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BELIZE NATIONAL STANDARD
SPECIFICATION FOR LIQUID HOUSEHOLD CHLORINE BLEACH

This standard was prepared in accordance with Regulation 3 of the Standards (Preparation and Declaration) Regulations 1997 after consultation with the following organizations and local manufacturers of liquid household chlorine bleach:

Belize Chamber of Commerce

Belize Business Bureau

Femagra Industries Limited

Matus Brothers Limited

Cuello's Store

Chell's

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0 FOREWORD

- 0.1 This standard is intended as a guide to the manufacture of liquid household chlorine bleaches for use in tropical conditions.
- 0.2 Chlorine bleaches are highly unstable under elevated conditions of temperature and on exposure to sunlight. Where a bleach would remain relatively stable under normal conditions of storage and use in temperate countries, this would not be the case in a tropical climate.
- 0.3 It was found necessary to prepare guidelines, to maintain, as far as possible, the stability and strength of the product, and to prolong the usefulness of the bleach in the tropical environment.
- 0.4 Chlorine bleaches are toxic and corrosive compounds. Provisions were therefore included for adequate use labelling on such a widely used and potentially dangerous substance.
- 0.5 In drafting this standard, assistance was derived from TTS 11 20 500 - 1982, Specification for Liquid Household Chlorine Bleaches, Trinidad and Tobago Bureau of Standards.

1 SCOPE

- 1.1 This standard specifies the requirements and methods of tests for liquid household chlorine bleaches.
- 1.2 No attempt is made to specify detailed requirements for chlorine bleaches for other uses. In such cases additional guidelines may be necessary.

2 DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

- 2.1 **Approved** means approved by the Belize Bureau of Standards.
- 2.2 **Available Chlorine** means the measure of the oxidizing power of the chlorine present as hypochlorite. It is expressed in terms of chlorine with a molecular weight of 35.46.
- 2.3 **Container** means the package in which the liquid chlorine bleach is sold, filled with bleach.
- 2.4 **Shipping Container** means any container intended to protect goods during transport, which is not customarily used to store the bleach when displayed for sale.

2.5 **Strength** means the measure of the disinfecting or bleaching strength of the substance, indicated as percentage available chlorine.

3 GENERAL REQUIREMENTS

3.1 The bleach shall be supplied as a clear liquid free from visible sediment or suspended matter.

3.2 The bleach shall be protected from light and shall not be stored at temperatures above 35°C (95°F) (See 4.6).

3.3 This product shall be graded as indicated in Table 1, when tested in accordance with Appendix A.

TABLE 1
(Clause 3.3 and 5.3 (f))

GRADE	% Available Chlorine
MILD	2.5 up to and including 4.0
MEDIUM	more than 4.0 up to and including 5.5
STRONG	more than 5.5

3.4 Free alkali content shall be not more than 0.75 g/100 ml, nor less than 0.1 g/100 ml, calculated as (NaOH) Sodium Hydroxide when tested in accordance with the method detailed in Appendix B.

3.4.1 The bleach solution shall have a pH of 11 ± 1 .

3.5 The raw materials used shall conform to required specifications so as to not affect the stability of the raw product.

3.6 During manufacture every precaution shall be taken to avoid contact with metals which may destabilize the bleach.

4 CONTAINERS

4.1 Containers shall be so closed and arranged as to prevent any loss of the content.

4.2 The materials used for making the containers and their closures shall be resistant to attack by the bleach and shall not cause the bleach to decompose or form harmful or dangerous compounds.

4.3 Containers shall be so designed to withstand normal transit hazards.

4.3.1 Glass and other brittle containers shall be free from faults liable to impair their strength. The thickness of the walls shall comply with the requirements of Table 2.

TABLE 2
(Sub-Clause 4.3.1)

Gross Weight of Brittle Container and Contents (gm)	Wall Thickness of Container (mm)
more than 35	not less than 3.0
less than 35	not less than 2.0

4.3.2 Containers and their closures shall be able to withstand any internal pressure which may occur in normal transport.

4.3.3 A free space, consistent with good manufacturing practice, shall be left within the container to compensate for expansion of the bleach.

4.4 Containers made of glass or brittle materials shall be provided with protective separators in their shipping container.

4.4.1 Containers shall be firmly secured in the shipping container.

4.5 The closure system shall ensure that the container may be tightly resealed after being opened.

Note: Approved screw type closures are preferred.

4.6 The container shall be opaque or dark coloured.

4.7 Containers shall be packed in an upright position and stored in a cool dark place.

4.8 All containers shall be clearly labelled in accordance with 5.0 of this standard.

5 LABELLING

5.1 The labelling of containers and shipping containers shall comply with the requirements of the Belize Standard on Labelling - BZS 1 Part 1 and 2* in addition to those specified in this section.

***BZS 1: Part 1: 1998 – Belize National Standard Specification for Labelling – General Principles, BZS 1: Part 2: 1998 – Belize National Standard Specification for Labelling Part 2 – Labelling of Prepackaged Goods**

- 5.2 Each shipping container and each container of bleach shall be labelled with the following information printed in bold type and securely affixed thereon:
- (a) the common or chemical name of the hazardous substance or of each component which contributes substantially to its hazard, such as “contains chlorine and caustic soda”;
 - (b) the signal word “Warning” or “Caution”; and
 - (c) an affirmative statement of the principal hazard or hazards - such as “corrosive”, “irritating to the skin”, or similar wording descriptive of the hazard.
- 5.3 Each container shall also be labelled with the following information:
- (a) a warning symbol which shall be in accordance with 5.4 below;
 - (b) instructions for first-aid treatment;
 - (c) the statement “keep out of reach of children”;
 - (d) directions for proper and safe use and storage;
 - (e) a statement of the risks involved in use of the substance; and
 - (f) the grade and strength of the product when manufactured, as indicated by the words MILD, MEDIUM or STRONG, and as percentage available chlorine. (See Table 1)
- 5.4 The warning symbol shall be placed on the principal panel of the label, clearly separated from other printed matters.
- 5.4.1 The warning symbol shall be not less than 15 mm in height. It shall be printed in strong contrast to the rest of the label, so as to be readily visible. (See diagram in Appendix C)
- 5.4.2 The signal word shall be placed immediately below the warning symbol. The letters shall be not less than 3 mm in height and shall be printed in red.
- 5.5 Each container of chlorine bleach shall be clearly labelled to show the date of manufacture, or expiry date, stated by words such as “Not guaranteed after (date)”, “Strength not guaranteed after (date)”, “Better if used before (date)” in accordance with BZS 1: Part 2: 1998* Clause 5.1.
- Note: The guarantee date shall be not more than five months after the date of manufacture printed as the year and month of expiry.*
- 5.6 The information required in 5.0, shall be legible at point of sale and the label

shall not be easily removed.

5.7 Each container may also be marked with the Belize Standard Mark by arrangement with the Belize Bureau of Standards, as provided in the Standards Act, 1992.

5.7.1 When the Standard Mark is used, it shall be placed in close proximity to the word “MILD”, “MEDIUM”, or “STRONG” used to indicate the grade of the product as determined by the Bureau.

6 SAMPLING

6.1 Unopened containers shall be taken at random from each batch of chlorine bleach, and sent to the laboratory for testing.

6.2 The sample size shall be agreed to between the manufacturer and the Bureau of Standards.

6.3 Samples shall be kept in a cool dark place or in dark-coloured bottles, until analysed. Analysis shall be done as soon as possible after sampling.

6.4 Test Methods

6.4.1 Available Chlorine – Samples of each batch shall be tested in accordance with the test set out in Appendix A or other approved test.

6.4.2 Alkali as Sodium Hydroxide – Samples of each shall be tested in accordance with the test set out in Appendix B, or other approved test.

6.4.3 Reagent grade chemicals shall be used in all tests.

6.4.4 Unless otherwise indicated, references to water shall be understood to mean reagent water (distilled water) conforming to ASTM Specification D 1193*.

7 ADVICE ON LABELS

7.1 An applicant may submit labels or drafts of labels to the Belize Bureau of Standards for advice as to whether they comply with this or any other standard on labelling.

7.2 The Bureau may refer the applicant to any competent authority administering a law that includes labelling requirements for particular goods.

***American Society for Testing and Materials - D 1193 - 77 Specifications for Reagent Water.**

8 CONFLICT

- 8.1 In the event of conflict between the provisions of this standard and the labelling requirements of any Belize Standard referring to particular goods the latter shall prevail.
- 8.2 In the event of conflict between the provisions of this standard and any Belize Standard referring to the labelling or marking of particular goods, the latter shall prevail.

APPENDIX A

(Sub-Clause 6.4.1)

A-1.0 STANDARDIZED METHOD OF TESTING FOR AVAILABLE CHLORINE

A-1.1 Summary of Method

- A-1.1.1 Determine the relative density of the bleach solution with the use of a hydrometer or by weighing the sample after pipetting the amount to be diluted for analysis into a weighing bottle.
- A-1.1.2 Accurately dilute the sample weighed and take aliquots for determination of available chlorine. The size of the aliquot shall be such that approximately 40 ml of the 0.1 mol/l reagent is required.
- A-1.1.3 The samples 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-1.2 Reagents - The following reagents shall be used:

- (a) Acetic Acid, glacial;
- (b) Potassium Iodide (KI) crystals, iodate – free;
- (c) Sodium Thiosulphate, Standard solution (0.1 mol/l);

Note: Sodium Thiosulphate, Standard solution (0.1 mol/l) shall be prepared as follows:

Dissolve 25 g of sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) crystals in freshly boiled cooled water and dilute to 1 litre. The solution is more stable if the glassware is cleaned with sulphuric-chromic acid and thoroughly rinsed with water. Standardized against potassium iodate as follows:

Weigh out accurately 3.567 g of dry potassium iodate (KIO_3) and transfer to a 1 litre volumetric flask. Dissolve with water, make up to the mark and mix thoroughly. This solution will be exactly 0.1mol/L. To standardized $\text{Na}_2\text{S}_2\text{O}_3$ 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 crystal. When it is dissolved, add 15 ml of 1.0 mol/l hydrochloric acid and titrate immediately with the $\text{Na}_2\text{S}_2\text{O}_3$ 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 molarity of the Na₂S₂O₃ solution as follows:

$$\text{Molarity} = (50 \times 0.1)/A$$

Where

A = millilitres of Na₂S₂O₃ solution required for titration of the KIO solution.

(d) Starch Indicator Solution (0.5 per cent)

Note: Starch Indicator Solution (0.5%) shall be prepared as follows:

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 percent salicylic acid to minimize deterioration.

A-1.3 Procedure

A-1.3.1 Dissolve 2 to 3 g of KI crystals in 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 one with 0.1 mol/l Na₂S₂O₃ 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 blue colour. Record the titration as A.

A-1.4 Calculation

A-1.4.1 Calculate the available chlorine as follows:

$$\text{Available chlorine as Cl g/litre} = (AM \times 35.46)/V$$

Available chlorine as Cl weight per cent

$$= ((AM \times 0.03546)/VS) \times 100$$

A-1.4.2 Calculate the sodium hypochlorite content as follows:

$$\text{Sodium hypochlorite (NaOCl) g/litre} = AM \times 37.22/V$$

Sodium hypochlorite (NaOCl) weight per cent

$$= ((AM \times 0.03722)/VS) \times 100$$

Where:

A = millilitres of $\text{Na}_2\text{S}_2\text{O}_3$ solution required for titration of the sample;

M = (mol/l) molarity of the $\text{Na}_2\text{S}_2\text{O}_3$ solution;

V = millilitres of original sample in aliquot

used; and

S = relative density of the sample.

APPENDIX B

(Sub-Clause 6.4.2)

B-1.0 STANDARDIZED METHOD OF TESTING FOR FREE ALKALI SODIUM HYDROXIDE (NaOH)

B-1.1 Summary of Method

B-1.1.1 The alkali determination shall be made directly on the sample received, and sample sized to require about 10 ml of the 0.1 mol/l reagent are recommended.

B-1.1.2 A sample is added to a neutralized, mixed solution of barium chloride and hydrogen peroxide, which precipitates any carbonate and reduces the hypochlorite to chloride. The free alkali is then titrated with standard hydrochloric acid using phenolphthalein indicator.

B-1.2 Reagent - The following reagents shall be used:

(a) Barium Chloride Solution (100 g/litre);

Note: Barium Chloride Solution (100 g/litre), shall be prepared as follows:

Dissolve 100 g of barium chloride ($\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$) in water and dilute to 1 litre. Filter if turbid.

(b) Hydrochloric Acid, Standard (0.1 mol/l);

Note: Hydrochloric Acid Standard (0.1 mol/l) shall be prepared and standardized against a primary standard, for example sodium carbonate or borax, using methyl red indicator.

(c) Hydrogen Peroxide Solution (3 percent); (“ H_2O_2 solution”);

(d) Phenolphthalein Indicator Solution (0.5 g/100 ml); and

Note: Phenolphthalein Indicator Solution (0.5 g/100 ml), shall be prepared as follows:

Dissolve 0.5 g of phenolphthalein in 60 ml of 95 per cent ethyl alcohol and dilute to 100 ml with water.

(e) Sodium Hydroxide Solution (g/litre)

B-1.3 Procedure

B-1.3.1 Place 50 ml of BaCl₂ solution and 30 ml of H₂O₂ solution in a 250-ml Erlenmeyer flask (or porcelain dish), add 10 drops of phenolphthalein indicator solution, and neutralize with NaOH solution. Introduce into this neutral mixture 10 ml of the liquid bleach, shake or stir vigorously for 1 minute, and titrate the resulting NaOH solution with 0.1 mol/l HCL until the pink colour disappears.

B-1.4 Calculations

B-1.4.1 Calculate the free alkali as NaOH as follows:

Free alkali as NaOH, g/litre - $(LM_3 \times 40)/V$

Free alkali as NaOH, weight per cent

$$= ((LM_3 \times 0.040)/VS) \times 100$$

Where:

L = millilitres of HCl required for titration of the sample;

M₃ = molarity of the HCl, (mol/l)

V = millilitres of original sample used; and

S = specific gravity of the sample.