



DRAFT TANZANIA STANDARD

Sodium dichloroisocyanurate - Specification

Draft Standard for Comments Only

TANZANIA BUREAU OF STANDARDS

Foreword

This Draft Tanzania Standard is being developed by the Water Quality Technical Committee under supervision of the Chemical Division Standards Committee and it is in accordance with the procedures of the Bureau.

This Tanzania Standard has been prepared with assistance drawn from:

BS EN 12931:2015 *Chemicals used for treatment of water intended for human consumption – Sodium dichloroisocyanurate, anhydrous*, published by European Union.

IS 15773:2008 *Sodium dichloroisocyanurate (NaDCC) – Specification Published by the Bureau of Indian Standards*.

In reporting the result of a test or analysis made in accordance with this Tanzania Standard, if the final value, calculated or observed is to be rounded off, it shall be done in accordance with TZS 4 (see clause 2).

Draft Standard for Comments Only

DRAFT TANZANIA STANDARD**CDC 6 (959) DTZS****Sodium dichloroisocyanurate - Specification****1. Scope**

This Draft Tanzania Standard specifies requirements, sampling and test methods for Sodium dichloroisocyanurate used for water treatment intended for human consumption. It covers both dihydrate and anhydrous Sodium dichloroisocyanurate.

2. Normative references

TZS 59/ ISO 3696 *Water for analytical laboratory use - Specification*

TZS 1445 / ISO 3165 *Sampling of chemical products for industrial use - Safety in sampling.*

TZS 1444/ ISO 6206 *Chemical products for industrial use - Sampling - Vocabulary.*

TZS 1443 / ISO 8213 *Chemical products for industrial use - Sampling techniques – Solid chemical products in the form of particles varying from powders to coarse lumps.*

3. Terms and definitions

For the purposes of this document terms and definitions given in TZS 1444/ ISO 6206 and the following 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>

water intended for human consumption

all water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a distribution network, from a tanker, or in bottles or containers

4 Requirements**4.1 General requirements****4.1.1 Descriptions**

4.1.1.1 Chemical name; 1-sodium - 3, 5-dichloro -1, 3, 5-triazine - 2, 4, 6-trione

4.1.1.2 Synonym or common name; Sodium dichloroisocyanurate.

4.1.1.3 Relative molecular mass; 219.98 (Type 2) or 256.02 (Type 1)

4.1.1.4 Empirical formula; $C_3N_3O_3Cl_2Na$ or $C_3N_3O_3Cl_2 \cdot 2H_2O$

4.1.1.5 Chemical formula; $C_3Cl_2N_3NaO_3$

4.1.1.6 Commercial form; The product is available in various granular forms or tablets.

4.1.2 Physical-chemical properties

4.1.2.1 The material shall be of two types;

a) Type 1 (Sodium Dichloroisocyanurate, Dihydrate)

b) Type 2 (Sodium Dichloroisocyanurate, Anhydrous)

4.1.2.2 Sodium dichloroisocyanurate shall be white coloured in form of granular solid or tablets with chlorinous odour.

4.1.2.3 The density of Sodium dichloroisocyanurate is approximately 0.9 g/cm³

4.1.2.4 The material is a strong oxidant, it is corrosive and hygroscopic; Sodium dichloroisocyanurate decomposes to hydrochloric and cyanuric acid. When dissolved in excess water it liberates chlorine by hydrolysis.

4.2 Specific requirements

4.2.1 The material, when tested according to the methods prescribed in Annexes A, B, and C shall comply with the specific requirements given in Table 1.

Table 1 Specific requirements for Sodium dichloroisocyanurate

S/N	Characteristic	Requirement		Method of test
		Type 1	Type 2	
i.	Available chlorine content, % wt, min	55	62	Annex A
ii.	Sodium chloride content %, (m/m), max	0.05		Annex B
iii.	Water content, % (m/m), max	—	3	Annex C

4.2.2 Toxic substances

The content of toxic substances shall comply with the requirements specified in Table 2.

Table 2 — Toxic substances

Element	Maximum limit mg/kg of product
Arsenic (As)	0.05
Cadmium (Cd)	0.01
Chromium (Cr)	0.05
Mercury (Hg)	0.001
Nickel (Ni)	0.02
Lead (Pb)	0.01
Antimony (Sb)	0.005
Selenium (Se)	0.01

5 Packaging and marking

5.1 Packaging

5.1.1 The granular product shall be packed in clean, dry and tight containers, without faults, made of material which do not affect the contents

5.1.2 The tablets shall be wrapped each individually enabling retailers to sell single tablet,

5.2 Marking

The following information shall be marked legibly and indelibly on the container:

- a) name of the product as 'SODIUM DICHLOROISOCYANURATE'.
- b) type of product i.e. dihydrate or anhydrous
- c) the name and address of manufacturer.
- d) net content.
- e) batch or code number.
- f) nominal available chlorine content.
- g) dates of manufacturer and best before.
- h) instruction for handling, storage and use.
- i) first aid instructions.
- j) the words "STORE IN COOL DRY PLACE AWAY FROM DIRECT SUNLIGHT"
- k) hazard warning in symbol or words

6. Sampling

Sampling shall be done as per TZS 1443/ISO 8213 while observing the general recommendations as given in TZS 1445/ISO 3165 and TZS 1444/ISO 6206

7. Testing

Methods of tests for Sodium dichloroisocyanurate shall be as prescribed in the annexes.

Annex A
(Normative)

Determination of available chlorine

A.1 Principle

The available chlorine is determined by measuring active chlorine in the sample. The oxidizing chlorine reacts with potassium iodide releasing iodine, which is then titrated with sodium thiosulphate standard volumetric solution in the presence of starch indicator solution.

A.2 Reagents

All reagents shall be of recognized analytical grade and the water used shall conform to grade according to TZS 59.

A.2.1 Potassium iodide crystals (KI)

A.2.2 Glacial acetic acid

A.2.3 Sodium thiosulphate standard volumetric solution, $c(\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}) = 0.1 \text{ mol/L}$

A.2.3.1 Dissolve 24.8 g of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ in water. Add 0.5 mL of chloroform as preservative, dilute to volume with water in a 1000 mL one-mark volumetric flask and mix thoroughly.

A.2.3.2 Weigh to the nearest 0.1 mg (160 ± 10) mg (m) primary potassium dichromate into tarred glass beaker. Place the contents of the beaker in a 500 ml stoppered conical flask, add 100 mL of water and (2 ± 0.5) g potassium iodide and stir to dissolve. Add (15 ± 1) mL of hydrochloric acid solution (dilute 1+1 by volume) swirl and allow standing for 5 min. Titrate with the Sodium thiosulphate solution until the solution is pale yellow. Add (5 ± 1) mL of starch solution and titrate to the end point, i.e. to the disappearance of the blue-black colour. Record the volume (V) used.

A.2.3.3 The concentration, C , of the Sodium thiosulphate standard volumetric solution ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$), expressed in moles per litre, is given by the following equation:

$$C = \frac{m}{V \times 49.0317}$$

where

m is the mass, in milligrams, of potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) weighed;

V is the volume, in millilitres, of the sodium thiosulphate standard volumetric solution used.

49.0317 is the molar mass, in grams per mole of potassium dichromate.

A.2.4 Starch solution, 1% (m/m)

Make a slurry with (1 ± 0.1) g starch and (5 ± 1) mL water. Add (90 ± 5) mL boiling water to the slurry. Stir to dissolve it and cool the solution. This solution needs refrigeration to avoid the decomposition of the starch, which results in a vague end point. Keep the solution cool and use it within one week.

NOTE – Commercial indicators for iodine titration exist and can be used in place of the described starch solution provided that their efficiency has been previously tested.

A.3 Apparatus

Ordinary laboratory apparatus glassware.

A.4 Procedure

A.4.1 Test portion

Weigh, to the nearest 0.1 mg, 0.25 g of the laboratory sample (m_0) into a tarred stoppered weighing bottle.

A.4.2 Determination

Transfer the test portion to a 200 mL volumetric flask. Add 10 mL of water and 10 mL glacial acetic acid, stir for 5 min. and then add 100 mL of water and 2 g of potassium iodide, mix to dissolve and wait for 10 min. Titrate with the Sodium thiosulphate standard volumetric solution to a light yellow colour. Add 5 mL of the starch solution and continue titration to the disappearance of the blue-black colour. Record the volume (V_1) of the Sodium thiosulphate standard volumetric solution used.

A.5 Expression of results

The chlorine (Cl_2) content, C_1 , expressed as a percentage by mass, is given by the following equation:

$$C_1 = \frac{V_1 \times 0.003545 \times C \times 100}{m_1}$$

where

V_1 is the volume, in millilitres, of the Sodium thiosulphate solution used for the titration;

C is the concentration, in moles per litre, of the Sodium thiosulphate standard volumetric solution;

m_1 is the mass, in grams, of the test portion;

0.003545 is the mass, in grams, of chlorine (Cl_2) corresponding to 1.00 mL of Sodium thiosulphate solution, $c(\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}) = 0.1 \text{ mol/L}$;

C is the actual concentration, expressed in moles per litre of the Sodium thiosulphate standard volumetric solution.

Annex B

(Normative)

Determination of Sodium chloride**B.1 General**

This method applies to products with Sodium chloride contents in the range of 0 % (m/m) to 0.05 % (m/m).

B.2 Principle

The anhydrous Sodium dichloroisocyanurate is acidified and then digested to remove all traces of available chlorine. Sodium is analysed in solution by atomic absorption spectrometry.

B.3 Reagents

All reagents shall be of recognized analytical grade and the water used shall conform to grade according to TZS 59.

B.3.1 Sulphuric acid, concentrated, (H_2SO_4) 95 % (m/m) minimum.

B.3.2 Sodium standard solution (1 000 $\mu\text{g/mL}$)

Weigh, 2.5421 g of Sodium chloride that has been previously dried for 1 h at 110 °C. Dissolve in water and dilute to volume with water to a 1 000 mL volumetric flask and make up to the mark. Mix well.

B.4 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

B.4.1 Atomic absorption spectrometer equipped with Sodium hollow cathode lamp

B.4.2 Hot plates

B.5 Procedure**B.5.1 Test portion**

Weigh, to the nearest 0.1 mg, 2.5 g of the laboratory sample (m_3) into a tarred stoppered weighing bottle.

B.5.2 Determination

Transfer the test portion to a 250 mL beaker. Dilute with 25 mL water. Mix and then add 10 mL of the concentrated sulphuric acid and place on a hot plate and boil until the salt begins to precipitate. Rinse the inside of the beaker with water.

Transfer to a 250 mL volumetric flask and dilute to the mark with water and mix well. Measure the absorbance of the solution on the atomic absorption spectrometer with Sodium hollow cathode lamp at a wavelength of 330.2 nm with slit setting at "4" using an acetylene flame.

B. 5.3 Calibration

Transfer accurately from the Sodium standard solutions 1.0 mL, 2.0 mL, 3.0 mL, 4.0 mL, 5.0 mL and 10.0 mL portions to series of 100 mL volumetric flasks, dilute to the mark with water and mix well. Prepare a calibration curve.

Measure the absorbance of each calibration solution as described in B.2.2.5.2, and prepare a calibration graph.

B 6 Expression of results

The Sodium chloride content, (C_2), expressed as a percentage by mass, % (m/m) of product is given by the following equation:

$$C_2 = \frac{C \times 100 \times 20 \times 2.5421}{m_3 \times 10\,000}$$

where

m_3 is the mass in grams, of the test portion;

C is the concentration, in micrograms per millilitre, of Sodium in the test portion as determined from the calibration graph.

Annex C

(Normative)

Determination of Water content**C.1 Principle**

Water content in Sodium dichloroisocyanurate is determined by the mass loss after heating in an oven. The temperature is set at a low level because Sodium dichloroisocyanurate can loose chlorine on heating.

C.2 Apparatus

Oven made of Aluminium, provided with a means of circulating the air inside

C.3 Procedure

Weigh 10 g of the laboratory sample (m_1), to the nearest 0.001g, in a glass-evaporating dish (diameter 150 mm). Put it in the ventilated oven at 105 °C for 4 h. Allow to cool in a desiccator and weigh again (m_2).

C.4 Expression of results

The water content, w_1 , expressed as a percentage by mass (% (m/m)), is given by the following equation:

$$w_1 = \frac{m_1 - m_2}{m_1} \times 100$$

where

m_1 is the mass, in grams, before drying;

m_2 is the mass, in grams, after drying.