, or alkynyl group and X is defined as above. More preferably R^1 is a linear C_6 - C_{18} saturated or unsaturated group and X is chloride, carbonate, acetate, sulphate or metho-sulphate.

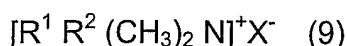
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Another preferred quaternary ammonium compound has the formula



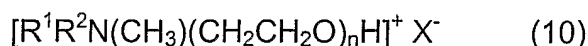
- 10 wherein R^1 is a linear or branched C_6 - C_{20} saturated or unsaturated group or C_6 - C_{20} substituted or unsubstituted aryl group, R^2 is a linear or branched C_1 - C_{20} saturated or unsaturated group or C_6 - C_{20} substituted or unsubstituted aryl group, and X is defined as above. We define as substituted any combination of, but not limited to, substitution with any one or any combination of the following substituents: C_1 - C_4
- 15 alkyl. Preferably, R^1 and R^2 independently are linear or branched C_8 - C_{16} saturated or unsaturated groups. In a more preferred embodiment, R^1 and R^2 independently are linear or branched C_8 - C_{12} saturated or unsaturated groups and X is chloride, carbonate, or acetate.

- 20 Another suitable quaternary ammonium compound has the formula



- 25 wherein R^1 is a substituted or unsubstituted benzyl group, R^2 is linear C_{10} to C_{20} saturated or unsaturated group, and X is defined as above. According to a preferred embodiment, R^1 is benzyl, R^2 is a linear C_{12} - C_{18} saturated or unsaturated group, and X is chloride.

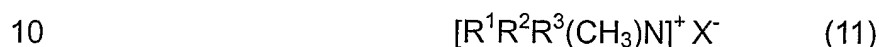
- 30 Another quaternary ammonium compound contemplated for use in the present invention has the formula



wherein R^1 is a C_6 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, R^2 is a C_1 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group n is an integer from 1 to 5, and X is defined as above.

- 5 Preferably, R^1 and R^2 are linear or branched C_8 - C_{10} substituted or unsubstituted groups and more preferably are decyl. X is preferably chloride.

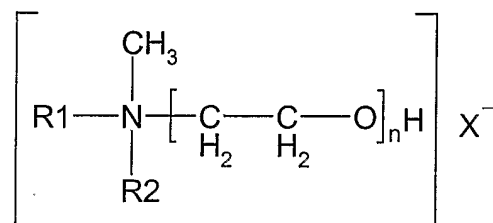
Another suitable quaternary ammonium compound has the formula



wherein R^1 , R^2 , and R^3 independently are linear or branched C_6 - C_{22} saturated or unsaturated groups. More preferably R^1 , R^2 , and R^3 independently are linear or branched C_8 - C_{10} saturated or unsaturated groups. X is preferably chloride.

15

A particularly preferred compound is a fattyhydroxyethyldimethyl ammonium chloride of the generic molecular formula

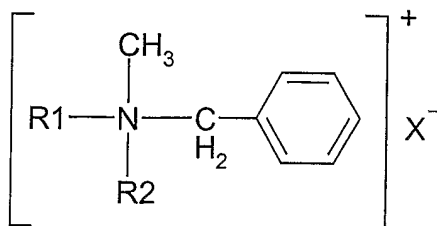


20

- wherein R^1 is a C_6 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, R^2 is a C_1 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group n is an integer from 1 to 5, and X is defined as above.
- 25 Preferably, R^1 and R^2 are linear or branched C_8 - C_{10} substituted or unsubstituted groups and more preferably are decyl. X is preferably chloride.

Another particularly preferred compound is a fattydimethylbenzyl ammonium

chloride of the generic molecular formula:



wherein R¹ is a C₆-C₂₀ linear or branched, substituted or unsubstituted alkyl group
 5 or a C₆-C₂₀ substituted or unsubstituted aryl group, R² is a C₁-C₂₀ linear or
 branched, substituted or unsubstituted alkyl group or a C₆-C₂₀ substituted or
 unsubstituted aryl group, and X is defined as above. Preferably, R¹ and R² are
 linear or branched C₈-C₁₀ substituted or unsubstituted groups and more preferably
 are decyl. X is preferably chloride.

10

Preferably, the biocide composition comprises a mixture of quaternary ammonium
 compound and an etheramine or ethernitrile, neutralized with an organic or
 inorganic acid in an aqueous solution with a pH between 4 to 10.

15 More preferably, the biocide composition comprises a mixture of neutralized
 etheramine or ethernitrile, a quaternary ammonium compound, and a glycol in an
 aqueous solution.

The most preferable form the biocide composition of this invention comprises is a
 20 mixture of neutralized etheramine or ethernitrile and a benzalkonium chloride in an
 aqueous solution. This form of composition is biodegradable.

The biocide composition may be prepared with any amount of said active
 ingredient(s) therein. It is also possible to prepare from a concentrated solution
 25 which can be diluted in commercially available glycols, alcohols or water for the
 actual use. Preferably, the active ingredient(s) of said composition may be present
 in an amount of from 0.001 weight percent to 1,0 weight percent on the total
 weight of the biocide composition.

In the following example all parts and percentages are by weight, and such example will not limit the present invention to such extent.

EXAMPLES

5

Microbiologic Methodology

Sessile cultures: Sulphate reducing bacteria (SRB) used in these assays were isolated from water samples of oilfield industrial plant. The cultures are maintained into flasks with API Macaé modified medium with iron cylinders coupons as a
10 biofilm. For the assays, the SRB culture is inoculated in API Macaé modified medium with iron coupons and incubated for 72 hours. The bacterial cells attach on the coupon surface forming a biofilm.

Kill Time Test: the contaminated iron cylinders are washed twice with sterilised
15 distilled water and put in biocide water solution. Each concentration is tested in triplicate. The contact time is, in general, two hours. After this, the cylinders are washed again and put in 10 ml flasks containing API Macaé modified medium, and incubated at 32°C for 21 days. The evaluation is done after 24 hours, 7, 14 and 21
20 days.

Bacteriostatic activity assay: the contaminated coupons are sonicated for two minutes, washed twice with destilated water, and directly put in 10 ml flasks with Macaé medium with the desired concentration of the biocide. In each assay, A control without biocide is carried out

25

Example of formulation

The biocide composition of the present invention was prepared by mixing etheramine, monomethylglycol, acid, benzalkonium chloride (Preapagen® HY, Clariant) and water. (All percentages are against the total weight of said
30 composition). All formulations are presented below.

Examples of formulations tested

Formulation	Raw Materials					
	EMA	HOE	HY	MEG	Acid	Water
065/02-06	65	--	6	10	10 ^a	9
065/02-14	--	28	--	10	10 ^b	52
065/02-15	--	28	6	10	11 ^b	45
065/02-17	65	--	--	20	8 ^a	7
065/02-23	--	58	5	9	18 ^a	2
065/03-24	65	--	--	20	10 ^c	--
065/03-25	--	28	--	20	11 ^c	41

EMA = Ethermonoamine iso – C₁₀ 50 % neutralized with acetic acid,

5 HOE = Ethermonoamine iso –C₁₀,

HY = Alkyl dimethylethanolamine chloride 40 % in water,

MEG = Monoethylene glycol

a) acetic acid, b) chloroacetic acid, c) nitric acid

Products tested without modification

10

Products	Description
EDA 2835	Etherdiamine salt neutralised with acetic acid, branched chain C ₁₃ .
EDA 2835 - 2L	Etherdiamine salt neutralised with acetic acid; linear chain C ₁₂₋₁₄ .
EDA 3135	Etherdiamine salt neutralised with acetic acid, branched chain C ₁₀ .
EMA	Ethermonoamine partially neutralised; branched chain C ₁₀ .
Genamin CC100	Coconut fatty acid amine

Examples 1 and 2

Several products amine based were evaluated in their biocide and bacteriostatic activity. In these assays a SRB culture isolated from Cabiúnas water sample (PB01) was grow for 72 hours attached on a iron cylinders coupons in order to form a biofilm. All the assays were performed with API Macaé modified medium containing 3.0% of NaCl.

15

The denotation „ + “ means that there was some bacterial growth observed in the test and that the biocide was unsuccessful at that test concentration. The denotation „ - “

- 5 means that there was no growth observed in the test and that the biocide was successful at that test concentration. The tests were performed in triplicate, and the results are given by e.g. (+++) and (+-).

Example 1 – Bacteriostatic activity

	Formulation	Concentration (ppm)			
		20	50	100	200
a	EDA 2835	(+ + +)	(+ + +)	(+ + +)	(+ + +)
b	EDA 2835 – 2L	(+ + +)	(+ + +)	(+ + +)	(+ + +)
c	EDA 3135	(+ + +)	(+ + +)	(+ + -)	(- - -)
d	Flotigan EDA	(+ + +)	(+ - -)	(- - -)	(- - -)
e	031/02-05*	(+ + +)	(+ + +)	(+ + +)	(+ - -)
f	Dodigen 1611	(+ + -)	(+ + -)	(+ + -)	(- - -)
g	Glutaraldehyde	(+ + +)	(+ + +)	(+ + +)	(- - -)
h	THPS	(+ + +)	(+ + -)	(- - -)	(- - -)
i	Control	(+ + +)			

10

*1:1:1 – A mix of EDA 3135, EDA 2835 and EMA. THPS –

Tetrakis(hydroxymethyl)-phosphonium sulfate, Dodigen 1611 – Dimethyl Alkylbenzylammonium Chloride,

Example 2 – Kill time test

	Formulation	Concentration (ppm)		
		500	1000	1500
a	EDA 2835	(+ + +)	(+ + -)	(+ - -)
b	EDA 2835 - 2L	(+ + +)	(+ - -)	(+ + -)
c	EDA 3135	(- - -)	(+ - -)	(+ - -)
d	EMA	(+ - -)	(- - -)	(- - -)
e	031/02-05*	(+ + +)	(+ - -)	(+ + +)
f	Cocoamine (DC)	(+ + -)	(+ - -)	(- - -)
g	Dodigen 1611	(+ + -)	(+ - -)	(- - -)
h	Glutaraldehyde	(- - -)	(- - -)	(- - -)
i	THPS	(+ + +)	(+ - -)	(- - -)
k	Control	(+ + +)		

- 1:1:1 mix of EDA 3135, EDA 2835 and EMA, Dodigen 1611 – Dimethyl
5 Alkylbenzylamonium Chloride, THPS – Tetrakis(hydroxymethyl)phosphonium sulfate, Cocoamine – Fatty amine of coconut,

EMA showed the better performance among the amine based products tested. Its performance was quite similar to the glutaraldehyde.

10

Examples 3 and 4

It was prepared several formulations contained the ethermonoamine Flotigan EDA, and the assays for evaluation their performance as biocides against SRB were carried out. The methodology was the same described above.

Example 3 – Bacteriostatic activity

	Formulation	Concentration (ppm)			
		50	100	150	200
a	Fongrabac THQ4	(+ + +)	(+ - -)	(+ - -)	(- - -)
b	065/02-6	(+ + -)	(- - -)	(- - -)	(- - -)
c	065/02-14	(+ + -)	(- - -)	(- - -)	(+ - -)
d	065/02-15	(+ + -)	(+ + -)	(- - -)	(- - -)
e	065/02-17	(+ + -)	(+ - -)	(- - -)	(- - -)
f	Control	(+ + +)			

Example 4 – Kill Time Test

5

	Formulation	Concentration (ppm)			
		500	1000	1500	2000
a	Fongrabac THQ4	(+ + +)	(- - -)	(- - -)	(- - -)
b	065/02-6	(- - -)	(- - -)	(- - -)	(- - -)
c	065/02-14	(- - -)	(+ + -)	(- - -)	(- - -)
d	065/02-15	(+ + -)	(- - -)	(+ - -)	(- - -)
e	065/02-17	(- - -)	(- - -)	(- - -)	(- - -)
f	Control	(+ + +)			

The formulations 065/02-6 and 17 showed the better performance in both bacteriostatic and bactericidal activity.

10 Example 5

In these assay the aim was the determination of the MIC values of formulations for a PB-01 SRB culture. The methodology was same described above for bacteriostatic activity.

Example 5 – MIC determination

	Formulation	Concentration (ppm)									
		20	50	70	100	120	150	170	200	220	250
a	065/02 - 6	(+ - -)	(+ - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
b	065/02 - 14	(+ + +)	(+ - -)	(+ + +)	(- - -)	(- - -)	(- - -)	(+ - -)	(- - -)	(- - -)	(- - -)
c	065/02 - 15	(+ - -)	(- - -)	(+ - -)	(+ - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
d	065/02 - 17	(+ + +)	(+ - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
e	Control	(+ + +)									

- In the conditions of the test, the MIC values of formulations against the PB-01 culture of SRB are the following:

	Formulation	MIC
f	065/02-6	between 20 and 50 ppm
g	065/02-14	100 ppm
k	065/02-15	between 20 and 50 ppm
i	065/02-17	between 50 and 70 ppm

Example 6

- The following assays were performed with API Macaé culture medium prepared with sea water. The products tested were the formulations 065/02-17 and 23. The aim was also to determine the MIC values in order to evaluate the effect of Praepagen HY in the formulation.

15 Example 06 – Bacteriostatic activity

Formulation	Concentration (ppm)					
065/02-17	(+ + +)	(+ + +)	(+ + -)	(+ - -)	(+ - -)	(- - -)
065/02-23	(+ + +)	(+ + +)	(+ + -)	(+ + -)	(+ + -)	(- - -)
Control	(+ + +)					

The MIC values are higher when the assay is performed with culture medium prepared with sea water. The susceptibility of SRB to formulation 23 is slightly lower than of formulation 17.

5 Example 7

In this assay were introduced two new formulations (006/03-24 and 25) and compared them with 065/02-17 and 23. These formulations were neutralised with nitric acid instead acetic acid.

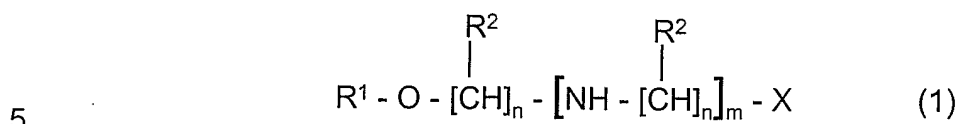
10 Example 7 – Bacteriostatic activity

	Formulation	Concentration (ppm)					
		50	100	150	200	250	300
a	065/02-17	(+ + +)	(+ + +)	(- - -)	(- - -)	(- - -)	(- - -)
b	065/02-23	(+ - -)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
c	065/02-24	(+ + +)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
d	065/02-25	(+ + +)	(- - -)	(- - -)	(- - -)	(- - -)	(- - -)
e	Control	(+ + +)					

There are no important differences between the formulations 23, 24 and 25.

Claims:

1. Use of a compound of the formula 1



wherein

R^1 is a linear or branched C_6 - C_{30} saturated or unsaturated hydrocarbyl group,

R^2 is H, CH_3 , CH_2CH_3 or $(CH_2)_2CH_3$,

10 n is 1, 2, 3, 4 or 5,

m is 0, 1, 2, 3 or 4, and

X is NH_2 or CN

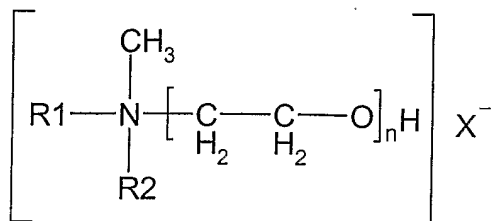
in a biocidal composition.

- 15 2. A method for treating a water system susceptible to infection by aquatic microorganisms in order to inhibit the growth of the latter, which method comprises adding to said water system at least one compound of formula 1.

3. A method for treating a water system susceptible to corrosion provoked by aquatic microorganisms, which method comprises adding to said water system at
20 least one compound of formula 1.

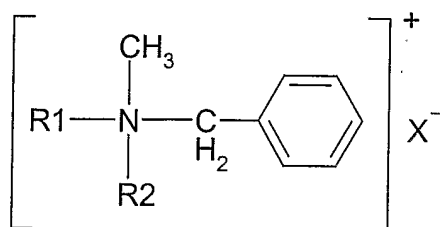
4. Use according to claim 1, wherein fattyhydroxylethyldimethyl ammonium salt of the generic molecular formula

25



wherein R^1 is a C_6 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, R^2 is a C_1 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, n is an integer from 1 to 5, and X is an anion such that the fattyhydroxylethyldimethyl ammonium salt is soluble is used as a further component.

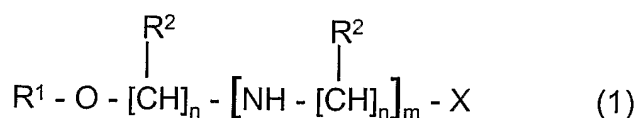
5. Use according to claim 1, wherein fattydimethylbenzyl ammonium chloride as of the generic molecular formula



wherein R^1 is a C_6 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, R^2 is a C_1 - C_{20} linear or branched, substituted or unsubstituted alkyl group or a C_6 - C_{20} substituted or unsubstituted aryl group, and X is an anion such that the fattydimethylbenzyl ammonium salt is soluble is used as a further component.

6. Use according to claim 1, wherein the compounds of formula 1 are added in an amount from 1 to 2,000 parts per million of the water to be treated.

7. Biocide composition, comprising a compound of the formula 1



wherein

R^1 is a linear or branched C_6 - C_{30} saturated or unsaturated hydrocarbonyl group,

R^2 is H, CH_3 , CH_2CH_3 or $(CH_2)_2CH_3$,

n is 1, 2, 3, 4 or 5,

m is 0, 1, 2, 3 or 4, and

X is NH_2 or CN.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP2004/008189

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C02F1/50 A01N33/08 A01N37/34 A01N33/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C02F A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 6 260 561 B1 (GARTNER CHARLES D ET AL) 17 July 2001 (2001-07-17) column 4, lines 1-4; claim 1	1-7
X	DATABASE COMPENDEX 'Online! ENGINEERING INFORMATION, INC., NEW YORK, NY, US; WATANABE S ET AL: "Characteristic properties of cutting fluid additives derived from fatty alcohols" XP002306079 Database accession no. EIX91050644404 abstract -/--	1-7

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

17 November 2004

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Inter: | Application No
PCT/EP2004/008189

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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International Application No
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