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DRAFT EAST AFRICAN STANDARD

Bleach for domestic, professional and industrial uses-specification

EAST AFRICAN COMMUNITY

Third Edition 2025

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS) and other deliverables. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards and other deliverables are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 074, *Surface active agents*

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This third edition cancels and replaces the second edition (EAS 295:2021), which has been technically revised.

Bleach for domestic, professional and industrial uses-specification

1. Scope

This East African Draft Standard specifies requirements, sampling and test methods for chlorine and oxygen-based (bleach) intended for domestic, professional and Industrial uses.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 847-17, Cosmetics —Analytical methods —Part 17: Determination of pH

ISO 4316 Surface active agents — Determination of pH of aqueous solutions — Potentiometric method

3. Terms and definitions

For the purpose of this draft standard the following definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
available chlorine
quantity of chlorine chemically equivalent to the oxygen that would be released during the complete decomposition of sodium hypochlorite to sodium chloride and oxygen

NOTE **-** This is a conventional way of expressing the concentration of sodium hypochlorite solution. The available chlorine is 0.95 times the sodium hypochlorite content and is a measure of the oxidising power of sodium hypochlorite solution.

3.2
nominal concentration
minimum available chlorine content of the sodium hypochlorite solution under test, at the time of manufacture or minimum available oxygen content of the peroxide solution under test.

3.3
product unit
unit of the final product, packed in a suitable container

3.4
lot
number of containers consisting of product of the same type and style, which have been manufactured and packed under essentially the same conditions

4. Requirements

4.1. General requirements

4.1.1 Chlorine bleach

4.1.1.1 Sodium hypochlorite solution shall be of one of the following nominal concentrations, as required

a) 15.0 % m/v for industrial use;
b) 5.0 % m/v for domestic use; or

c) 3.5 % m/v for domestic use.

4.1.1. 2 Chlorine bleach solution shall be a clear liquid, free from sediment and suspended matter. A solution shall be considered to be clear if the small amount of salts that has crystallised from the solution dissolves completely when the solution is mixed with twice its volume of distilled water. When so, required, the solution shall contain laundry blue. The laundry blue may settle on standing but shall disperse completely in the solution when shaken.”

4.1.2 Liquid Oxygen bleach

4.1.2.1 Liquid oxygen bleach shall be free from sediment and suspended matter.

4.1.2.2 The liquid oxygen bleach may be perfumed or not.

4.1.2.3 The liquid oxygen bleach shall be miscible with water in all proportions.

4.1.2.4 The product shall be stable under normal household conditions of use. The product should not be heated up to temperatures greater than 50 °C.

4.1.2.5 Powder oxygen bleach shall be a white to off white free flowing powder that is free of impurities (new clause)

4.2. Specific requirements

The solution shall comply with the specific requirements given in Table 1 for chlorine bleach and Table 2 for liquid oxygen bleach when tested in accordance with the test methods specified therein.

Table 1 — Specific requirements for Chlorine bleach

S/No:	Characteristic	Requirement			Test method
		Domestic use		**Industrial use**	
		5%	**3.5%**		
i	Available chlorine content determined within 14 days ± 2 days of the date of manufacture, % (m/v), min.	5.0	3.5	15	Annex A
ii	Available chlorine content determined from 14th to the 60th day ± 2 days of the date of manufacture, % (m/v), min.	4.5	3.2	13	Annex A
iv	Sodium hydroxide content, % (m/v), max.	0.5		1.5	Annex B
v	Sediment content, % (mass fraction expressed as a percentage), max.	0.1		0.1	Annex C

Table 2 – Specific requirements for oxygen bleach

S/No:	Characteristic	Requirement	Test method
i	Available oxygen, (as H_2O_2), %, w/v, min.	2	Annex D
ii	pH, at 20^{0}C, max.	4.1	EAS 847-17[a] ISO 4316[b]

[a] PH for liquid oxygen bleach is done according to EAS 847-17
[b] PH for powder oxygen bleach is done according to ISO 4316

5. Packaging

The product shall be packaged in a suitable opaque containers that withstand normal handling and transportation and that will prevent leakage and contamination of the product. The packaging materials which are recyclables (environmental friendly).

6 Labelling

Each container shall be in prominent, legibly and indelibly labelled either in English, Kiswahili or French or combination or any other language as agreed between the manufacturer and supplier with the following information:

a) The product name either chlorine bleach or Oxygen bleach
b) Indication for either domestic, professional or industrial use
c) Nominal available chlorine for Chlorine bleach or percentage w/v available oxygen for oxygen based bleach
d) name and physical address of the manufacturer and trade mark if any;
e) net content;
f) the words "store in a cool place away from direct sunlight; avoid contact with aluminium, zinc, tin and their alloys and do not mix with acids”;
g) the instructions for use;
h) country of origin;
i) date of manufacture and best before date;
j) Caution:
   -"Keep out of reach of children", “avoid contact with eyes”, or words having similar meaning;
   - **Do not use on wool, silk, rayon, and leather**”;

   NOTE - Sodium hypochlorite solution may have deleterious effect on certain resin-treated materials, such as grease resistant, dry drip, embossed and glazed fabrics. Coloured fabrics may lose their colour if their dyes are not colour fast to hypochlorite

   NOTE The name, physical address of the distributor/supplier and trade mark may be added.

7 Sampling

7.1 For ascertaining the conformity of the lot to the requirements of this standard, tests shall be carried out on each lot separately.

7.2 The number of packages and product units from each container respectively to be selected for drawing the sample shall be in accordance with column 1 of Table 3.

7.3 The sample so drawn shall be deemed to represent the lot. From a given lot, for product units of 500 cm^3 or more a sample of one unit shall be chosen.

7.4 After checking the lot for compliance with the relevant requirements of 5 and 6, take from it at random the number of containers shown in column 2 of Table 3, relative to the appropriate lot size given in column 1.

7.5 Reserve half the containers for the determination of the characteristics other than stability and the other for the determination of stability.

Table 3 — Scale of sampling

1	2	3
Lot size, number of cartons (packages) in a lot ***N***	**Number of cartons (containers) to be selected** ***n***	**Number of product units to be selected from each carton**
25 – 50	4	4
51 – 100	6	6
101 – 500	8	2
501 – 1500	10	1
1501 – 5000	12	1

7.6 The packages (cartons) shall be selected at random, using tables of random numbers. If these are not available, the following procedure shall be applied:

Starting from any package, count all the packages in one order as 1, 2, 3.... N, selecting every $k^{\text{th package}}$, where k is the integral part of N ÷ n.

From each package thus selected, draw at random an equal number of units so as to obtain a total volume of at least 2 L.

Annex A
(Normative)

Determination of available chlorine

A.1 Method 1

A.1.1 Principle
Known volumes of sodium hypochlorite solution and arsenite solution are mixed and titrated against iodine solution.

A.1.2 Reagents
A.1.2.1 Phenolphthalein indicator solution*,*
Dissolve 1 g of phenolphthalein in 100 mL of ethanol (95 % v/v)

A.1.2.2 Starch solution
Prepare the starch solution immediately before use as follows
Make a paste of 1 g of soluble starch and a small amount of distilled water. Pour the paste into 100 mL of boiling water, stirring it constantly. Boil for approximately 1 min and cool.

A.1.2.3 Standard sodium arsenite solution (c $(\mathrm{NaASO_2})$. = 0.025 mol/l)
Dissolve exactly 4.946 g of arsenic trioxide $(\mathrm{AS_2O_3})$ in 150 mL of warm water containing about 3 g of sodium hydroxide. Cool, add one drop of phenolphthalein indicator, and then neutralise the excess alkali with dilute sulphuric acid (1:3) until the solution is just decolourised. Transfer to a 1-L volumetric flask and add 500 mL of water containing about 25 g of sodium bicarbonate. If a pink colour develops, add dilute sulphuric acid drop by drop until the solution becomes colourless. Make up to the mark with water, and mix well.

A.1.2.4 Standard iodine solution 0.025M

A.1.2.4.1 Preparation
Mix 6.35 g ± 0.05 g of Iodine with twice this mass of potassium iodide. Dissolve the mixture in 100 mL of water and then filter the solution through a filter the solution through a filter paper of medium porosity, into a 1-L volumetric flask. Wash the filter paper three times with 25 mL portions of water. Make up to the mark with water and mix well.

A.1.2.4.2 Standardisation
Standardise the iodine solution as follows:

a) Pipette 20 mL of the standard sodium arsenite solution (A.1.2.3) into a 250-mL conical flask;
b) Add 5 mL of water and about 5 g of bicarbonate and shake well the flask until the sodium bicarbonate has completely dissolved;
c) While shaking the flask continuously, titrate the solution with the iodine solution until the yellow
d) colour formed disappears slowly from the solution when it is shaken; and
e) Add 5 mL of the starch solution (A.1.2.2) and continue the titration until a permanent blue colour is obtained.

Calculate the concentration of the standard iodine solution *M,* in moles per litre, as follows:

$$M = 1.0/V$$

where

V is the volume, in millimetres, of iodine solution used in the titration,.

A.1.3 Procedure

A.1.3.1 Pipette 25 mL of sodium hypochlorite solution into a volumetric flask containing about 500 mL of distilled water, dilute to 1 000 mL mark and mix well.
A.1.3.2 Pipette 25 mL this solution and 25 mL of the standard sodium arsenite solution into a 250-mL

conical flask.
A.1.3.3 Add 5 g of sodium bicarbonate and shake the flask until it has completely dissolved.
A.1.3.4 Titrate with the standard iodine solution until the yellow colour formed slowly disappears from the solution when it is shaken.
A.1.3.5 Add 5 mL of the starch solution and continue the titration until a permanent blue colour is obtained.

A.1.4 Calculation

Available chlorine content C, expressed as grams per litre, shall be calculated as follows:

$$C = ((1.25 - VM) \times 2836.0)\ V_1$$

where,

V is the volume, in millilitres, of iodine solution used in the titration;
V_1 is the volume, in millilitres, of sodium hypochlorite (test specimen taken); and
M is the concentration, in moles per litre, of the standard iodine solution..

A.2 Method 2 *(Alternative method)*

A.2.1 Principle

The sample is added to acidified solution of potassium iodide and the released iodine is titrated with standard sodium thiosulphate solution to the usual starch end point.

A.2.2 Reagents

A.2.2.1 *Acetic acid, glacial*
A.2.2.2 *Potassium iodide (KI), crystals, iodate free*
A.2.2.3 *Sodium thiosulphate ($Na_2S_2O_3.5H_2O$),* standard solution - Dissolve 25 g of Na_2SO_3 crystals in freshly boiled and cooled water and dilute to 1 L. The solution is more stable if the glassware is cleaned with sulphuric-chromic acid and thoroughly rinsed with water. Standardize against potassium iodate (KIO_3) as follows: Weigh out accurately 3.567 g of dry KIO_3 and transfer to a 1-L volumetric flask. Dissolve with water, make up to the mark and mix thoroughly. This solution will be exactly 0.1000 N. To standardize the $Na_2S_2O_3$. solution, carefully pipette a 50-mL aliquot of the KIO_3 solution into a 250-mL Erlenmeyer flask and dilute to 100 mL with water. Add 1 g of KI crystals. When it is dissolved, add 15 mL of 1.0 N hydrochloric acid and titrate immediately with the $Na_2S_2O_3$. solution. When the solution becomes light yellow, add 1 mL of starch indicator solution and complete the titration to the disappearance of the blue colour. Standardize at least monthly.

Calculate the normality of the $Na_2S_2O_3$ solution as follows:

Normality, $N1 = (50 \times 0.1)/A$

where,

A is the value of $Na_2S_2O_3$. solution required for titration of KIO_3 solution.

A.2.2.4 *Starch indicator solution,* mix 0.5 g of soluble starch with 5 mL of cold water and add to 95 mL of boiling water. Mix, cool and store in a sterilized bottle. Replace frequently or add 0.1 % salicylic acid to minimize deterioration.

A.2.3 Procedure

Dissolve 2 g to 3 g of KI crystals to 50 mL of water in a 250 mL Erlenmeyer flask. Add 10 mL of acetic acid. Then pipette the aliquot of sample into the solution keeping the tip of the pipette beneath the surface of the solution until drained. Titrate at once with 0.1 N $Na_2S_2O_3$ solution until the iodine colour is nearly gone then add 1 mL of starch indicator solution and complete the titration to the disappearance of the iodine colour. Record the titration as A.

A.2.4 Calculations

A.2.4.1 Available chlorine, expressed as gram per litre, shall be calculated as follows:

$$\frac{A \times N_1 \times 35.46}{V}$$

A.2.4.2 Sodium hypochlorite content, expressed as gram per litre, shall be calculated as follows;

$$\frac{A \times N_1 \times 37.22}{V}$$

where

A is the volume, in millilitres, of $Na_2S_2O_3$ solution required for titration of the sample;
N_1 is the normality of the $Na_2S_2O_3$ solution; and
V is the volume, in millilitres, of original sample in aliquot used.

Annex B
(Normative)

Determination of sodium hydroxide

B.1 Principle
The sodium hypochlorite is decomposed with hydrogen peroxide, carbonate precipitated with barium chloride and the hydroxide determined by titration with hydrochloric acid.

B.2 Reagents

B.2.1 *Barium chloride solution* 100 g of barium chloride ($BaCl_2.2H_2O$) in water and dilute to 1 L with water. Filter the solution of turbid.
B.2.2 *Hydrogen peroxide solution* - *a*pproximately 3 % (10 volumes)
B.2.3 *Sodium hydroxide solution* - approximately 4 g/L in water
B.2.4 *Phenolphthalein indicator* - prepared as described in 6.1.2.1
B.2.5 *Screened methyl orange indicator* - Dissolve 0.2 g of methyl orange and 0.28 g of xylene cyanol FF in 100 mL of ethanol (50 %).
B.2.6 *Standard hydrochloric acid solution* 0.1M

B.3 Procedure

B.3.1 Place 50 mL of barium chloride solution and 40 mL of hydrogen peroxide solution in a 250-mL conical flask.
B.3.2 Add 10 drops of phenolphthalein indicator and then add sodium hydroxide solution drop by drop until a permanent faint pink colour is obtained.
B.3.3 Immediately pipette 10 mL of sodium hypochlorite solution drop by drop into the flask, taking care that the effervescence does not become excessive.
B.3.4 When the effervescence subsides, shake the flask vigorously for 1 min.
B.3.5 Add another drop of phenolphthalein indicator and rapidly titrate the, solution with the standard hydrochloric acid solution (B.2.6) until the pink colour first disappears. Do not continue the titration if the pink colour reappears on standing.

B.4 Calculation

Sodium hydroxide content *X,* expressed as grams per litre, shall be calculated as follows:

$$V \times M \times 4.0$$

where

V is the volume, in millilitres, of standard hydrochloric acid solution used in the titration; and
M is the concentration, in moles per litre, of the standard hydrochloric acid solution..

Annex C
(Normative)

Sediment content

C.1 Procedure

C.1.1 Mix the test specimen of sodium hypochlorite solution thoroughly and then accurately weigh out approximately 300 g into a 500-mL beaker.
C.1.2 Filter the solution through a Whatman GF/A glass-fibre filter paper that has been dried at 100 °C ± 2 °C and tared, or equivalent.
C.1.3 Wash the beaker and the sediment five times with 20 mL portions of cold water and then dry the glass fibre filter paper with the sediment at 100 °C ± 2 °C until a constant mass is attained.

C.2 Calculation

The sediment content, S, expressed as percent, shall be calculated as follows:

$$S = \frac{m_1}{m_2} \times 100$$

where

m_1 is the mass, in grams, of the sediment after it has been dried;
m_2 is the mass, in grams, of the test specimen taken.

Annex D
(normative)
Determination of available oxygen

D.1 Place 20-mL distilled water in a small beaker. Add 2.5-mL concentrated sulphuric acid (H2SO4) and mix. Allow to cool.

D.2 Pipette 10-mL sample into a 100-ml volumetric flask and make to volume with distilled water. Place in a refrigerator for 30 min to cool.

D.3 Pipette 10.0 mL of this solution into a 250-mL conical flask. Add cool sulphuric acid mixture.

D.4 Titrate with 0.2 N Potassium Permanganate (KMNO4) to a faint pink colour.

D.5 Calculation

Titre x 0.001701 x F x 10 x 100 = % available oxygen.
Where F is concentration factor of 0.2 N potassium permanganate.
Where 10 is the dilution factor

D.5 Standardization of 0.2 N Potassium Permanganate (KMnO4) Solution using Sodium Oxalate (Na2C2O4)

D.5.1 Introduction:

Standardization is the process of accurately determining the concentration of a solution. Potassium permanganate (KMnO4) is a powerful oxidizing agent widely used in titrations. However, its concentration can change over time, so it must be standardized before use. Sodium oxalate (Na2C2O4) is an excellent primary standard for this purpose because it is highly pure, stable, and non-hygroscopic.

The reaction between potassium permanganate and sodium oxalate is a redox reaction that requires an acidic medium. The reaction proceeds as follows:

2KMnO4+5Na2C2O4+8H2SO4→2MnSO4+K2SO4+5Na2SO4+10CO2+8H2O

D.5.2 Key Points:

- This reaction is autocatalytic, meaning one of the products, Mn2+ (manganese(**II**) ions), acts as a catalyst for the reaction.
- The reaction is performed at a temperature between **60°C and 80°C** to ensure the reaction proceeds at a reasonable rate. If the temperature is too low, the reaction is slow; if it is too high, some of the oxalic acid may decompose.
- The endpoint is self-indicating. The excess drop of unreacted potassium permanganate will impart a permanent pale pink or light purple color to the solution, which lasts for at least 30 seconds.

D.5.3 Materials and Reagents:

- **Primary Standard:** Anhydrous Sodium Oxalate (Na2C2O4), analytical grade.
- **Titrant:** Potassium Permanganate (KMnO4) solution, approximately 0.2 N.
- **Acid:** Sulfuric Acid (H2SO4), approximately 1:1 or 1:4 dilution.
- **Distilled or Deionized Water.**
- **Laboratory Equipment:**
    - Analytical balance.
    - 250 mL volumetric flask.
    - 50 mL burette.

- 25 mL pipette.
- 250 mL conical flask (Erlenmeyer flask).
- Glass beaker.
- Thermometer.
- Hot plate or Bunsen burner with wire gauze.

D.5.4 Procedure:

D.5.4.1 Preparation of Standard Sodium Oxalate Solution:

D.5.4.1.1 Accurately weigh approximately **1.675 g** of dry sodium oxalate. This amount will prepare a 0.1 N solution in a 250 mL flask, which is a common concentration for this titration
D.5.4.1.2 Transfer the weighed sodium oxalate to a 250 mL volumetric flask.
D.5.4.1.3 Add distilled water to dissolve the solid, swirling gently.
D.5.4.1.3 Once dissolved, add distilled water to the mark on the volumetric flask.
D.5.4.1.3 Mix thoroughly by inverting the flask several times to ensure a uniform concentration.

D.5.4.2 Titration Procedure:

5.4.2 .1 Rinse the burette with a small amount of the potassium permanganate solution, then fill it to the zero mark. Ensure no air bubbles are present in the tip of the burette.
5.4.2 .2 Accurately pipette **25.0 mL** of the standard sodium oxalate solution into a clean 250 mL conical flask.
5.4.2 .3 Carefully add **25 mL** of the diluted sulfuric acid to the conical flask.
5.4.2 .4 Place the flask on a hot plate and gently heat the solution to a temperature of **70°C to 80°C**. Use a thermometer to monitor the temperature. Do not heat to boiling.
5.4.2 .5 Begin the titration by adding the potassium permanganate solution from the burette into the hot sodium oxalate solution while swirling constantly.
5.4.2 .6 Initially, the permanganate color will disappear slowly. As the reaction progresses and Mn2+ is produced, the color will disappear more quickly due to the autocatalytic effect.
5.4.2 .7 As you approach the endpoint (when the color begins to disappear less quickly), add the potassium permanganate drop by drop.
5.4.2 .8 The endpoint is reached when the solution in the conical flask retains a **faint pink color that persists for at least 30 seconds**.
5.4.2 .9 Record the exact volume of potassium permanganate used.
5.4.2 .10 Repeat the titration a minimum of three times. The volumes of potassium permanganate used for each run should be in close agreement (e.g., within ±0.1 mL).

D.5.4.3 Calculation:

D.5.4.3.1 Calculate the exact normality of the standard sodium oxalate solution.

- Normality (N) = (Mass of Na2C2O4 in g) / (Equivalent Mass of Na2C2O4 in g/eq) / (Volume of Solution in L)
- The equivalent mass of sodium oxalate is 134.00 g/mol divided by 2 (since it donates 2 electrons per molecule in the redox reaction) = 67.00 g/eq.

D.5.4.3 .2 Use the principle of equivalence to calculate the normality of the potassium permanganate solution.

- N1V1=N2V2
- Where:
  - N1 = Normality of KMnO4 (unknown)
  - V1 = Average volume of KMnO4 consumed in mL
  - N2 = Normality of Na2C2O4 (calculated)

        - V2 = Volume of Na2C2O4 taken for titration (25.0 mL)

D.5.4.3 .3 Rearrange the formula to solve for the normality of the potassium permanganate:

    - NKMnO4=VKMnO4NNa2C2O4×VNa2C2O4

D.5.4.4 Safety Precautions:

- Wear appropriate personal protective equipment (PPE), including lab coat, safety glasses, and gloves.
- Sulfuric acid is corrosive. Handle with extreme care and add it slowly to water while preparing the solution. Always add acid to water, never the other way around.
- Potassium permanganate is a strong oxidizing agent and can stain skin and clothes.
- Dispose of all chemical waste according to laboratory protocols.