(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 December 2016 (08.12.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/192787 A1

(51) International Patent Classification:
C11D 3/04 (2006.01) *C11D 3/395* (2006.01)
C11D 3/33 (2006.01) *C11D 7/06* (2006.01)
C11D 3/37 (2006.01) *C11D 7/32* (2006.01)

(21) International Application Number:
PCT/EP2015/062393

(22) International Filing Date:
3 June 2015 (03.06.2015)

(25) Filing Language: English

(26) Publication Language: English

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) **Title**: HIGHLY ALKALINE CLEANING CHLORINATED COMPOSITION WITH CHLORINE STABILISATION

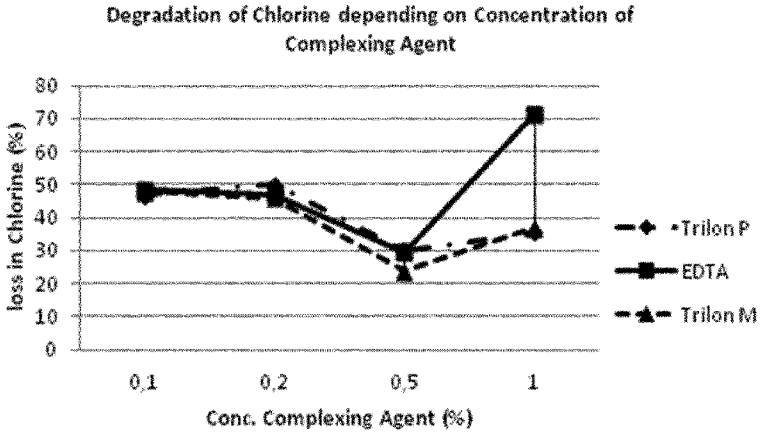


Fig. 1

(57) **Abstract**: The present invention relates to a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below: about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine; about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity; about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and water; wherein the weight amounts of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

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HIGHLY ALKALINE CLEANING CHLORINATED COMPOSITION WITH CHLORINE STABILISATION

FIELD OF THE INVENTION

The invention relates to highly alkaline chlorinated liquid cleaning compositions having an increased chlorine stabilization. The invention further relates to the use of such compositions for cleaning, bleaching and/or disinfection purposes.

Products used preferably for cleaning. However, these products are not limited to cleaning purposes.

BACKGROUND

Alkaline chlorinated cleaning compositions are presently used in many applications, such as retail, industrial and institutional applications. In these compositions, a source of alkalinity is provided for soil removal. Additionally, in some compositions, it is also desirable to provide a source of chlorine to aid in sanitizing, bleaching, cleaning, or the like. However, it has been found that in many such compositions, the stability of the chlorine within such alkaline compositions is less than may be desired.

It has been further found that for these high alkaline chlorinated compositions frequently a black precipitation is observed.

Frequently there are complaints on chlorinated alkaline products that contain black precipitations. Beside a dirty appearance of the chlorinated alkaline product, these precipitations can lead to blockage of the dosing systems.

Furthermore it is frequently reported that the active chlorine concentration in the chlorinated alkaline products decreases over time.

There remains a need, for chlorinated cleaning and disinfecting compositions with cleaning and disinfecting capabilities where the composition has a desired high level of alkalinity, and also has an increased level of chlorine stability.

Further remains a need to avoid a black precipitation for high alkaline chlorinated compositions.

It is an object of the claimed invention to develop high alkaline chlorinated compositions with enhanced stability of the chlorine within such alkaline compositions.

A further object is to avoid black precipitation of high alkaline chlorinated compositions.

A further object of the invention is to provide improved chlorine stabilized high alkaline chlorinated compositions and methods for using the compositions for clean and/or disinfection in place (CIP) applications, for example cleaning of tanks, lines, pumps and other process equipment used for processing typically liquid product streams of beverages, in particular for cleaning milking machines.

A still further object of the invention is to provide improved chlorine stabilized high alkaline chlorinated compositions and methods for using the compositions for clean out of place (COP) applications, for example cleaning the interior and exterior surfaces of a wide variety of parts, such as textiles, ceramic surfaces, metal surfaces, walls in, wash tanks, soaking vessels, mop buckets, holding tanks, scrub sinks, vehicle parts washers, non-continuous batch washers and systems, and the like.

BRIEF SUMMARY OF THE INVENTION

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

a) about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
c) about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and
d) water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

a) about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
c) about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and
d) water; wherein

the highly alkaline chlorinated liquid cleaning composition is a true solution; and

the weight amounts of the components are based on the total weight amount of the liquid composition.

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

a) about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;

b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;

c) about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of a carboxy-methylated polyethyleneimine; and

d) water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

The components are selected such that the amount of all components don't exceed 100 wt.-%. The components of the highly alkaline chlorinated liquid cleaning composition may be selected such that the wt.-% amount of all components of the highly alkaline chlorinated liquid cleaning composition is in total 100 wt.-%.

The highly alkaline chlorinated liquid cleaning composition may comprise:

- about ≥ 30 wt.-% to about ≤ 50 wt.-%, and preferably about ≥ 39 wt.-% to about ≤ 41 wt.-% of a hypochlorite.
- about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate; and
- water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

- about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
- about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
- about ≥ 0.2 wt.-% to 0.8 ≤ wt.-%, preferably about ≥ 0.3 wt.-% to 0.7 ≤ wt.-%, of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine;

- ≥ 0.5 wt.-% to ≤ 5 wt.-% of a nonionic surfactant, preferably at least one amine oxide, and more preferred lauryldimethylamine oxide; and
- water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

- about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
- about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
- about ≥ 0.2 wt.-% to 0.8 ≤ wt.-%, preferably about ≥ 0.3 wt.-% to 0.7 ≤ wt.-%, of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine;
- ≥ 0.5 wt.-% to ≤ 5 wt.-% of at least one amine oxide, and more preferred lauryldimethylamine oxide; and
- water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In one aspect, the disclosure provides a highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:

- about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
- about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
- about ≥ 0.2 wt.-% to 0.8 ≤ wt.-%, preferably about ≥ 0.3 wt.-% to 0.7 ≤ wt.-%, of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine;
- ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of lauryldimethylamine oxide; and
- water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

The highly alkaline chlorinated liquid cleaning composition may comprises about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8

wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

a) about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
c) about ≥ 0.4 wt.-% to 0.7 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and
d) water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

a) about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
c) about ≥ 0.4 wt.-% to 0.7 ≤ wt.-% of at least one complexing agent of carboxy-methylated polyethyleneimine;
d) water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition that comprises about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

a) about ≥ 20 wt.-% to about ≤ 60 wt.-% of a source of chlorine;
b) about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
c) about ≥ 0.4 wt.-% to 0.7 ≤ wt.-% of at least one complexing agent of carboxy-methylated polyethyleneimine;
d) water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition that comprises about ≥ 20 wt.-% to about ≤ 85 wt.-%; preferably about ≥ 30 wt.-% to about ≤ 60 wt.-%, and more preferred about ≥ 48 wt.-% to about ≤ 53 wt.-%, of water; wherein the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 30 wt.-% to about ≤ 50 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 5 wt.-% to about ≤ 15 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-% of a methylglycinediacetate and/or carboxy-methylated polyethyleneimine;
- and at least ≥ 34.2 wt.-% to about ≤ 64.8 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 30 wt.-% to about ≤ 50 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 5 wt.-% to about ≤ 15 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-% of a trisodium salt of methylglycinediacetic acid;
- and at least ≥ 34.2 wt.-% to about ≤ 64.8 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 30 wt.-% to about ≤ 50 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 5 wt.-% to about ≤ 15 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.35 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- and at least ≥ 34.3 wt.-% to about ≤ 64.65 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 30 wt.-% to about ≤ 50 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 5 wt.-% to about ≤ 15 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- and at least ≥ 34.3 wt.-% to about ≤ 64.6 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- about ≥ 48.2 wt.-% to about ≤ 52.8 wt.-% water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine comprises preferably a hypochlorite;
- about ≥ 5 wt.-% to about ≤ 25 wt.-%, preferably about ≥ 7 wt.-% to about ≤ 15 wt.-%, and more preferred about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity comprises an alkali metal hydroxide, an alkali earth metal hydroxide, or mixtures thereof;

- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.35 wt.-% to ≤ 0.75 wt.-%, and more preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine;
- about ≥ 4.2 wt.-% to about ≤ 84.8 wt.-%; preferably about ≥ 24.25 wt.-% to about ≤ 72.65 wt.-%, and more preferred about ≥ 48.45 wt.-% to about ≤ 52.55 wt.-%, of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonate, preferably phosphonobutane-tricarboxylate; and
- about ≥ 43.2 wt.-% to ≤ 52.3 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

In another aspect, the disclosure may provide a highly alkaline chlorinated liquid cleaning composition comprising:

- about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonate, preferably phosphonobutane-tricarboxylate;

- about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a nonionic surfactant, preferably at least one amine oxides, and more preferred lauryldimethylamine oxide; and
- about ≥ 38.2 wt.-% and ≤ 51.8 wt.-% of water; wherein

the weight amounts of the components are based on the total weight amount of the liquid composition.

Some other aspects relate to methods of making, and methods of using such highly alkaline chlorinated liquid cleaning compositions. Additional aspects are encompassed by the disclosure and will become apparent in light of the following description.

DETAILED DESCRIPTION

The disclosure provides a highly alkaline chlorinated liquid cleaning composition that combines several advantages. At first, the highly alkaline chlorinated liquid cleaning composition is effective in cleaning surfaces.

Further, the highly alkaline chlorinated liquid cleaning composition is effective in deactivating, inhibiting, disabling, killing and/or sterilizing spores.

Furthermore, the highly alkaline chlorinated liquid cleaning composition provides a highly increased chlorine stabilization.

It has been found that sources of at least one complexing agent of methylglycine diacetate and/or carboxy-methylated polyethyleneimine, prefereably carboxy-methylated polyethyleneimine, within the highly alkaline chlorinated liquid cleaning composition provide for better chlorine stability within such alkali cleaning compositions. While not wishing to be held to any theory as to the nature of compositions in accordance with the invention, it is believed that an increases or decreases in the concentration of the complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine, especially of carboxy-methylated polyethyleneimine, beyond the range of about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.3 wt.-% to ≤ 0.7 wt.-%, further preferred about ≥ 0.4 wt.-% to ≤ 0.6 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, negatively effects the stability of chlorine or a source of chlorine within the cleaning composition.

In addition, it has been surprisingly found that the highly alkaline chlorinated liquid cleaning composition inhibits the so called “black-precipitation”.

Without being bond to a specific theory, alkaline chlorinated liquid cleaning composition may lead to a black precipitation of metal oxides, such as Nickel oxides, Iron oxides or there like, because the components thereof are available as an aqueous solution that may contains traces of minerals, salts, metals, in particular Nickel oxides, Iron oxides and there like. Furthermore, the composition itself, due to the method of manufacture, may contain traces of minerals, salts, metals, in particular Nickel oxides, Iron oxides and there like.

For the following terms, these meanings shall be applied, unless a different meaning is given or indicated in the claims or elsewhere in this specification.

The demineralized water as used here has a conductivity of ≤ 0.2 µS.

All numeric values are herein assumed to be modified by the term "about," whether or not explicitly indicated. The term "about" generally refers to a range of numbers that one of skill in the art would consider equivalent to the recited value, i.e., having the same function or result. In many instances, the terms "about" may include numbers that are rounded to the nearest significant figure.

Weight percent, percent by weight, % by weight, and the like are synonyms that refer to the concentration of a substance as the weight of that substance divided by the weight of the highly alkaline chlorinated liquid cleaning composition and multiplied by 100.

It is understood as used here, “cleaning composition” or “alkaline cleaning composition” or “chlorinated cleaning composition”, and the like are intended to be synonymous with „highly alkaline chlorinated liquid cleaning composition”.

It is understood that the total weight percent amount of all components, substances or agents of the highly alkaline chlorinated liquid cleaning composition are selected such that it does not exceed 100 wt.-%.

It is understood that, as used here, „percent”, „%”, and the like are intended to be synonymous with „weight percent”, „wt-%“, etc..

It is specifically understood that any numerical value recited herein (e.g., ranges) includes all values from the lower value to the upper value, i.e., all possible combinations of numerical values between the lowest value and the highest value enumerated are to be considered to be expressly stated in this application. For example, if a concentration range is stated as 1% to 50%, it is intended that values such as 2% to 40%, 10% to 30%, or 1% to 3%, etc., are expressly enumerated in this specification.

The recitation of numerical ranges by endpoints includes all numbers subsumed within that range, e.g. 1 to 5 includes 1, 1.5, 2, 2.75, 3, 3.80, 4, and 5.

As used in this specification and the appended claims, the singular forms "a", "an", and "the" include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to a highly alkaline chlorinated liquid cleaning composition containing "a compound" includes a mixture of two or more compounds.

As used in this specification and the appended claims, the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

The term "true solution" when used in the context of the highly alkaline chlorinated liquid cleaning composition according to the invention, refers to a highly alkaline chlorinated liquid cleaning composition, wherein all components are completely solved within the highly alkaline chlorinated liquid cleaning composition.

The term "disinfection" when used in the context of the highly alkaline chlorinated liquid cleaning composition according to the invention, refers to an agent or composition that can kill or otherwise inhibit the growth or proliferation of microbes including, for example, bacteria, viruses, fungi and bacterial spores.

The term "stable" or "stability", as used herein, refers to physical and/or chemical stability. Physical stability refers to retaining an original physical form without undergoing phase change or separation, discoloration, and the like. Chemical stability refers to resistance to impurity generation and degradation of active components.

As used herein, the term “ready to use” refers to a highly alkaline chlorinated liquid cleaning composition that can be directly applied to a surface to be cleaned and/or disinfected without any further dilution.

As used herein, the term „surface“ refers to a surface of a medical instrument, a healthcare setting, a tool, a machine, equipment, a structure, a building, or the like that is employed as part of a food processing, preparation, or storage activity. Examples of healthcare settings include hospitals, doctor's offices and long term care facilities. Examples of food processing surfaces include surfaces of food processing or preparation equipment, e.g., slicing, canning, or transport equipment, including flumes, of food processing wares, e.g., utensils, dishware, wash ware, and bar glasses), and of floors, walls, or fixtures of structures in which food processing occurs. Food processing surfaces are found and employed in milking machines, food anti-spoilage air circulation systems, aseptic packaging sanitizing, food refrigeration and cooler cleaners and sanitizers, ware washing sanitizing, blancher cleaning and sanitizing, food packaging materials, cutting board additives, third-sink sanitizing, beverage chillers and warmers, meat chilling or scalding waters, auto dish

sanitizers, sanitizing gels, cooling towers, food processing antimicrobial garment sprays, and non-to-low-aqueous food preparation lubricants, oils, and rinse additives.

As used herein, the term „ware“ refers to items such as eating and cooking utensils, dishes, and other hard surfaces such as showers, sinks, toilets, bathtubs, countertops, windows, mirrors, transportation vehicles, and floors.

These are only examples of what is specifically intended.

Source of Chlorine

The highly alkaline chlorinated liquid cleaning composition include a source of chlorine for sanitizing, bleaching, cleaning, and/or disinfecting and the like.

Some examples of classes of compounds that can act as sources of chlorine include a hypochlorite, a chlorinated phosphate, a chlorinated isocyanaurate, a chlorinated melamine, a chlorinated amide, and the like, or mixtures of combinations thereof.

Some specific examples of sources of chlorine can include sodium hypochlorite, potassium hypochlorite, calcium hypochlorite, lithium hypochlorite, chlorinated trisodiumphosphate, sodium dichloroisocyanurate, potassium dichloroisocyanurate, pentaisocyanurate, trichloromelamine, sulfondichloroamide,1,3-dichloro 5,5-dimethyl hydantoin, N-chlorosuccinimide, N,N'-dichloroazodicarbonimide, N,N'-chloroacetylurea, N,N'-dichlorobiuret, trichlorocyanuric acid or hydrates thereof, or mixtures thereof; and wherein the source of chlorine is preferably a hypochlorite.

However, most preferred as a compound to be used as a source of chlorine maybe a hypochlorite.

The source of chlorine, preferably hypochlorite, may be included within the composition in an amount to provide the desired level of chlorine concentration. In at least some embodiments, the source of chlorine may be present in the range of about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-%; based on the total weight amount of the liquid composition.

According to one aspect the source of chlorine may be a hypochlorite, preferably sodium hypochlorite, in the range of about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-%; based on the total weight amount of the liquid composition.

According to one aspect the source of chlorine may be a hypochlorite, preferably sodium hypochlorite, in the range of about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-%; based on the total weight amount of the liquid composition.

It should be understood that these ranges can vary, depending, for example, upon factors such as the desired level of chlorine, and the desired level of chlorine stability.

The source of chlorine is included within the highly alkaline chlorinated liquid cleaning composition in an amount to provide the desired level of chlorine concentration. In at least some embodiments the Cl_2 – gas concentration within the highly alkaline chlorinated liquid cleaning composition can be of about ≥ 1.0 wt.-% to about ≤ 10 wt.-%, and preferably of about ≥ 1.1 wt.-% to about ≤ 9.7 wt.-%. The Cl_2 – gas concentration within the highly alkaline chlorinated liquid cleaning composition is measured at about 20° C for a highly alkaline chlorinated liquid cleaning composition storing at about 20° C.

According to one embodiment the highly alkaline chlorinated liquid cleaning composition may have a Cl_2 concentration, within the highly alkaline chlorinated liquid cleaning composition, after about 70 days and storage at about 20° C, of about ≥ 50 wt.-%, preferably about ≥ 55 wt.-% to about ≤ 80 wt.-% and more preferred about ≥ 60 wt.-% to about ≤ 75 wt.-% and further preferred about ≥ 65 wt.-% to about ≤ 70 wt.-%, based and calculated on the Cl_2 concentration at about 20° C directly after the highly alkaline chlorinated liquid cleaning composition is formed.

The Cl_2 concentration within the highly alkaline chlorinated liquid cleaning composition is calculated on a storage temperature at about 20° C.

It has been further surprisingly found that the highly alkaline chlorinated liquid cleaning composition has a Cl_2 loss after 70 days at storage at 20° C of about ≤ 50 wt.-%, preferably about ≥ 10 wt.-% to about ≤ 40 wt.-%, or about ≥ 15 wt.-% to about ≤ 35 wt.-% or about ≥ 20 wt.-% to about ≤ 30 wt.-%, based on the Cl_2 concentration at about 20° C directly after the highly alkaline chlorinated liquid cleaning composition is formed.

Source of alkalinity

The highly alkaline chlorinated liquid cleaning composition includes a source of alkalinity that is compatible with the other components of the highly alkaline chlorinated liquid cleaning composition and that will provide the solution of the highly alkaline chlorinated liquid cleaning composition with the desired pH.

The source of alkalinity, preferably sodium hydroxide, may be included within the highly alkaline chlorinated liquid cleaning composition in an amount to provide the desired level of pH.

According to one aspect the highly alkaline chlorinated liquid cleaning composition has a pH in the range of about ≥ 13 to about ≤ 14, preferably a pH of about ≥ 13.5 to about ≤ 13.8.

Exemplary sources of alkalinity include alkali metal hydroxides, alkali metal salts, phosphates, amines, and mixtures thereof.

Exemplary alkali metal hydroxides include sodium hydroxide, potassium hydroxide, and lithium hydroxide.

Exemplary alkali metal salts include sodium carbonate, trisodium phosphate, potassium carbonate, and mixtures thereof.

Exemplary phosphates include sodium pyrophosphate, potassium pyrophosphate, and mixtures thereof.

Exemplary amines include alkanolamine selected from the group comprising triethanolamine, monoethanolamine, diethanolamine, and mixtures thereof.

The source of alkalinity, preferably an alkali metal hydroxide, may be added to the highly alkaline chlorinated liquid cleaning composition in a variety of forms, including for example in the form of solid beads, dissolved in an aqueous solution or a combination thereof. Alkali metal hydroxides are commercially available as pellets or beads having a mix of particle sizes ranging from 12-100 U. S. mesh, or as an aqueous solution, as for example, as about 45 wt. %, about 50 wt. % and about 73 wt. % solution.

According to one aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 5 wt.-% to about ≤ 25 wt.-%, preferably about ≥ 7 wt.-% to about ≤ 15 wt.-%, and more preferred about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity.

According to one embodiment the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 5 wt.-% to about ≤ 25 wt.-%, preferably about ≥ 7 wt.-% to about ≤ 15 wt.-%, and more preferred about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity comprises an alkali metal hydroxide, an alkali earth metal hydroxide, or mixtures thereof, preferably sodium hydroxide.

According to another embodiment the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity comprises sodium hydroxide.

According to one aspect the source of alkalinity is completely solved within the highly alkaline chlorinated liquid cleaning composition.

Completely solved within the highly alkaline chlorinated liquid cleaning composition means that the source of alkalinity is fully ionized within the highly alkaline chlorinated liquid cleaning composition.

The weight amounts, if not other way indicated, of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

Complexing agent

The highly alkaline chlorinated liquid cleaning composition includes a complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine.

According to one aspect the highly alkaline chlorinated liquid cleaning composition includes methylglycinediacetate and/or carboxy-methylated polyethyleneimine, but is free of additional complexing agents.

According to one aspect the highly alkaline chlorinated liquid cleaning composition includes carboxy-methylated polyethyleneimine, but is free of additional complexing agents.

According to one aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine.

According to another aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate.

According to another aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.4 wt.-% to 0.7 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine.

According to one aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of a carboxy-methylated polyethyleneimine.

According to another aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.4 wt.-% to 0.7 ≤ wt.-% of a carboxy-methylated polyethyleneimine.

It has surprisingly found that the range of about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of a methylglycinediacetate, significant increase the chlorine stabilization within the highly alkaline chlorinated liquid cleaning composition and avoids the so called "black precipitation".

The weight amounts, if not other way indicated, of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

Solvent water

Water is added at 100 wt.-% to the highly alkaline chlorinated liquid cleaning composition. That means that water can be added as the remaining component. The water can be tape water or preferably deionized water.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be a true solution, that means it is not a dispersion or suspension or emulsion, all components of the highly alkaline chlorinated liquid cleaning composition are completely solved within the highly alkaline chlorinated liquid cleaning composition.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be not a gel.

According to another aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 20 wt.-% to about ≤ 85 wt.-%; preferably about ≥ 30 wt.-% to about ≤ 60 wt.-%, and more preferred about ≥ 48 wt.-% to about ≤ 53 wt.-%, of water.

The weight amounts, if not other way indicated, of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

Phosphonates

The highly alkaline chlorinated liquid cleaning composition may comprise in addition a phosphonate. The phosphonate are useful in water softening. Also the addition of phosphonate can be useful in suppressing the catalytic properties of metal ions.

The phosphonate can be selected from the group of aminomethylphosphonate, dimethyl methylphosphonate, 1-hydroxyethylidene-1,1-diphosphonate, amino tris(methylene phosphonate), ethylenediamine tetra(methylene phosphonate), tetramethylenediamine tetra

(methylene phosphonate), hexamethylenediamine tetra(methylene phosphonate), diethylene triamine penta(methylene phosphonate), phosphonobutane-tricarboxylate, N-(phosphono methyl) iminodiacetate, 2-carboxyethyl phosphonate, 2-Hydroxyphosphonocarboxylate, and/or amino-tris-(methylene-phosphonate), N,N-bis(phosphonomethyl)glycine; and more preferred the phosphonate is a phosphonobutane-tricarboxylate, and preferably 2-phosphono butane-1,2,4-tricarboxylate.

According to one aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonate.

According to one aspect, the highly alkaline chlorinated liquid cleaning composition may comprise about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonobutane-tricarboxylate.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be free of a phosphonate.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be free of a phosphate.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be free of a phosphonate and phosphate.

The weight amounts, if not other way indicated, of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

Additional Materials

The highly alkaline chlorinated liquid cleaning composition may also include additional materials, such as additional functional materials, for example, an additional source of alkalinity, a surfactant, a chelating agent, a sequestering agent, a bleaching agent, a thickening agent, a solubility modifier, a detergent filler, a defoamer, an anti-redeposition agent, a threshold agent or system, an aesthetic enhancing agent, i.e. dye, perfume and the like, or combinations or mixtures thereof. Adjuvants and other additive ingredients will vary according to the type of composition being manufactured and can be included in the highly alkaline chlorinated liquid cleaning composition. In at least some embodiments, any additional functional materials that are added to the highly alkaline chlorinated liquid cleaning composition are compatible with the other components within the highly alkaline chlorinated liquid cleaning composition. For example, because chlorine will be substantially present within most compositions, it may be useful that any additional materials be chlorine

compatible. The following is a brief discussion of some examples of such additional materials.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be preferably free of additional materials.

Surfactants

Surfactants may be present in some embodiments of the highly alkaline chlorinated liquid cleaning composition. Any surfactant that is compatible with chlorine can be used. The surfactant or surfactant admixture can be selected from nonionic, semi-polar nonionic, anionic, cationic, amphoteric, or zwitterionic surface active agents; or any combination thereof. In at least some embodiments, the surfactants are water soluble or water dispersible. The particular surfactant or surfactant mixture chosen for use in the process and products of this invention can depend on the conditions of final utility, including method of manufacture, physical product form, use pH, use temperature, foam control, and soil type.

The highly alkaline chlorinated liquid cleaning composition may include a surfactant in an amount effective to provide a desired level of cleaning, such as about $\geq$ 0 wt.-% to about $\leq$ 20 wt.-%, or about $\geq$ 0.5 wt.-% to about $\leq$ 18 wt.-%, or about $\geq$ 1 wt.-% to about $\leq$ 17 wt.-%, or about $\geq$ wt.-% to about $\leq$ 15 wt.-%.

Some examples of suitable surfactants include phosphate esters, alkyl alkoxy alkanoates, alkyl phenoxy alkoxy alkanoates, alkyl carboxylates, or the like, or combinations or derivatives thereof.

Nonionic Surfactants

Exemplary nonionic surfactants that can be used in the highly alkaline chlorinated liquid cleaning composition of the invention may be alkoxylated, preferably ethoxylated or ethoxylated and propoxylated, fatty acid alkyl esters preferably containing 1 to 4 carbon atoms in the alkyl chain, more particularly the fatty acid methyl esters.

Further surfactants include ethoxylated long chain fatty acid amides where the fatty acid has 8-20 carbon atoms and the amide group is ethoxylated with 1-20 ethylene oxide units.

A further class of nonionic surfactants, which can be used according to the invention, is that of the alkyl polyglycosides (APG). Suitable alkyl polyglycosides satisfy the general Formula RO(G)z where R is a linear or branched, particularly 2-methyl-branched, saturated or unsaturated aliphatic radical containing 8 to 22 and preferably 12 to 18 carbon atoms and G

stands for a glycose unit containing 5 or 6 carbon atoms, preferably glucose. The degree of oligomerization z is a number between about 1.0 and about 4.0 and preferably between about 1.1 and about 1.4.

Additionally, non-ionic surfactants derived from the condensation of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylene diamine are also useful. For example, there are compounds containing from 40% to 80% of polyoxyethylene by weight and having a molecular weight from about 5,000 to about 11,000 resulting from the reaction of ethylene oxide groups with a hydrophobic base constituted of the reaction product from ethylene diamine and excess propylene oxide wherein the base has a molecular weight on order of about 2,500-3, 000.

Suitable nonionic surfactants include the polyoxyethylene-polyoxypropylene condensates, which are sold by BASF under the trade name 'Pluronic', polyoxyethylene condensates of aliphatic alcohols/ethylene oxide condensates having from 1 to 30 moles of ethylene oxide per mole of coconut alcohol; ethoxylated long chain alcohols sold by Shell Chemical Co. under the trade name 'Neodol', polyoxyethylene condensates of sorbitan fatty acids, alkanolamides, such as the monoalkoanolamides, dialkanolamides and the ethoxylated alkanolamides, for example coconut monoethanolamide, lauric isopropanolamide and lauric diethanolamide; and amine oxides for example dodecyldimethylamine oxide.

Suitable amine oxides include for example alkylamine oxides, particularly the alkyldimethylamine oxides, alkylamido amine oxides, and alkoxyalkylamine oxides. The amine oxides may be used as foaming forming agents and/or foam stabilizers.

Exemplary suitable amine oxides are the following compounds named according to INCI: almondamidopropylamine oxide, babassuamidopropylamine oxide, behenamine oxide, cocamidopropyl amine oxide, cocamidopropylamine oxide, cocamine oxide, coco-morpholine oxide, decylamine oxide, decyltetradecylamine oxide, diaminopyrimidine oxide, dihydroxyethyl C8-C10 alkoxypropylamine oxide, dihydroxyethyl C9-C11 alkoxypropylamine oxide, dihydroxyethyl C12-C15 alkoxypropylamine oxide, dihydroxyethyl cocamine oxide, dihydroxyethyl lauramine oxide, dihydroxyethyl stearamine oxide, dihydroxyethyl tallowamine oxide, hydrogenated palm kernel amine oxide, hydrogenated tallowamine oxide, hydroxyethyl hydroxypropyl C12-C15 alkoxypropylamine oxide, isostearamidopropylamine oxide, isostearamidopropyl morpholine oxide, lauramidopropylamine oxide, lauramine oxide, methyl morpholine oxide, milkamidopropyl amine oxide, minkamidopropylamine oxide, myristamidopropylamine oxide, myristamine

oxide, myristyl/cetyl amine oxide, oleamidopropylamine oxide, oleamine oxide, olivamidopropylamine oxide, palmitamidopropylamine oxide, palmitamine oxide, PEG-3 lauramine oxide, potassium dihydroxyethyl cocamine oxide phosphate, potassium trisphosphonomethylamine oxide, sesamidopropylamine oxide, soyamidopropylamine oxide, stearamidopropylamine oxide, stearamine oxide, tallowamidopropylamine oxide, tallowamine oxide, undecylenamidopropylamine oxide, and wheat germamidopropylamine oxide.

Preferred exemplary amine oxides are N-cocoalkyl-N,N-dimethylamine oxide, N-tallowalkyl-N,N-dihydroxyethylamine oxide, myristylcetyldimethylamine oxide, and more preferred lauryldimethylamine oxide.

The amine oxide content can be provided in the highly alkaline chlorinated liquid cleaning composition in an amount of about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred ≥ 2 wt.-% to ≤ 3 wt.-%, based on the weight of the total highly alkaline chlorinated liquid cleaning composition.

Preferably the lauryldimethylamine oxide content can be provided in the highly alkaline chlorinated liquid cleaning composition in an amount of about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred ≥ 2 wt.-% to ≤ 3 wt.-%, based on the weight of the total highly alkaline chlorinated liquid cleaning composition.

Nonionic surfactants that can be used in the highly alkaline chlorinated liquid cleaning composition of the invention include polyalkylene oxide surfactants, also known as polyoxyalkylene surfactants or polyalkylene glycol surfactants. Suitable polyalkylene oxide surfactants include polyoxypropylene surfactants and polyoxyethylene glycol surfactants. Suitable surfactants of this type are synthetic organic polyoxypropylene (PO)-polyoxyethylene (EO) block copolymers. These surfactants include a di-block polymer comprising an EO block and a PO block, a center block of polyoxypropylene units (PO), and having blocks of polyoxyethylene grafted onto the polyoxypropylene unit or a center block of EO with attached PO blocks. Further, this surfactant can have further blocks of either polyoxyethylene or polyoxypropylene in the molecules. A suitable average molecular weight range of useful surfactants can be about 1,000 to about 40,000 and the weight percent content of ethylene oxide can be about 10-80 wt.-%.

A suitable polyethylene glycol for use in the present invention can have an average mol weight (MW) in the range of about ≥ 4000 to about ≤ 12000, preferably about ≥ 6000 to about ≤ 10000 and more preferred of about ≥ 7000 to about ≤ 8000. Polyethylene glycol that can be used are marketed for example by BASF under the tradename PLURIOL®.

According to the invention, the highly alkaline chlorinated liquid cleaning composition may comprises at least one polyethylene glycol, preferably a polyethylene glycol with an average mol weight in the range of 4.000 to 12.000, and more preferred a polyethylene glycol having an average mol weight of about 8,000.

Further exemplary non-ionic surfactants include alkylphenol alkoxylates, and amine oxides such as alkyl dimethylamine oxide or bis(2- hydroxyethyl) alkylamine oxide.

The nonionic surfactants can be provided in the highly alkaline chlorinated liquid cleaning composition in an amount of about ≥ 0 wt.-% to about ≤ 5 wt.-%, preferably about ≥ 0.1 wt.-% to about ≤ 3 wt.-%, further preferred ≥ 0.5 wt.-% to about ≤ 2 wt.-%, and more preferred about ≥ 1 wt.-% to about ≤ 1.5 wt.-%, based on the weight of the total highly alkaline chlorinated liquid cleaning composition.

It should be understood that the highly alkaline chlorinated liquid cleaning composition of the invention can be preferably free of a non-ionic surfactant.

Anionic surfactant

The highly alkaline chlorinated liquid cleaning composition may contain an additional anionic surfactant component that includes a detersive amount of an anionic surfactant or a mixture of anionic surfactants. Anionic surfactants are desirable in highly alkaline chlorinated liquid cleaning composition s because of their wetting and detersive properties. The anionic surfactants that can be used according to the invention include any anionic surfactant available in the cleaning and disinfection field using highly alkaline chlorinated liquid cleaning composition. Suitable groups of anionic surfactants include sulfonates and sulfates. Suitable surfactants that can be provided in the anionic surfactant component include alkyl aryl sulfonates, secondary alkane sulfonates, alkyl methyl ester sulfonates, alpha olefin sulfonates, alkyl ether sulfates, alkyl sulfates, and alcohol sulfates.

Suitable alkyl aryl sulfonates that can be used in the highly alkaline chlorinated liquid cleaning composition can have an alkyl group that contains 6 to 24 carbon atoms and the aryl group can be at least one of benzene, toluene, and xylene. A suitable alkyl aryl sulfonate includes linear alkyl benzene sulfonate. A suitable linear alkyl benzene sulfonate includes linear dodecyl benzyl sulfonate that can be provided as an acid that is neutralized to form the sulfonate. Additional suitable alkyl aryl sulfonates include xylene sulfonate and cumene sulfonate. Suitable alkane sulfonates that can be used in the highly alkaline chlorinated liquid cleaning composition can have an alkane group having 6 to 24 carbon atoms. Suitable alkane sulfonates that can be used include secondary alkane sulfonates. A suitable secondary alkane

sulfonate includes sodium C14-C17 secondary alkyl sulfonate commercially available as Hostapur SAS from Clariant. Suitable alkyl methyl ester sulfonates that can be used in the highly alkaline chlorinated liquid cleaning composition include those having an alkyl group containing 6 to 24 carbon atoms. Suitable alpha olefin sulfonates that can be used in the highly alkaline chlorinated liquid cleaning composition include those having alpha olefin groups containing 6 to 24 carbon atoms.

Suitable alkyl ether sulfates that can be used in the highly alkaline chlorinated liquid cleaning composition include those having between about 1 and about 10 repeating alkoxy groups, between about 1 and about 5 repeating alkoxy groups. In general, the alkoxy group will contain between about 2 and about 4 carbon atoms. A suitable alkoxy group is ethoxy. A suitable alkyl ether sulfate is sodium lauryl ether sulfate and is available under the name Steol CS-460.

Suitable alkyl sulfates that can be used in the highly alkaline chlorinated liquid cleaning composition include those having an alkyl group containing 6 to 24 carbon atoms. Suitable alkyl sulfates include, but are not limited to, sodium lauryl sulfate and sodium lauryl/myristyl sulfate.

Suitable alcohol sulfates that can be used in the highly alkaline chlorinated liquid cleaning composition include those having an alcohol group containing about 6 to about 24 carbon atoms.

The anionic surfactant can be neutralized with an alkaline metal salt, an amine, or a mixture thereof. Suitable alkaline metal salts include sodium, potassium, and magnesium. Suitable amines include monoethanolamine, triethanolamine, and monoisopropanolamine. If a mixture of salts is used, a suitable mixture of alkaline metal salt can be sodium and magnesium, and the molar ratio of sodium to magnesium can be between about 3:1 and about 1:1.

The highly alkaline chlorinated liquid cleaning composition may include the anionic surfactant component in an amount sufficient to provide a composition having desired wetting and detersive properties. The highly alkaline chlorinated liquid cleaning composition contain about $\geq$ 0 wt.-% to about $\leq$ 5 wt.-%, preferably about $\geq$ 0.1 wt.-% to about $\leq$ 3 wt.-%, further preferred $\geq$ 0.5 wt.-% to about $\leq$ 2 wt.-%, and more preferred about $\geq$ 1 wt.-% to about $\leq$ 1.5 wt.-%, of at least one anionic surfactant, more preferred an C6 to C18 ether sulfate, and most preferred an lauryl ether sulfate with 2 EO.

It should be understood that the highly alkaline chlorinated liquid cleaning composition of the invention can be preferably free of an anionic surfactant.

Cationic Surfactans

The highly alkaline chlorinated liquid cleaning composition may contain a cationic surfactant component that includes a detersive amount of cationic surfactant or a mixture of cationic surfactants. The cationic surfactant can be used to provide sanitizing properties. Cationic surfactants that can be used in the highly alkaline chlorinated liquid cleaning composition include, but are not limited to: amines such as primary, secondary and tertiary monoamines with C1-8 alkyl or alkenyl chains, ethoxylated alkylamines, alkoxylates of ethylenediamine, imidazoles such as a 1-(2-hydroxyethyl)-2-imidazoline, a 2-alkyl-1-(2-hydroxyethyl)-2-imidazoline, and the like; and poly sulfonate ammonium salts, as for example, alkylpoly sulfonate ammonium chloride surfactants such as n-alkyl(C12-C18)dimethylbenzyl ammonium chloride, n-tetradecyldi-methyl¬benzylammonium chloride monohydrate, and a naphthylene-substituted poly sulfonate ammonium chloride such as dimethyl-1-naphthylmethylammonium chloride.Suitable cationic surfactants include quaternary ammonium compounds having the formula of RR'R"R'"N+X-, where R, R', R" and R'" are each a C1-C24 alkyl, aryl or arylalkyl group that can optionally contain one or more P, O, S or N heteroatoms, and X is F, Cl, Br, I or an alkyl sulfate.

Additional preferred cationic surfactants include ethoxylated and/or propoxylated alkyl amines, diamines, or triamines.

Each of R, R', R" and R'" can independently include, individually or in combination, substituents including 6 to 24 carbon atoms, preferably 14 to 24 carbon atoms, and more preferably, 16 to 24 carbon atoms.

Each of R, R', R" and R'" can independently be linear, cyclic, branched, saturated, or unsaturated, and can include heteroatoms such as oxygen, phosphorous, sulfur, or nitrogen. Any two of R, R', R" and R'" can form a cyclic group. Any one of three of R, R', R" and R'" can independently be hydrogen. X is preferably a counter ion and preferably a non-fluoride counter ion. Exemplary counter ions include chloride, bromide, methosulfate, ethosulfate, sulfate, and phosphate.

In an embodiment, the quaternary ammonium compound includes alkyl ethoxylated and/or propoxylated quaternary ammonium salts (or amines).

Preferably, the alkyl group contains between about 6 and about 22 carbon atoms and can be saturated and/or unsaturated. The degree of ethoxylation is preferably between about 2 and about 20, and/or the degree of propoxylation is preferably between about 0 and about 30.

In an embodiment, the quaternary ammonium compound includes an alkyl group with about 6 to about 22 carbon atoms and a degree of ethoxylation between about 2 and about 20. A preferred cationic surfactant is commercially available under the name Berol 563 from Akzo-Nobel.

The cationic surfactants can be provided in the highly alkaline chlorinated liquid cleaning composition in an amount of about ≥ 0 wt.-% to about ≤ 5 wt.-%, preferably about ≥ 0.1 wt.-% to about ≤ 3 wt.-%, further preferred ≥ 0.5 wt.-% to about ≤ 2 wt.-%, and more preferred about ≥ 1 wt.-% to about ≤ 1.5 wt.-%, based on the weight of the total highly alkaline chlorinated liquid cleaning composition.

It should be understood that the highly alkaline chlorinated liquid cleaning composition of the invention can be preferably free of a cationic surfactant.

Amphoteric Surfactants

Amphoteric surfactants may also be used to provide desired detersive properties. Suitable amphoteric surfactants that can be used include, but are not limited to: betaines, imidazolines, and propionates. Suitable amphoteric surfactants include, but are not limited to: sultaines, amphopropionates, amphodipropionates, aminopropionates, aminodipropionates, amphoacetates, amphodiacetates, and amphohydroxypropylsulfonates. When the detergent composition includes an amphoteric surfactant, the amphoteric surfactant can be included in an amount of about ≥ 0 wt.-% to about ≤ 5 wt.-%, preferably about ≥ 0.1 wt.-% to about ≤ 3 wt.-%, further preferred ≥ 0.5 wt.-% to about ≤ 2 wt.-%, and more preferred about ≥ 1 wt.-% to about ≤ 1.5 wt.-%, based on the weight of the total highly alkaline chlorinated liquid cleaning composition.

It should be understood that the highly alkaline chlorinated liquid cleaning composition of the invention can be preferably free of an amphoteric surfactant.

Thickening agent

The highly alkaline chlorinated liquid cleaning composition may include thickeners. Some examples of thickeners include soluble organic or inorganic thickener material. Some examples of inorganic thickeners include clays, silicates and other well-known inorganic thickeners. Some examples of organic thickeners include thixotropic and non-thixotropic thickeners. In some embodiments, the thickeners have some substantial proportion of water solubility to promote easy removability.

Examples of useful soluble organic thickeners for the highly alkaline chlorinated liquid cleaning composition comprise carboxylated vinyl polymers such as polyacrylic acids and alkali metal salts thereof, and other similar aqueous thickeners that have some substantial proportion of water solubility.

The highly alkaline chlorinated liquid cleaning composition may include at least one polymeric polycarboxylate. The polymeric polycarboxylates suitable for use include those having a pendant carboxylate (--CO2) groups and include, for example, polyacrylic acid, maleic/olefm copolymer, acrylic/maleic copolymer, polymethacrylic acid, acrylic acid-methacrylic acid copolymers, hydrolyzed polyacrylamide, hydrolyzed polymethacrylamide, hydrolyzed polyamide-methacrylamide copolymers, hydrolyzed polyacrylonitrile, hydrolyzed polymethacrylonitrile, hydrolyzed acrylonitrile-methacrylonitrile copolymers, and the like.

Further suitable copolymeric polycarboxylates are particularly those of acrylic acid with methacrylic acid and of acrylic acid or methacrylic acid with maleic acid.

Copolymers of acrylic acid with maleic acid, which comprise about 50 wt.- % to about 90 wt.- % acrylic acid and about 50 wt.- % to about 10 wt.- % maleic acid, have proven to be particularly suitable.

More preferred suitable polycarboxylates are the polyacrylates, which preferably have a molecular weight of 1,000 to 50,000 g/mol and preferably about 2,000 to 10,000 g/mol. In some embodiments the highly alkaline chlorinated liquid cleaning composition may comprise a polymeric polycarboxylate, preferably a polyacrylate having a molecular weight of about 500 Mw to about 50000 Mw, preferably about 1000 Mw to about 20000 Mw, in addition preferred about 3000 Mw to about 10000 Mw and more preferred about 4000 Mw to about 6000 Mw, wherein the molecular weight of the polymeric polycarboxylate is based on a totally neutralized sodium polymeric polycarboxylate. More preferred is a polymeric polycarboxylate that is a polyacrylate.

In some embodiments, a highly alkaline chlorinated liquid cleaning composition may comprise the polymeric polycarboxylate, preferably polyacrylate, in an amount of about ≥ 0 wt.-% to about ≤ 5 wt.-%, preferably about ≥ 0.5 wt.-% to about ≤ 2 wt.-% and more preferred about ≥ 0.7 wt.-% to about ≤ 1 wt.-% of a polycarboxylate, preferably polyacrylate of a polymeric polycarboxylate, based on the total weight amount of the aqueous foaming composition.

In some embodiments, a highly alkaline chlorinated liquid cleaning composition may comprise the polymeric polycarboxylate, preferably polyacrylate, in an amount of about ≥ 0 wt.-% to about ≤ 5 wt.-%, preferably about ≥ 0.5 wt.-% to about ≤ 2 wt.-% and more

preferred about ≥ 0.7 wt.-% to about ≤ 1 wt.-% of a polycarboxylate, preferably polyacrylate having about 4000 Mw to about 6000 Mw, based on the total weight amount of the aqueous foaming composition.

By virtue of their superior solubility, preferred representatives of this group of polymeric polycarboxylate are the short-chain polyacrylates, which have molecular weights, based on free acids, of 2,000 g/mol to 10,000 g/mol and, more particularly, 4,000 g/mol to 6,000 g/mol.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of a thickening agent.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of a polymeric polycarboxylate.

According to one aspect the highly alkaline chlorinated liquid cleaning composition can be free of a polymeric polycarboxylate, except of a polyacrylate.

Bleaching Agents

The highly alkaline chlorinated liquid cleaning composition may include a bleaching agent in addition to or in conjunction with the source of chlorine. Bleaching agents for lightening or whitening a substrate, include bleaching compounds having a peroxygen or active oxygen source such as hydrogen peroxide, perborates, sodium carbonate peroxyhydrate, phosphate peroxyhydrates, potassium permonosulfate, and sodium perborate mono and tetrahydrate, with and without activators such as tetraacetylethylene diamine, and the like.

The highly alkaline chlorinated liquid cleaning composition may include a minor but effective amount of a bleaching agent, such as about ≥ 0.1 wt.-% to about ≤ 10 wt.-%, or about ≥ 1 wt.-% to about ≤ 6 wt.-%.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of an additional bleaching agent.

Detergent Builders or Fillers

The highly alkaline chlorinated liquid cleaning composition may include a minor but effective amount of one or more of a detergent filler which does not perform as a cleaning agent per se, but cooperates with the cleaning agent to enhance the overall cleaning capacity of the highly alkaline chlorinated liquid cleaning composition. Examples of fillers suitable for

use in the present highly alkaline chlorinated liquid cleaning composition include sodium sulfate, sodium chloride, and the like. Inorganic or phosphatecontaining detergent builders may include alkali metal salts of polyphosphates, e.g. tripolyphosphates, pyrophosphates, and glassy polymeric meta-phosphates, and the like. Non-phosphate builders may also be used. A detergent filler may be included in the highly alkaline chlorinated liquid cleaning composition in an amount of about ≥ 1wt.-% to about ≤ 20 wt.-%, or about ≥ 3wt.-% to about ≤ 15 wt.-%.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of a builder and/or filler.

Defoaming Agents

A minor but effective amount of a defoaming agent for reducing the stability of foam may also be included in the highly alkaline chlorinated liquid cleaning composition.

Examples of defoaming agents include silicone compounds such as silica dispersed in polydimethylsiloxane, fatty amides, hydrocarbon waxes, fatty acids, fatty acid soaps, alkoxylates, mineral oils, alkyl phosphate esters such as monostearyl phosphate, and the like.

The highly alkaline chlorinated liquid cleaning composition may be included the defoaming agent in an amount of about ≥ 0.01wt.-% to about ≤ 5 wt.-%, or about ≥ 0.1 wt.-% to about ≤ 3 wt.-%.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of a defoaming agent.

Anti-Redeposition Agents

The highly alkaline chlorinated liquid cleaning composition may include an anti-redeposition agent capable of facilitating sustained suspension of soils in a cleaning solution and preventing the removed soils from being redeposited onto the substrate being cleaned.

Examples of suitable antiredeposition agents include fatty acid amides, fluorocarbon surfactants, complex phosphate esters, styrene maleic anhydride copolymers, and the like.

The highly alkaline chlorinated liquid cleaning composition may be included the anti-redeposition agent in an amount of about ≥ 0.5wt.-% to about ≤ 10 wt.-%, or about ≥ 1 wt.-% to about ≤ 5 wt.-%.

It should be understood that the highly alkaline chlorinated liquid cleaning composition can be free of an anti-redeposition agent.

Dyes/Odorants

Chlorine compatible dyes, pigments, and fragrances can be used.

Methods of Making

The highly alkaline chlorinated liquid cleaning composition can be formed by combining the components of the highly alkaline chlorinated liquid cleaning composition to produce a product having a stable single phase.

In other embodiments, a dispersion, or colloidal suspension may be created. The highly alkaline chlorinated liquid cleaning composition can be diluted with aqueous and/or non-aqueous materials to form a use solution of any strength and viscosity depending on the application. The highly alkaline chlorinated liquid cleaning composition may be in the form of a liquid, gel, paste, structured liquid, a dispersion, a colloidal suspension, and the like. The highly alkaline chlorinated liquid cleaning composition can be uniform or non-uniform.

The highly alkaline chlorinated liquid cleaning composition can be applied as a foam.

However, most preferred the highly alkaline chlorinated liquid cleaning composition may be in the form of a true solution.

The highly alkaline chlorinated liquid cleaning composition and diluted use solutions may be useful as cleaners, sanitizers, and the like, for example, for surfaces, laundry, ware-washing, cleaning-in-place, cleaning- out of - place, medical cleaning and sanitizing, vehicle care, floors, and the like.

Other uses of the highly alkaline chlorinated liquid cleaning composition can be for example the use as a detergent or additive of a detergent for cleaning and/or disinfecting surfaces, or for cleaning and/or disinfecting textiles. However, the focus for the highly alkaline chlorinated liquid cleaning composition is for cleaning and/or bleaching. The highly alkaline chlorinated liquid cleaning composition can be also used as a detergent or additive of a detergent for dishwashing, in particular automatic dishwashing.

Further, the highly alkaline chlorinated liquid cleaning composition can be used as a detergent or additive of a detergent for medical instrument cleaning and/or disinfecting, in particular for automatic medical instrument cleaning and/or disinfecting.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional details, features, characteristics and advantages of the invention are disclosed in more detail in the subclaims, the figures and examples.

Fig. 1 shows the Chlorine degradation depending on the concentration of EDTA, Trilon M and Trilon P,

Fig. 2 shows the Chlorine loss depending on time and on the concentration of Trilon M stored at 20° C (room temperature)

Fig. 3 shows the Chlorine degradation depending on the concentration of Trilon M after 70 days storage at 20° C (room temperature)

The Iodometric titration method is used to measure the chlorine concentration.

Iodometry

20 ml of Hydrochloric acid (1:1) is added to a chlorine containing sample of 3g of 20° C in a conical flask of 250 ml volume to acidify the sample. Then 15 ml of a 10% solution of potassium iodide (KI) is added to the sample and dissolved by thoroughly mixing it with a stirring rod. Immediately thereafter the sample is titrated with a 0.01 N sodium thiosulphate solution at 20° C until the yellow color of liberated iodine is almost faded out to a pale yellow color. Then 1ml of a saturated starch solution is added to the sample and the sample is titrated with a 0.01 N sodium thiosulphate solution at 20° C until the blue color disappears and the sample becomes colorless. Based on the consumption of the sodium thiosulphate solution the chlorine concentration is calculated.

Determination of chlorine stability

The following examples were carried out to illustrate the chlorine stability.

The examples 1 to 18 of Table 1 have been formulated comprising different complexing agent concentrations (wt.-%) of 0,00% (negative standard); 0,1%; 0,2%; 0,5%; 0,7 % and 1%.

Table 1

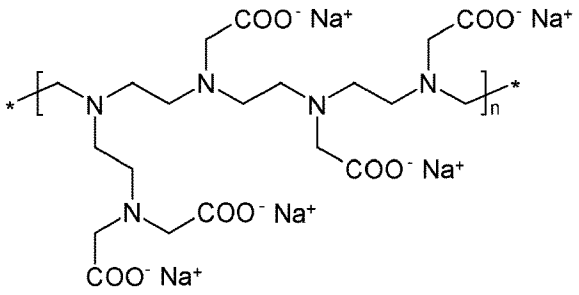
wt.-% based on the composition	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6
NaOH	9	9	9	9	9	9

NaClO	40	40	40	40	40	40
H_3PO_3	2.5	2.5	2.5	2.5	2.5	2.5
EDTA[*1]	0	0.1	0.2	0.5	0.7	1
Trilon M[*2]	-	-	-	-	-	-
Trilon P[*3]	-	-	-	-	-	-
demineralized water and water of the components[*4]	48.5	48.4	48.3	48	47.8	47.5
wt.-% based on the composition	Example 7	Example 8	Example 9	Example 10	Example 11	Example 12
NaOH	9	9	9	9	9	9
NaClO	40	40	40	40	40	40
H_3PO_3	2.5	2.5	2.5	2.5	2.5	2.5
EDTA[*1]	-	-	-	-	-	-
Trilon M[*2]	0	0.1	0.2	0.5	0.7	1
Trilon P[*3]	-	-	-	-	-	-
demineralized water and water of the components[*4]	48.5	48.4	48.3	48	47.8	47.5
wt.-% based on the composition	Example 13	Example 14	Example 15	Example 16	Example 17	Example 18
NaOH	9	9	9	9	9	9
NaClO	40	40	40	40	40	40
H_3PO_3	2.5	2.5	2.5	2.5	2.5	2.5
EDTA[*1]	-	-	-	-	-	-
Trilon M[*2]	-	-	-	-	-	-
Trilon P[*3]	0	0.1	0.2	0.5	0.7	1
demineralized water and water of the components[*4]	48.5	48.4	48.3	48	47.8	47.5

[*1] = ethylenediaminetetraacetate.

[*2] = Trilon® M which is commercially available from BASF SE. Trilon® M is a trisodium salt of methylglycinediacetic acid (Na3MGDA).

*3 = Trilon® P which is commercially available from BASF SE. Trilon® P has a molecular weight of 50,000, a degree of substitution of 80% and a negative charge density. Trilon® P is a carboxy-methylated polyethyleneimine which is represented by the below formula:



*4 = demineralized water and water of the components, since most of the components of the compositions of Examples 1 to 18 are commercially available in an aqueous form that may comprises traces of salts and metals, like Fe or Ni.

1. Prevention of precipitation of metal oxides in chlorinated alkaline products

Table 2

Performance of compositions of Examples 1 to 4, 6, 13 to 16 and 18 containing different concentrations of chelating agents EDTA, Trilon® M and Trilon® P at storage at 20° C

		Storage in Days / 20° C		
	wt.-% based on the composition	0	1 4	56
Example 1	0.0 EDTA	no	**yes**	**yes**
Example 2	0.1 EDTA	no	**yes**	**yes**
Example 3	0.2 EDTA	no	no	**yes**
Example 4	0.5 EDTA	no	no	**yes**
Example 6	1.0 EDTA	no	**yes**	**yes**
Example 7	0.0 Trilon M	no	**yes**	**yes**
Example 8	0.1 Trilon M	no	no	no
Example 9	0.2 Trilon M	no	no	no

Example 10	0.5 Trilon M	no	no	no
Example 12	1.0 Trilon M	no	no	no
Example 13	0.0 Trilon P	no	**yes**	**yes**
Example 14	0.1 Trilon P	no	no	no
Example 15	0.2 Trilon P	no	no	no
Example 16	0.5 Trilon P	no	no	no
Example 18	1.0 Trilon P	no	no	no

No = no black precipitation is visible detected

Yes = stands for black precipitation is visible detected

It can be clearly taken from Table 2 that the compositions of Examples 2 to 4 and 6 containing the complexing agent EDTA as well as the compositions 1, 7 and 13 being free of a complexing agent, show after storage up to about 14 days at 20° C, and Examples 2 to 4 and 6 after storage at 56 days black precipitation.

In contrast, the compositions of examples 8 to 12 of Trilon M and 14 to 18 containing Trilon P have not shown any black precipitation if stored up to 56 days at 20° C.

Further examples 9, 10, 11 and 12 of Trilon M were stored at 20° C for 226 days. For example 12 a slight black precipitation was observed after 70 days and for example 9 a slight black precipitation was observed after 226 days.

Thus, compositions containing EDT have a worse performance compared to the composition containing Trilon M and Trilon P. However, compositions containing Trilon M and composition containing Trilon P have been proved superior compared to composition containing EDTA.

2. Stabilize active chlorine in highly alkaline chlorinated liquid cleaning composition

The compositions varying in the content of complexing agents according to Examples 2 to 6, 8 to 12 and 14 to 18 have been tested with regard to their ability to stabilize the chlorine in the high alkaline chlorinated liquid cleaning composition. The chlorine loss after

56 days is shown in Figure 1 for each composition of Examples 2 to 6, 8 to 12 and 14 to 18 stored at about 20° C.

Fig. 1 shows that the chlorine lost is at the lowest at a complexing agent concentration of about 0.5% wt.-% for Trilon M. It is remarkable that the loss in chlorine stability increases with increasing the complexing agent concentration. At a complex concentration for EDTA, Trion P and Trilon M of 0.1 wt.-% the loss is about 50%, whereas at a complex concentration for EDTA, Trion P and Trilon M of 0.5 wt.-% the loss for EDTA and Trilon P is around 30%. The best performing at a complex concentration of 0.5 wt.-% shows Trilon M, with a loss in chlorine concentration of about 23% only.

Further, the chlorine loss of Examples 7 to 12 with respect to different Trilon M concentrations was tested and the loss of chlorine were measured and recorded in Figure 2.

The compositions of examples 7 to 12 were tested and recorded for 70 days at 20° C. The diagram of Fig. 2 shows the best performance of Trilon M in terms of stabilizing chlorine in alkaline chlorinated products at a concentration between 0.2 wt.-% to 0.5 wt.-%.

In the diagram of Figure 3 the Trilon M concentration is plotted against the loss in chlorine at about 70 days.

Here it can be demonstrated that according to Fig. 3 the optimum concentration for Trilon M to stabilize chlorine is in the range of about 0.2 wt.-% to 0.8 wt.-%, more preferred at about 0.4 wt.-% to 0.7 wt.-% and even more preferred at about 0.45 wt.-% to 0.55 wt.-% or about 0.5 wt.-%. At a concentration of below about 0.2 wt.-% and above 0.8 wt.-% of Trilon M the ability to stabilize chlorine is significant decreasing.

As a conclusion, the optimum conditions to prevent precipitation of black particles and to stabilize chlorine is to use Trilon P and/or Trilon M, preferably Trilon M as a complexing agent at a concentration of about 0.45 wt.-% to 0.55 wt.-% or about 0.5 wt.-%.

From the foregoing detailed description and examples, it will be evident that modifications and variations can be made to the compositions and methods of the invention without departing from the spirit and scope of the invention. Therefore, it is intended that all modifications made to the invention without departing from the spirit and scope of the invention come within the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A highly alkaline chlorinated liquid cleaning composition comprising the components mentioned below:
   - about ≥ 10 wt.-% to about ≤ 70 wt.-% of a source of chlorine;
   - about ≥ 5 wt.-% to about ≤ 25 wt.-% of a source of alkalinity;
   - about ≥ 0.2 wt.-% to 0.8 ≤ wt.-% of at least one complexing agent of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and
   - water; wherein

   the weight amounts of the components are based on the total weight amount of the highly alkaline chlorinated liquid cleaning composition.

2. The composition according to claim 1, comprising about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate.

3. The composition according to at least one of the preceding claims 1 or 2, comprising about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine.

4. The composition according to at least one of the preceding claims 1 to 3, comprising about ≥ 20 wt.-% to about ≤ 85 wt.-%; preferably about ≥ 30 wt.-% to about ≤ 60 wt.-%, and more preferred about ≥ 48 wt.-% to about ≤ 53 wt.-%, of water.

5. The composition according to at least one of the preceding claims 1 to 4, wherein the source of chlorine is selected from the group comprising sodium hypochlorite, potassium hypochlorite, calcium hypochlorite, lithium hypochlorite, chlorinated trisodiumphosphate, sodium dichloroisocyanurate, potassium dichloroisocyanurate, pentaisocyanurate, trichloromelamine, sulfondichloroamide,1,3-dichloro 5,5-dimethyl

hydantoin, N-chlorosuccinimide, N,N'-dichloroazodicarbonimide, N,N'-chloroacetylurea, N,N'-dichlorobiuret, trichlorocyanuric acid or hydrates thereof, or mixtures thereof; and wherein the source of chlorine is preferably a hypochlorite.

6. The composition according to at least one of the preceding claims 1 to 5, comprising:
   - about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and more preferred about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, and most preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate; and
   - about ≥ 30 wt.-% to about ≤ 50 wt.-%, and preferably about ≥ 39 wt.-% to about ≤ 41 wt.-% of a hypochlorite.

7. The composition according to at least one of the preceding claims 1 to 6, comprising:
   - about ≥ 10 wt.-% to about ≤ 70 wt.-%, preferably about ≥ 20 wt.-% to about ≤ 60 wt.-%, further preferred about ≥ 30 wt.-% to about ≤ 50 wt.-%, and more preferred about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, preferably the source of chlorine is a hypochlorite;
   - about ≥ 5 wt.-% to about ≤ 25 wt.-%, preferably about ≥ 7 wt.-% to about ≤ 15 wt.-%, and more preferred about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity comprises an alkali metal hydroxide, an alkali earth metal hydroxide, or mixtures thereof, preferably sodium hydroxide;
   - about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.35 wt.-% to ≤ 0.75 wt.-%, and more preferred about ≥ 0.4 wt.-% to ≤ 0.7 wt.-%, and more preferred about ≥ 0.45 wt.-% to ≤ 0.55 wt.-% or about 0.5 wt.-%, of methylglycinediacetate and/or carboxy-methylated polyethyleneimine; and
   - about ≥ 4.2 wt.-% to about ≤ 84.8 wt.-%; preferably about ≥ 24.25 wt.-% to about ≤ 72.65 wt.-%, and more preferred about ≥ 48.45 wt.-% to about ≤ 52.55 wt.-%, of water; wherein

   the weight amounts of the components are based on the total weight amount of the liquid composition.

8. The composition according to at least one of the preceding claims 1 to 7, comprising:

- about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid; and
- about ≥ 48.2 wt.-% to about ≤ 52.8 wt.-% water.

9. The composition according to at least one of the preceding claims 1 to 8, wherein the composition comprises in addition a phosphonate, preferably selected from the group of aminomethylphosphonate, dimethyl methylphosphonate, 1-hydroxyethylidene-1,1-diphosphonate, amino tris(methylenephosphonate), ethylenediamine tetra(methylene phosphonate), tetramethylenediamine tetra(methylene phosphonate), hexamethylenediamine tetra(methylene phosphonate),diethylenetriamine penta(methylene phosphonate), phosphonobutane-tricarboxylate, N-(phosphonomethyl)iminodiacetate, 2-carboxyethyl phosphonate, 2-Hydroxyphosphonocarboxylate, and/or amino-tris-(methylene-phosphonate), N,N-bis(phosphonomethyl)glycine; and more preferred the phosphonate is a phosphonobutane-tricarboxylate, and preferably 2-phosphonobutane-1,2,4-tricarboxylate.

10. The composition according to at least one of the preceding claims 1 to 9, comprising:
    - about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
    - about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
    - about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
    - about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonate, preferably phosphonobutane-tricarboxylate; and
    - about ≥ 43.2 wt.-% and ≤ 52.3 wt.-% of water.

11. The composition according to at least one of the preceding claims 1 to 10, comprising:

- about ≥ 39 wt.-% to about ≤ 41 wt.-% of a source of chlorine, wherein the source of chlorine is sodium hypochlorite;
- about ≥ 8 wt.-% to about ≤ 10 wt.-% of a source of alkalinity, wherein the source of alkalinity is sodium hydroxide;
- about ≥ 0.2 wt.-% to ≤ 0.8 wt.-%, preferably about ≥ 0.4 wt.-% to ≤ 0.7 wt.-% of a trisodium salt of methylglycinediacetic acid;
- about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a phosphonate, preferably phosphonobutane-tricarboxylate;
- about ≥ 0.5 wt.-% to ≤ 5 wt.-%, preferably about ≥ 1 wt.-% to ≤ 4 wt.-%, and more preferred about ≥ 2 wt.-% to ≤ 3 wt.-% of a nonionic surfactant, preferably at least one amine oxides, and more preferred lauryldimethylamine oxidepreferred; and
- about ≥ 38.2 wt.-% and ≤ 51.8 wt.-% of water.

12. The composition according to at least one of the preceding claims 1 to 11, wherein the composition is free of a phosphate.

13. The composition according to at least one of the preceding claims 1 to 12, wherein the composition has a pH in the range of about ≥ 13 to about ≤ 14, preferably a pH of about ≥ 13.5 to about ≤ 13.8.

14. The composition according to at least one of the preceding claims 1 to 13, wherein the composition comprises a Cl_2 – gas concentration of about ≥ 1.0 wt.-% to about ≤ 10 wt.-%, and preferably of about ≥ 1.1 wt.-% to about ≤ 9.7 wt.-%.

15. The composition according to at least one of the preceding claims 1 to 14, wherein the composition has a Cl_2 concentration after about 70 days and storage at about 20° C, of about ≥ 50 wt.-%, preferably about ≥ 55 wt.-% to about ≤ 80 wt.-% and more preferred about ≥ 60 wt.-% to about ≤ 75 wt.-% and further preferred about ≥ 65 wt.-% to about ≤ 70 wt.-%, based on the Cl_2 concentration at about 20° C directly after the composition is formed.

16. The composition according to at least one of the preceding claims 1 to 15, wherein the composition has a Cl_2 loss after about 70 days at storage at about 20° C of about ≤ 50 wt.-

%, preferably about ≥ 10 wt.-% to about ≤ 40 wt.-%, or about ≥ 15 wt.-% to about ≤ 35 wt.-% or about ≥ 20 wt.-% to about ≤ 30 wt.-%, based on the Cl_2 concentration at about 20° C directly after the composition is formed.

17. Use of the composition to at least one of the preceding claims 1 to 16 as a detergent or additive of a detergent for cleaning, bleaching and/or disinfecting surfaces.

18. Use according to claim 17 for cleaning, bleaching and/or disinfecting textiles.

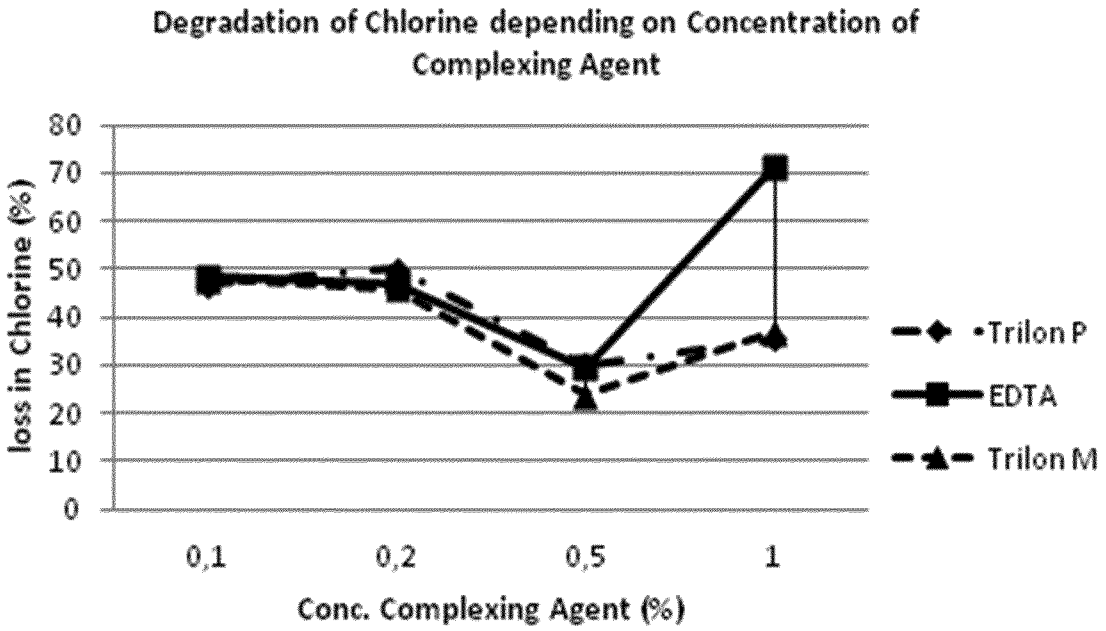

Degradation of Chlorine depending on Concentration of Complexing Agent
loss in Chlorine (%)
80
70
60
50
40
30
20
10
0
0,1
0,2
0,5
1
Conc. Complexing Agent (%)
Trilon P
EDTA
Trilon M

Fig. 1

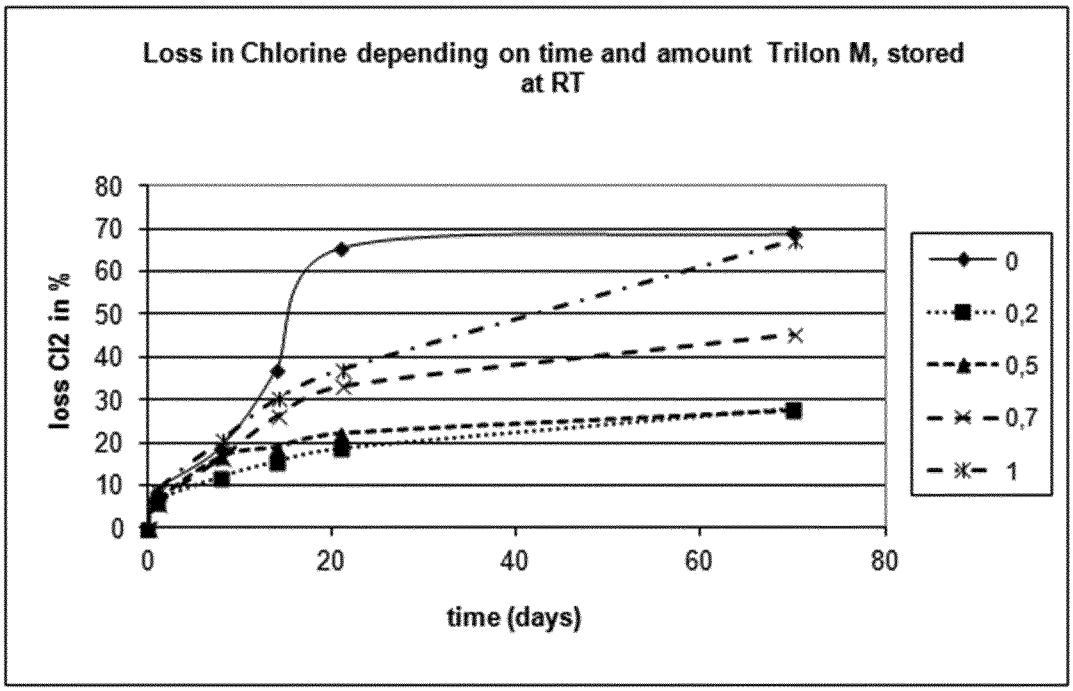

Loss in Chlorine depending on time and amount Trilon M, stored at RT
loss Cl2 in %
80
70
60
50
40
30
20
10
0
0
20
40
60
80
time (days)
0
0,2
0,5
0,7
1

Fig. 2

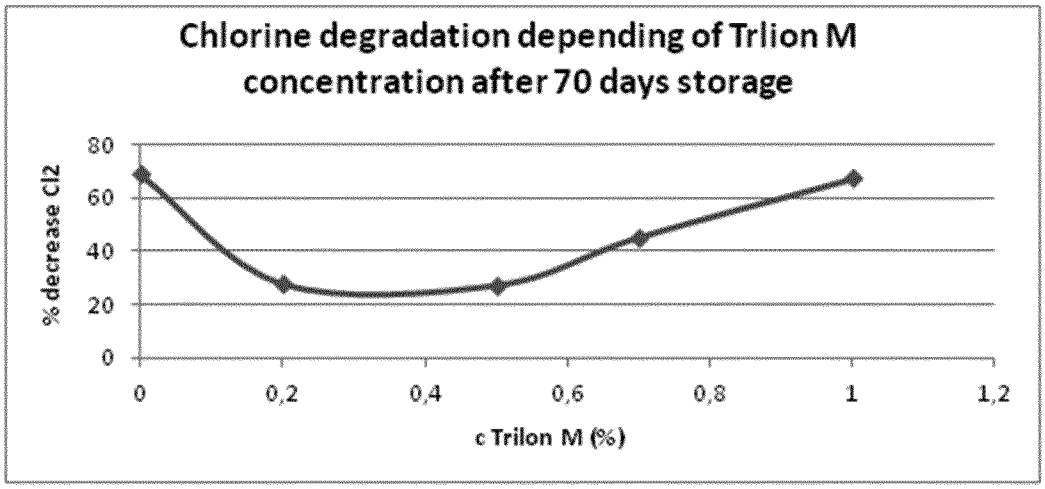

Chlorine degradation depending of Trlion M concentration after 70 days storage
% decrease Cl2
80
60
40
20
0
0
0,2
0,4
0,6
0,8
1
1,2
c Trilon M (%)

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/062393

A. CLASSIFICATION OF SUBJECT MATTER
INV. C11D3/04 C11D3/33 C11D3/37 C11D3/395 C11D7/06
C11D7/32
ADD.
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)
C11D

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/011676 A1 (ECOLAB INC [US]) 22 January 2009 (2009-01-22) pages 3-4,7-8; claims; table 2	1-18
A	WO 2007/121785 A1 (ECOLAB INC [US]) 1 November 2007 (2007-11-01) claims; examples	1-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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

"P" document published prior to the international filing date but later than the priority date claimed

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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	Date of mailing of the international search report
2 February 2016	10/02/2016

Name and mailing address of the ISA/	Authorized officer
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1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2015/062393

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2009011676 A1	22-01-2009	AU 2007356500 A1	22-01-2009
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		JP 2010533765 A	28-10-2010
		WO 2009011676 A1	22-01-2009
WO 2007121785 A1	01-11-2007	NONE	