US 20080280792A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2008/0280792 A1**

(43) **Pub. Date: Nov. 13, 2008**

Williams

(54) **STABILIZED FLUIDS**

(76) Inventor: **Terry Michael Williams**, Lower Gwynedd, PA (US)

Correspondence Address:
ROHM AND HAAS COMPANY
PATENT DEPARTMENT
100 INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-2399 (US)

(21) Appl. No.: **12/150,922**

(22) Filed: **May 1, 2008**

Related U.S. Application Data

(60) Provisional application No. 60/928,230, filed on May 8, 2007.

Publication Classification

(51) **Int. Cl.**
C10M 125/18 (2006.01)
C10M 135/36 (2006.01)

(52) **U.S. Cl.** **508/154**; 508/271; 508/276

(57) **ABSTRACT**

There is provided a fluid composition comprising

(a) one or more non-chlorinated 3-isothiazolone,

(b) 0.7% to 10% by weight, based on the weight of said fluid composition, one or more primary alkanolamine,

(c) 2% to 30% by weight, based on the weight of said fluid composition, one or more tertiary alkanolamine,

(d) one or more stabilizer selected from the group consisting of iodine-containing stabilizers, mercaptobenzothiazole, and mixtures thereof,

wherein the molar ratio of said stabilizer to said non-chlorinated 3-isothiazolone is from 0.3:1 to 3:1.

STABILIZED FLUIDS

[0001] This application claims the benefit of priority under 35 U.S.C. § 19(e) of U.S. Provisional Patent Application No. 60/928,230 filed on May 8, 2007.

BACKGROUND

[0002] A variety of useful fluids contain one or more 3-isothiazolone and contain a relatively high concentration of one or more alkanolamine. Some 3-isothiazolones are not stable during storage in some of such fluids, and it is desired to also include a stabilizer in the fluid. One example of such a fluid is a metalworking fluid concentrate, which is a fluid that, after dilution by a factor of at least 10, is useful as a metalworking fluid.

[0003] U.S. Pat. No. 5,210,094 discloses metalworking fluids and metalworking fluid concentrates that contain 3-isothiazolones and a sulfur-containing compound.

[0004] It is desired to provide fluids that contain one or more 3-isothiazolone and that contain a relatively high concentration of certain alkanolamines, in which the one or more 3-isothiazolone is stable on storage.

STATEMENT OF THE INVENTION

[0005] In one aspect of the present invention, there is provided a fluid composition comprising

[0006] (a) one or more non-chlorinated 3-isothiazolone,

[0007] (b) 0.7% to 10% by weight, based on the weight of said fluid composition, one or more primary alkanolamine,

[0008] (c) 1% to 30% by weight, based on the weight of said fluid composition, one or more tertiary alkanolamine,

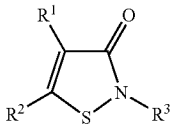
[0009] (d) one or more stabilizer selected from the group consisting of iodine-containing stabilizers, mercaptobenzothiazole, and mixtures thereof,

wherein the weight ratio of said stabilizer to said non-chlorinated 3-isothiazolone is from 0.2:1 to 5:1.

DETAILED DESCRIPTION

[0010] A fluid composition is a composition that is liquid from 15° C. to 60° C. or possibly over a broader temperature range.

[0011] A 3-isothiazolone is a compound of the formula



wherein R^1, R^2, and R^3 is each independently a hydrogen or a halogen or a substituted or unsubstituted organic radical. R^1 and R^2 may or may not be connected to each other to form a ring structure. If any one or more of R^1, R^2, and R^3 has one or more chlorine atom, the compound is known as a chlorinated 3-isothiazolone. If any one or more of R^1, R^2, and R^3 has one or more halogen atom, the compound is known as a halogenated 3-isothiazolone. If none of R^1, R^2, and R^3 has any chlorine atoms, the compound is known as a non-chlorinated 3-isothiazolone. If none of R^1, R^2, and R^3 has any halogen atoms, the compound is known as a non-halogenated 3-isothiazolone.

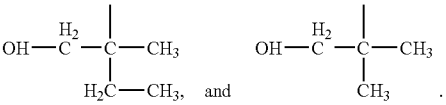
[0012] A non-chlorinated 3-isothiazolone suitable for use in the present invention is, for example, a compound of the above formula, where R^3 is $(C_1\text{-}C_{18})$ alkyl or $(C_3\text{-}C_{12})$ cycloalkyl, each optionally substituted with one or more of hydroxy, cyano, alkylamino, dialkylamine, arylamino, carboxy, carbalkoxy, alkoxy, aryloxy, alkylthio, arylthio, cycloalkylamino, carbamoxy, or isothiazolonyl; an unsubstituted $(C_2\text{-}C_8)$ alkenyl or alkynyl; a $(C_7\text{-}C_{10})$ aralkyl optionally substituted with one or more of $(C_1\text{-}C_4)$ alkyl or $(C_1\text{-}C_4)$ alkoxy; or an aryl optionally substituted with one or more of, nitro, $(C_1\text{-}C_4)$ alkyl, $(C_1\text{-}C_4)$ alkyl-acylamino, carb$(C_1\text{-}C_4)$ alkoxy or sulfamyl; and wherein R^1 and R^2 are each independently H, $(C_1\text{-}C_4)$ alkyl, $(C_4\text{-}C_8)$ cycloalkyl, or joined to form a benzyl.

[0013] In some embodiments, the fluid composition contains any one of or any mixture of the non-chlorinated 3-isothiazolones defined herein above. It is contemplated that the fluid composition of the present invention contains at least one 3-isothiazolone that has no chlorine atom. In some embodiments, the fluid composition contains no 3-isothiazolone that has a chlorine atom.

[0014] In some embodiments, the fluid composition of the present invention contains one or more of 2-methyl-3-isothiazolone, 2-n-octyl-3-isothiazolone, 1,2-benzisothiazolone, or a mixture thereof. In some embodiments, the fluid composition contains one or more of 2-methyl-3-isothiazolone or 2-n-octyl-3-isothiazolone or a mixture thereof. Independently, in some embodiments, the fluid composition contains no halogenated 3-isothiazolones. Independently, in some embodiments, the fluid composition contains no 3-isothiazolone other than 2-methyl-3-isothiazolone, 2-n-octyl-3-isothiazolone, and 1,2-benzisothiazolone. Independently, in some embodiments, the fluid composition contains no 3-isothiazolone other than 2-methyl-3-isothiazolone and 2-n-octyl-3-isothiazolone.

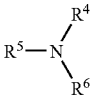
[0015] Independent of the type of non-chlorinated 3-isothiazolone used, the amount of non-chlorinated 3-isothiazolone may vary widely. It is contemplated that a specific fluid composition, used under specific conditions, will have greater or lesser tendency to form biological growth, and thus a larger or smaller amount of non-chlorinated 3-isothiazolone, which is generally considered to be an effective biocide, will be used. In some embodiments, the amount of non-chlorinated 3-isothiazolone, by weight based on the weight of fluid composition, is 200 ppm or more; or 500 ppm or more, or 900 ppm or more. Independently, in some embodiments, the amount of non-chlorinated 3-isothiazolone, by weight based on the weight of fluid composition, is 20,000 ppm or less; or 10,000 ppm or less, or 5,000 ppm or less.

[0016] An alkanol group is a group with the structure HO—R^7—, wherein R^7 is an alkyl or alkoxyalkyl group. R^7 may be straight, branched, cyclic, or a combination thereof. Some suitable alkanol groups are, for example, —CH_2OH, —CH_2CH_2OH, —$CH_2CH_2CH_2OH$, —$C(CH_3)_2CH_2OH$, —CH_2CH_2—O—CH_2CH_2OH,



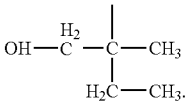
In some embodiments, alkanol groups include —CH_2CH_2OH, —$C(CH_3)_2CH_2OH$, and —CH_2CH_2—O—CH_2CH_2OH.

[0017] An alkanolamine is a compound with the structure



wherein R^4 an alkanol group, and wherein R^5 and R^6 is each independently a hydrogen or a substituted or unsubstituted organic radical.

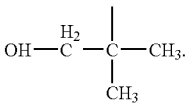
[0018] A primary alkanolamine is an alkanolamine in which R^5 and R^6 is each a hydrogen. In some embodiments, a primary alkanolamine is used in which the alkanol group has four or five carbon atoms. In some embodiments, a primary alkanolamine is used in which the alkanol group has four carbon atoms. Independently, some embodiments, a primary alkanolamine is used in which the alkanol group is $—CH_2CH_2OH$, $—C(CH_3)_2CH_2OH$, $—CH_2CH_2—O—CH_2CH_2OH$, or



Independently, in some embodiments, a primary alkanolamine is used in which the alkanol group is $—C(CH_3)_2CH_2OH$ or $—CH_2CH_2—O—CH_2CH_2OH$. In some embodiments, no primary alkanolamine is used that has an alkanol group other than $—C(CH_3)_2CH_2OH$ or $—CH_2CH_2—O—CH_2CH_2OH$.

[0019] A tertiary alkanolamine is an alkanolamine in which neither R^5 nor R^6 is a hydrogen. Each of R^5 and R^6 may, for example, be a substituted or unsubstituted alkyl group (straight, branched, cyclic, or a combination thereof), a substituted or unsubstituted aryl group, or a combination thereof. In some embodiments, at least one of R^5 and R^6 is an unsubstituted alkyl group or an alkanol group. In some embodiments, both of R^5 and R^6 are selected from unsubstituted alkyl groups, alkanol groups, and mixtures thereof. In some embodiments, no tertiary alkanolamine is used other than those in which both of R^5 and R^6 are selected from unsubstituted alkyl groups, alkanol groups, and mixtures thereof. Independently, in some embodiments, at least one of R^5 and R^6 is an alkanol group.

[0020] Among embodiments in which at least one of R^5 and R^6 is an unsubstituted alkyl group, some suitable unsubstituted alkyl groups are, for example, C_1 to C_4 alkyl groups that are straight or branched. In some embodiments, at least one of R^5 and R^6 is a methyl group. Independently, among embodiments in which at least one of R^5 and R^6 is an alkanol group, suitable alkanol groups include, for example, $—CH_2OH$, $—CH_2CH_2OH$, $—CH_2CH_2CH_2OH$, and



In some embodiments, at least one of R^5 and R^6 is $—CH_2CH_2OH$.

[0021] Some suitable tertiary alkanolamines include, for example, triethanolamine, bis(hydroxyethyl)methylamine (also called N-methyldiethanolamine), 2-dimethylamino-2-methylpropanol, and mixtures thereof. In some embodiments, the tertiary alkanolamine includes triethanolamine, bis(hydroxyethyl)methylamine, or mixtures thereof. In some embodiments, no tertiary alkanolamine is used other than triethanolamine or bis(hydroxyethyl)methylamine.

[0022] The fluid compositions of the present invention contain one or more primary alkanolamine in an amount chosen so that the amount of all primary alkanolamines is 0.7% or more by weight, based on the weight of the fluid composition. In some embodiments, the amount of all primary alkanolamines is, by weight based on the weight of the fluid composition, 1.5% or more, or 3% or more.

[0023] Independently, the fluid compositions of the present invention contain one or more primary alkanolamine in an amount chosen so that the amount of all primary alkanolamines is 10% or less by weight, based on the weight of the fluid composition. In some embodiments, the amount of all primary alkanolamines is, by weight based on the weight of the fluid composition, 7% or less, or 5% or less.

[0024] The fluid compositions of the present invention contain one or more tertiary alkanolamine in an amount chosen so that the amount of all tertiary alkanolamines is 2% or more by weight, based on the weight of the fluid composition. In some embodiments, the amount of all tertiary alkanolamines is, by weight based on the weight of the fluid composition, 4% or more, or 8% or more.

[0025] Independently, the fluid compositions of the present invention contain one or more tertiary alkanolamine in an amount chosen so that the amount of all tertiary alkanolamines is 30% or less by weight, based on the weight of the fluid composition. In some embodiments, the amount of all tertiary alkanolamines is, by weight based on the weight of the fluid composition, 20% or less, or 15% or less.

[0026] In some embodiments, the fluid composition of the present invention contains no secondary alkanolamine. A secondary alkanolamine is an alkanolamine in which exactly one of R^5 and R^6 is a hydrogen.

[0027] The fluid composition of the present invention contains one or more stabilizer selected from iodine-containing stabilizers, mercaptobenzothiazole, and mixtures thereof. Iodine-containing stabilizers are compounds that contain at least one iodine atom per molecule and that are effective at stabilizing non-chlorinated 3-isothiazolones when used in fluid compositions of the present invention. Suitable iodine-containing stabilizers include, for example, iodic acid, periodic acid, iodate salts, periodate salts, and iodopropynylbutylcarbamate. Iodate salts include, for example, alkali metal salts. One suitable iodate salt is potassium iodate. Periodate salts include, for example, alkali metal salts. One suitable periodate salt is potassium periodate.

[0028] In some embodiments, the fluid composition contains one or more iodine-containing stabilizer. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from iodic acid, iodate salts, periodic acid, periodate salts, iodopropynylbutylcarbamate, mercaptobenzothiazole, and mixtures thereof. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from iodic acid, iodate salts, periodic acid, periodate salts, iodopropynylbutylcarbamate, and mixtures thereof. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from

iodic acid, iodate salts, periodic acid, periodate salts, and mixtures thereof. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from iodic acid, potassium iodate, iodopropynylbutylcarbamate, mercaptobenzothiazole, and mixtures thereof. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from iodic acid, potassium iodate, iodopropynylbutylcarbamate, and mixtures thereof. Independently, in some embodiments, the fluid composition contains one or more stabilizer selected from iodic acid, potassium iodate, and mixtures thereof.

[0029] Independent of the type of stabilizer that is used, the amount of stabilizer is chosen according to the weight ratio of stabilizer to non-chlorinated 3-isothiazolone. In the practice of the present invention, that weight ratio is from 0.2:1 to 5:1. In some embodiments, that weight ratio is 0.5 or larger, or 0.75 or larger, or 0.9 or larger. Independently, in some embodiments, that weight ratio is 2 or lower, or 1.5 or lower. As used herein, when a ratio is said to be "X or larger," it is meant that the ratio is Y:1, where Y is equal to or greater than X. Similarly, when a ratio is said to be "W or lower," it is meant that the ratio is Z:1, where Z is equal to or less than W.

[0030] In some embodiments, the fluid composition of the present invention contains no pyridine-N-oxide, pyridine, 2-pyrrolidone, 1-methyl-2-pyrrolidone, s-triazine, or dimethyl oxime. In some embodiments, the fluid composition contains no nitrogen-based heterocyclic compounds. In some embodiments, the fluid composition contains no nitrogen-containing compounds that are not alkanolamines and that are capable of reversibly forming an adduct with any of the non-chlorinated 3-isothiazolones described herein above.

[0031] In some embodiments, the fluid composition of the present invention contains no 2-mercaptopyridine, 4-mercaptopyridine, sodium salt of 2-mercaptopyridine-N-oxide, 2-mercaptobenzothiazole, 4-methyl-4-H-1,2,4-triazole-3-thiol, 2-methylthiobenzothiazole, 2-thiohydantoin, methylenebisthiocyante, L-cystin, or 4-R(thiazolidene-thione-4-carbonic acid). In some embodiments, the fluid composition contains no nitrogen-based heterocyclic thiols. In some embodiments, the fluid composition contains no compounds having a sulfur atom attached to a nitrogen-containing aromatic ring. In some embodiments, the fluid composition contains no sulfur-containing compound or salt thereof capable of reversibly forming an adduct with any of the non-chlorinated 3-isothiazolones described herein above.

[0032] In some embodiments, the fluid composition of the present invention contains no aromatic disulfide.

[0033] The fluid compositions of the present invention may be used for any purpose. For example, the fluid compositions, optionally diluted and/or optionally mixed with additional ingredients, may form preparations that are useful for any of a wide variety of purposes. In some cases, such preparations are subject to contamination by bacteria, fungi, yeast, or algae, and it is contemplated that non-chlorinated 3-isothiazolone may provide useful biocide properties. Independently, in some cases, such preparations may be useful as one or more of metalworking fluid, industrial process water, laundry rinse water, coatings, adhesives, lubricants, process additives, cosmetics, caulks, and personal care products.

[0034] In some embodiments, a fluid composition of the present invention further contains one or more metalworking additive. Metalworking additives include, for example, fatty acids, surfactants, soluble oils, emulsifiable oils, and mixtures thereof. In some embodiments, a fluid composition of the present invention contains one or more surfactant, one or more fatty acid, or a mixture thereof.

[0035] Independently, in some embodiments, a fluid composition of the present invention is suitable as a metalworking fluid concentrate. That is, diluting the fluid composition of the present invention by a factor of at least 10 produces a preparation that is suitable as a metalworking fluid, or in some cases, a preparation that becomes suitable as a metalworking fluid after addition of additional ingredients. In some of such embodiments, the fluid composition of the present invention, prior to dilution, is not suitable as a metalworking fluid.

[0036] As used herein, diluting the fluid composition by a factor of F means mixing the fluid composition with a solvent, where the ratio of weight of solvent to weight of fluid composition is F.

[0037] In some embodiments, the fluid composition of the present invention is used to produce a preparation suitable as a metalworking fluid by dilution with an aqueous solvent. An aqueous solvent is a solvent that contains 50% or more water by weight, based on the weight of the solvent. In some embodiments, an aqueous solvent is used that has water, by weight based on the weight of the solvent, of 75% or more, or 90% or more, or 95% or more.

[0038] In some embodiments, a preparation suitable as a metalworking fluid is made by diluting a fluid composition of the present invention by a factor of 15 or more. Independently, in some embodiments, a preparation suitable as a metalworking fluid is made by diluting a fluid composition of the present invention by a factor of 50 or less, or 25 or less.

EXAMPLES

[0039] In the following examples, the non-chlorinated 3-isothiazolones were methylisothiazolone (MIT), octylisothiazolone (OIT) and benzisothiazolone (BIT). The primary alkanolamines used were monoethanolamine (MEA), 2-amino-2-methyl-1-propanol (AMP), monoisopropanolamine (MIPA), and 2-(2-aminoethoxy)-ethanol (AEE). Secondary alkanolamine used was 2-butylaminoethanol (BAE). Tertiary alkanolamines were triethanolamine (TEA) and bis (hydroxyethyl)methylamine (BHEMA).

Test Formulation

[0040] The formulation used for these tests was prepared in 2 stages. The following amounts were used to prepare 100 grams of the formulation. For stage one, the following was added: distilled water, 2.7 g; tertiary or secondary amine, 10.1 g; primary amine, 2.6 g; boric acid, 2.0 g; Corfree™ M1, 1.2 g; pelargonic acid, 0.2 g; caprylic acid, 0.2 g; citric acid, 0.1 g; and glycerin, 0.2 g. Each of the above components was added individually and in order with heating (50° C.) and mixing. Each ingredient was allowed to thoroughly dissolve before adding the next component. Heating of the mixture was discontinued after all ingredients were added. The following ingredients were added to the stage one mixture: distilled water, 65.7 g; primary amine, 1.0 g; Pluronic™ 25R (100% polyoxypropylene-polyoxyethylene block copolymer), 10.0 g; caprylic acid, 2.0 g; sodium tolyltriazole-50% solution, 1.0 g; and biocide, 0.3-0.6 g. The ingredients were added individually and in the above order at room temperature with mixing. Each ingredient was allowed to thoroughly dissolve before adding the next component.

[0041] It is contemplated that this formulation would be suitable as a metalworking fluid if it were diluted with water by a factor of 20.

[0042] Each formulation received an addition of one of the following stabilizers, at a 1:1 ratio to the biocide active ingredient to stabilizer. Stabilizers tested were potassium iodate, iodic acid, iodopropynylbutylcarbamate (IPBC) and mercaptobenzothiazole (MBZ). A sample without stabilizer served as a control. Biocide additions (by weight of active ingredient) to formulations were as follows: 2,000 ppm MIT, 1,000 ppm OIT, and 4,000 ppm BIT. The biocides used in this study were Kordek™ LX 5000 (50% MIT), Kathon™ 893 MW (45% OIT), and Rocima™ BT 2S (19% BIT).

[0043] Samples were aged at 50° C. for 30 days to determine the percent biocide remaining over time. The 3-isothiazolone content was measured by high pressure liquid chromatography (HPLC) at time zero (initial, prior to aging) and after 30 days. The % remaining of the biocides are reported for each amine combination and in the presence or absence of 4 stabilizers. The initial pH of the various formulations was pH 10-11.

[0044] Corfree™ M1 is a registered trademark of INVISTA, and is a mixture containing dibasic acids, primarily dodecanedioic acid (38-49%) and undecanedioic acid (31-38%), sebacic acid (5-7%), other dibasic acids (9-19%), other organics (7-11%), nitrogen (0.5%), and water (0.3%).

[0045] Pluronic™ is a registered trademark of BASF Corporation.

[0046] Kordek, Kathon, and Rocima are registered trademarks of the Rohm and Haas Company.

Example 1

Results for MIT

[0047]

			% MIT Remaining				
Sample #	Primary Amine	Secondary or Tertiary Amine	No Stabilizer	Potassium Iodate	Iodic Acid	IPBC	MBZ
1	MEA	TEA	4	68	67	3	5
2	AEE	TEA	3	92	92	0	3
3	MIPA	TEA	3	86	95	83	5
4	AMP	TEA	6	93	98	85	0
5	MEA	BHEMA	8	72	7	6	8
6	AEE	BHEMA	10	71	78	7	9
7	MIPA	BHEMA	16	97	98	5	8
8	AMP	BHEMA	12	100	100	100	100
9	MEA	BAE	5	1	2	3	5
10	AEE	BAE	4	2	1	3	5
11	MIPA	BAE	2	2	0	2	5
12	AMP	BAE	2	2	1	2	4

[0048] In the absence of a stabilizer, MIT degraded significantly. None of the stabilizers were effective (no increased stability of MIT) with any of the combinations using BAE as the secondary amine. Combinations with TEA or BHEMA as the tertiary amine provided greatly improved stability of the MIT (from 67 to 100% remaining) with one or more of the stabilizers. The AMP/BHEMA amine combination (#8) was most effective with no measurable loss of biocide with all stabilizers tested (100% remaining). Combinations #3 (MIPA/TEA) and #4 (AMP/TEA) also showed excellent stability with three of the four stabilizers. Overall, iodate and iodic acid demonstrated the best improvement in stability of MIT with 8 amine combinations showing greater than 60% of the biocide remaining. IPBC and MBZ were effective stabilizers with three and one amine combination, respectively.

Example 2

Results for OIT

[0049]

			% OIT Remaining				
Sample #	Primary Amine	Secondary or Tertiary Amine	No Stabilizer	Potassium Iodate	Iodic Acid	IPBC	MBZ
1	MEA	TEA	0	87	80	0	0
2	AEE	TEA	0	85	78	15	17
3	MIPA	TEA	13	96	78	0	0
4	AMP	TEA	0	77	83	83	80
5	MEA	BHEMA	0	57	68	0	0
6	AEE	BHEMA	13	45	49	12	0
7	MIPA	BHEMA	0	72	80	0	0
8	AMP	BHEMA	0	94	100	85	96
9	MEA	BAE	0	5	0	0	0
10	AEE	BAE	0	0	0	0	0
11	MIPA	BAE	0	0	0	0	0
12	AMP	BAE	0	0	0	0	0

[0050] In the absence of a stabilizer, OIT degraded completely in 10 fluids and only 13% remaining in two combinations. None of the stabilizers were effective (no increased stability of OIT) with any of the combinations using BAE as the secondary amine. Combinations with TEA or BHEMA as the tertiary amine provided greatly improved stability of the OIT (from 45 to 100% remaining) with one or more of the stabilizers. Amine combinations #8 (AMP/BHEMA) and #4 (AMP/TEA) were most effective with 77-100% of the biocide remaining with the four stabilizers tested. Iodate and iodic acid demonstrated the best overall improvement in stability of OIT with 8 amine combinations showing greater than 60% of the biocide remaining. IPBC and MBZ were effective stabilizers with two amine combinations.

Example 3

Results with BIT

[0051]

			% BIT Remaining				
Sample #	Primary Amine	Secondary or Tertiary Amine	No Stabilizer	Potassium Iodate	Iodic Acid	IPBC	MBZ
1	MEA	TEA	100	91	96	58	100
2	AEE	TEA	93	91	90	93	98
3	MIPA	TEA	100	100	100	100	89
4	AMP	TEA	100	100	97	98	99
5	MEA	BHEMA	82	99	91	97	81
6	AEE	BHEMA	94	85	100	90	99
7	MIPA	BHEMA	100	99	94	100	102
8	AMP	BHEMA	99	100	100	100	81
9	MEA	BAE	77	88	94	97	88
10	AEE	BAE	87	94	98	96	100
11	MIPA	BAE	88	92	100	100	100
12	AMP	BAE	100	89	100	100	89

[0052] BIT showed very good stability without addition of a stabilizer in all of the fluids, with 77-100% of the biocide remaining. Several combinations provided improved stability of the BIT using one or more stabilizers, compared to the controls with no stabilizer added.

We claim:

1. A fluid composition comprising

(a) one or more non-chlorinated 3-isothiazolone,

(b) 0.7% to 10% by weight, based on the weight of said fluid composition, one or more primary alkanolamine,

(c) 2% to 30% by weight, based on the weight of said fluid composition, one or more tertiary alkanolamine,

(d) one or more stabilizer selected from the group consisting of iodine-containing stabilizers, mercaptobenzothiazole, and mixtures thereof,

wherein the weight ratio of said stabilizer to said non-chlorinated 3-isothiazolone is from 0.2:1 to 5:1.

2. The fluid composition of claim **1**, wherein said primary alkanolamine has a primary hydroxyl group, and wherein said alkanolamine has 4 or more carbon atoms.

3. The fluid composition of claim **1**, wherein said primary alkanolamine comprises one or more compound selected from the group consisting of 2-amino-2-methyl-1-propanol, 2-(2-aminoethyl)ethanol, and mixtures thereof.

4. The fluid composition of claim **1**, wherein said tertiary alkanolamine has two or more —CH_2CH_2OH groups.

5. The fluid composition of claim **1**, wherein said tertiary alkanolamine comprises one or more compound selected from the group consisting of triethanolamine, bis(hydroxyethyl)methylamine, and mixtures thereof.

6. The fluid composition of claim **1**, wherein said stabilizer comprises one or more compound selected from the group consisting of iodic acid, periodic acid, iodate salts, periodate salts, iodopropynylbutylcarbamate, mercaptobenzothiazole, and mixtures thereof.

7. The fluid composition of claim **1**, wherein said stabilizer comprises one or more iodine-containing stabilizer.

8. The fluid composition of claim **1**, wherein said stabilizer comprises one or more compound selected from the group consisting of iodic acid, periodic acid, iodate salts, periodate salts, iodopropynylbutylcarbamate, and mixtures thereof.

9. The fluid composition of claim **1**, further comprising one or more metalworking additive selected from the group consisting of one or more fatty acid, one or more surfactant, and mixtures thereof.

10. A dilute fluid composition formed by a process comprising diluting the fluid composition of claim **1** by a factor of 10 to 50, wherein said dilute fluid composition is suitable as a metalworking fluid.

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