Canadian General Standards Board

Office des normes générales du Canada

CAN/CGSB-2.21-92

WITHDRAWAL

December 1994

CANADIAN GENERAL STANDARDS BOARD

CHLORINATED MACHINE DISHWASHING COMPOUND

This standard is hereby withdrawn. However, the requirements pertaining to the type of products referred to in CAN/CGSB-2.21-92 have been incorporated in the new edition of CAN/CGSB-2.20, Machine Dishwashing Compound.

RETRAIT

Décembre 1994

OFFICE DES NORMES GÉNÉRALES DU CANADA

DÉTERGENT CHLORÉ POUR LAVE-VAISSELLE

Cette norme est retirée par le présent avis. Cependant, les exigences relatives au type de produit mentionné dans CAN/CGSB-2.21-92 ont été incorporées à la nouvelle édition de CAN/CGSB-2.20, Détergent pour lave-vaisselle.

Canada

NATIONAL STANDARD OF CANADA

CAN/CGSB-2.21-92

Supersedes 2-GP-21M

Chlorinated Machine Dishwashing Compound



Withdrawn/Retirée

Canadian General Standards Board

CGSB

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NATIONAL STANDARD OF CANADA

CAN/CGSB-2.21-92

Supersedes 2-GP-21M
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CHLORINATED MACHINE DISHWASHING COMPOUND

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Acknowledgment is made for the French translation of this National Standard of Canada by the Translation Bureau of the Department of the Secretary of State.

Supersedes 2-GP-21M
July 1978

CANADIAN GENERAL STANDARDS BOARD

CHLORINATED MACHINE DISHWASHING COMPOUND

1. SCOPE

1.1 This standard applies to material consisting of alkaline salts and chlorine-bearing compounds suitable for use in mechanical dishwashing equipment.

1.2 For more detailed information on intended uses, see par. 7.2.

1.3 The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any existing applicable regulatory requirements prior to its use.

2. APPLICABLE PUBLICATIONS

2.1 The following publications are applicable to this standard:

2.1.1 Canadian General Standards Board (CGSB)

2-GP-11 — Methods of Testing and Analysis of Soaps and Detergents

CAN/CGSB-8.2 — Sieves, Testing, Woven Wire, Metric.

2.2 Reference to the above publications is to the latest issues, unless otherwise specified by the authority applying this standard. The source of these publications is shown in the Notes section.

3. GENERAL REQUIREMENTS

3.1 The dishwashing compound shall be a uniform product in powder or granular form, free from foreign matter.

3.2 The compound shall be suitable for use in mechanical dishwashing appliances. When used in accordance with the manufacturer's instructions, it shall have satisfactory water-softening and detergent properties, control staining on crockery and plasticware and prevent the deposition of scale in the machine. It shall be free-rinsing and not give rise to excessive foaming.

3.3 The compound shall not be injurious to plastic tableware and utensils normally used for the cooking and serving of foodstuffs. Traces of the compound that may be left on the utensils after washing shall not constitute a health hazard when the compound is used as directed.

3.4 There shall be no segregation of the ingredients during shipment and handling.

3.5 The dishwashing compound shall be free from objectionable odour, either in dry form or in solution.

3.6 The compound shall contain no abrasive materials.

3.7 The surfactant used in the compound shall be a chlorine stable surfactant of the low-foaming nonionic type, having a depressant action on foams caused by proteinaceous materials such as eggs, milk, flour, etc., and shall improve rinsability.

3.8 The product shall not contain trisodium phosphate.

3.9 The dishwashing compound shall comply with any relevant Government Act or Regulation.

Withdrawn/Retirée

4. DETAILED REQUIREMENTS

The dishwashing compound shall comply with the following detailed requirements:

		Min.	Max.	Test Method
4.1	Volatile matter, % by mass	—	2.0	Par. 6.3
4.2	Water-insoluble matter, % by mass	—	1.0	Par. 6.4
4.3	Silicates (as SiO_2), % by mass	10	15	Par. 6.5
4.4	Phosphates (as P_2O_5), % by mass	21.5	—	Par. 6.6
4.5	Carbonates (as CO_2), % by mass	—	6.0	2-GP-11/26.1
4.6	Available chlorine, % by mass	1.8	—	Par. 6.7
4.7	Chlorine stability (solution), % loss available chlorine	—	20.0	Par. 6.8
4.8	Active alkalinity (as Na_2O), % by mass	28.3	32.4	Par. 6.9
4.9	Total alkalinity (as Na_2O), % by mass	38.0	42.4	Par. 6.10
4.10	Foam height, mm	—	15	Par. 6.11

4.11 **Condition and Particle Size** — The material, when supplied in powder or granular form, shall be free-flowing and free from caking. As received, 95% shall pass a 2800 µm sieve (CAN/CGSB-8.2), when tested in accordance with CGSB standard 2-GP-11, Method 16.2.

5. PREPARATION FOR DELIVERY

5.1 **Packaging, Packing and Marking** — Unless otherwise specified (par. 7.1), normal commercial packaging, packing and marking shall be acceptable.

5.2 **Labelling** — The supplier shall provide instructions covering the use of the compound, and these shall be permanently affixed to the outside of each container. The instructions shall include the amount of compound to be used for various ranges of water hardness in relation to tank capacities. The labelling shall conform to requirements stated in regulations under the Hazardous Products Act. The following warning and caution statements are recommended.

WARNING: Injurious to skin and eyes.
Harmful if inhaled or swallowed.
Contains caustic substance.
Avoid contact with eyes and mucous membranes and prolonged contact with skin.

FIRST AID TREATMENT: In case of external contact, flush with water.
For eye contact, flush with water for 15 min.
Get prompt medical attention.
If swallowed, give large quantities of water or milk.
Call a physician.

CAUTION: Alkaline Powder — Do not mix with acid or other chemicals. Not recommended as a dip destainer for dinnerware. Not recommended for cleaning or destaining coffee urns.

Withdrawn/Retirée

6. INSPECTION

6.1 **Sampling** — Sampling shall be carried out in accordance with CGSB standard 2-GP-11, Method 1.6.

6.2 **Testing** — Preparation of the samples in the laboratory shall be carried out in accordance with CGSB standard 2-GP-11, Method 2.

6.3 **Volatile Matter** — Accurately weigh approximately 5 g of compound into a porcelain or glass dish 60 to 80 mm in diameter and 20 to 40 mm deep. Dry to a constant mass in an oven at 105 ± 2°C and calculate the loss as moisture.

6.4 **Water-Insoluble Matter** — Accurately weigh approximately 20 g of the compound and transfer it to a 250 mL beaker. Add 50 mL of dry acetone (reagent grade) and stir well to dissolve soluble matter. Allow to settle and decant the supernatant liquid. Repeat this extraction twice with 50 mL portions of acetone, each time allowing to settle and decanting the supernatant liquid. Discard acetone extracts. To the acetone insoluble residue add 150 mL of distilled water at room temperature and stir to dissolve. Filter through a tared, sintered-glass crucible washing thoroughly with water. Retain the combined filtrate and washings for determination of silicates and phosphates. Dry the crucible to constant mass at 105 ± 2°C. Determine the increase in mass and calculate the water insoluble matter.

6.5 **Silicates** — Transfer the combined filtrate and washings (par. 6.4) to a 1 L volumetric flask, dilute to volume with water and mix thoroughly. Pipette an accurately measured volume of the solution equivalent to about 0.4 g of sample into a 250 mL beaker and dilute to 60 mL with water. Add 25 mL of concentrated hydrochloric acid, and evaporate to dryness on a steam bath. Bake the residue for 1 h at 105 to 110°C. Add 5 mL of concentrated hydrochloric acid, 50 mL of distilled water, and heat on the steam bath to dissolve soluble salts. Filter through a No. 40 Whatman filter paper and wash the residue thoroughly with hot dilute (1:20) hydrochloric acid, transferring the residue quantitatively to the filter. Reserve the combined filtrate and washings for the determination of phosphates. Ignite the filter paper and silica residue to constant mass at approximately 1100°C. Calculate the percentage of silicate (SiO_2) in the sample.

6.6 **Phosphates** — Taking the combined filtrate and washings (par. 6.5), add 5 g of NH_4Cl, 25 mL of magnesia mixture reagent (Note 1), 1 or 2 drops of methyl red indicator, and cool the solution to 0 to 10°C in an ice bath. Slowly add dilute ammonium hydroxide (1:1) while stirring vigorously with a rubber-tipped stirring rod, in such a manner that the rubber tip contacts the bottom or sides of the beaker. When the precipitate of magnesium ammonium phosphate begins to appear, reduce the rate of addition of ammonium hydroxide and continue at such a rate until a crystalline precipitate is formed and precipitation appears to be complete. Add 15 mL of dilute (1:1) ammonium hydroxide in excess and permit the solution to stand for 4 h in an ice bath, or overnight at room temperature. Filter, without attempting to transfer the precipitate to the filter, and wash the precipitate in the beaker a few times with dilute (1:20) ammonium hydroxide each time pouring the liquid phase through the filter. Dissolve the precipitate by passing 25 mL of dilute (1:1) hydrochloric acid through the filter and catching the filtrate in the original beaker containing the bulk of the precipitate. Wash the filter thoroughly with dilute (1:20) hydrochloric acid catching all washings in the original beaker. Dilute the solution to 100 mL, add 2 mL of magnesia mixture reagent and reprecipitate, filter and wash as previously. Transfer the precipitate and filter to a tared platinum or porcelain crucible and dry. Burn off the carbon at the lowest possible temperature. Raise the temperature gradually to 950 to 1000°C, and ignite to constant mass. Cool the ignited precipitate in a desiccator and weigh as magnesium pyrophosphate ($Mg_2P_2O_7$). Calculate the percentage of P_2O_5 in the sample (Mass of P_2O_5 = Mass of $Mg_2P_2O_7$ x 0.6379).

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Note 1: Magnesia Mixture — Dissolve 50 g *of* $MgCl_2 \cdot 6H_2O$ *and* 100 g *of ammonium chloride* (NH_4Cl) *in* 500 mL *of distilled water. Add ammonium hydroxide in slight excess, allow the solution to stand overnight, and filter. Make the solution just acid with hydrochloric acid, dilute to* 1 L, *and reserve for use in a stoppered bottle or other suitable container.*

6.7 **Determining Available Chlorine in Detergents** — Place 10.0 g of the product to be tested into a suitable flask or beaker. Add 50 mL of distilled water, 3 g potassium iodide (KI), 10 mL of dilute sulphuric acid (1:2) and mix, but do not wait to dissolve as chlorine will be lost. Titrate with 0.4 mol/L sodium thiosulphate ($Na_2S_2O_3$) until the solution is pale yellow, then add 1 mL of starch indicator (turns bluish black) and continue titrating until the blue disappears. Record the volume of sodium thiosulphate and calculate the percentage of chlorine as follows:

$$\text{Percentage of available chlorine} = \frac{v \times c \times 35.5 \times 100}{\text{mass of sample} \times 1000}$$

where: v = mL of $Na_2S_2O_3$

c = concentration, in mol/L of $Na_2S_2O_3$ solution (Note 2)

6.8 **Chlorine Stability (Solution)** — Dilute 10.0 g of the compound to 250 mL in a volumetric flask. Place the flask (unstoppered) in a water bath maintained at 66°C. Check the available chlorine after 4 h by the method outlined in par. 6.7. Calculate the loss of available chlorine from the initial sample as percentage by mass Cl_2 loss.

6.9 **Active Alkalinity** — Prepare a 1% solution of the compound. Pipette 10 mL of the 1% solution into a 50 mL flask. Add 3 or 4 drops of 30% hydrogen peroxide (H_2O_2) and mix. (If this is not done, the chlorine will destroy the indicators). Add 1 or 2 drops of phenolphthalein indicator and titrate with 0.1 mol/L hydrochloric acid until the solution is colourless. Retain the solution for additional determination as outlined in par. 6.10. Record the volume of acid used and calculate the active alkalinity as follows:

Percentage of Na_2O = v x c x 31

where: v = mL of HCl

c = concentration in mol/L of HCl solution

6.10 **Total Titratable Alkalinity** — Add 1 drop of methyl orange indicator to the same 10 mL of a 1% solution of the compound that was titrated (par. 6.9), and continue to titrate until the colour changes to a salmon pink colour. Record the total volume used and calculate the total alkalinity as follows:

Percentage of Na_2O = v x c x 31

where: v = total volume (in millilitres) of HCl required to reach methyl orange end point

c = concentration in mol/L of HCl

6.11 **Determination of Foam Height**

6.11.1 ***Equipment***

Stirring Motor — The stirring motor shall be a Hamilton Beach Model No. 936 mixer or equivalent, with the stirring blade attached. Remove the motor with stirring blade attached from its original stand and support it on a ring stand by means of a 250 mL beaker clamp.

Test Cell — The test cell shall be a glass cylinder sealed at one end to provide a flat bottom with a 70 mm inside diameter and 185 mm high.

Baffle — The baffle used shall be a cage constructed as shown in Figure 1.

Water Bath — The water bath shall be capable of maintaining a temperature of 66 ± 0.5°C in the test cell.

6.11.2 ***Procedure*** — Place 200 mL of 0.01% test solution of dishwashing compound (using distilled or deionized water) in the test cell and allow it to equilibrate in a 66°C bath. Centre the stirrer between the four baffles and clamp it in position so that the liquid level shall be midway between the two blades on the stirrer. Measure the liquid height from the bottom of the test cell. Run the stirring motor for 3 min ± 2 s at approximately 19 000 r/min to allow the foam to reach maximum height, then stop the motor and measure the foam height after 5 s. Determine the foam height by measuring the total height, in millimetres, of the combined foam and liquid (from the bottom of the test cell), and subtracting the initial height of liquid measured prior to agitation. The difference is proportional to the volume of entrapped air and designated as the foam height. Make two complete determinations of foam height and report both values.

Note 2: If the product is low in chlorine so that an accurate titration and burette reading is not possible, do not increase the sample size, but use 0.1 mol/L $Na_2S_2O_3$ *for titrating. If the product is so high in chlorine that too much solution is used, decrease the sample size to* 5 g. *Do not use less than* 5 g *as detergents are too heterogeneous to obtain a good sample.*

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7. NOTES

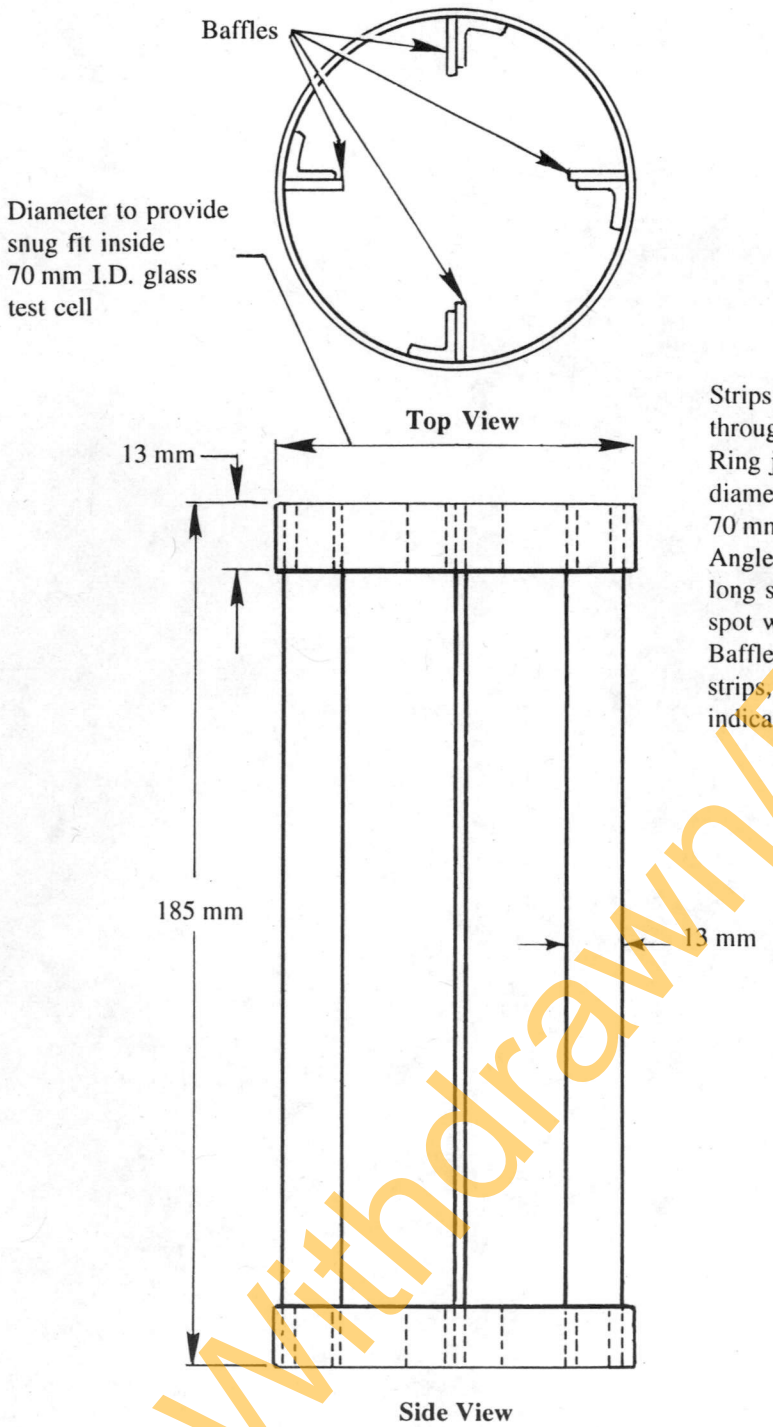
7.1 **Option** — The following option must be specified in the application of this standard:

a. Packaging, packing and marking details, if normal commercial practice is not suitable (par. 5.1).

7.2 **Intended Uses** — Material produced in accordance with this standard is intended for use in mechanical dishwashing machines in soft or hard water areas. The material is suitable for use in the cleaning of plasticware, china, glass dishware and cutlery, but should not be used on aluminum or on articles having silver surfaces.

7.3 **Source of Referenced Publications** — The publications referred to in par. 2.1.1 may be obtained from the Canadian General Standards Board, Sales Centre, Ottawa, Canada K1A 1G6. Telephone (613) 941-8703 or (613) 941-8704. Fax (613) 941-8705.

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Strips of 160 mm (16 gauge) stainless steel are used throughout the assembly.
Ring joints are lapped, spot welded and feathered in a diameter capable of providing a snug fit inside the 70 mm I.D. glass tubing.
Angles are formed by using 13 mm wide by 25 mm long strips, bent in the centre of the long direction and spot welded to the formed rings.
Baffles are formed using 13 mm wide by 185 mm long strips, spot welded to the angles in the positions indicated on the diagram.

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FIGURE 1
Baffle Cage for Foam Height Determination



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