SAUDI STANDARDS, METROLOGY AND

QUALITY ORGANIZATION

Project No. 33503 /2023

Stain Remover for Tableware – Test Methods

ICS 11.040.01

Stain Remover for Tableware – Test Methods

1. Scope and Field of Application

1.1 This standard concerned with test methods for a distaining compound for the removal of coffee, tea and other adsorbed food stains primarily from plastic tableware, be the immersion process.

2. Complementary References

2.1 SASO 2332 "Stain Remover for Tableware"

3. Visual Inspection

Samples shall be visually examined by the naked eye to ensure compliance of the product to SASO in item (2.1).

4. Preparation of Laboratory Samples

Prior to making the required analysis, the material shall be thoroughly mixed in a tumbler mixer for 30min. it is extremely important that all of the ingredients be uniformly distributed in the samples subsequently used in several of the tests.

5. Active Oxygen

5.1 Apparatus

5.1.1 **Analytical Balance —** Capable of determining the mass to 0.1 mg**.**

5.1.2 **Normal Laboratory Glassware**

5.2 Reagents

5.2.1 **Concentrated Sulphuric Acid, (H_2SO_4) —** Analytical Grade.

5.2.2 **10 % v/v Sulphuric Acid Solution —** Prepared by adding 1 part of concentrated sulphuric acid to 9 parts of distilled water.

5.2.3 **Potassium Permanganate, ($KMnO_4$), Crystals —** Analytical Grade

5.2.4 **Potassium Permanganate, ($KMnO_4$), 0.02 mol/L VS —**

Prepared by dissolving 3.2 g of potassium permanganate crystals in about 1 L of distilled water. Heat to boiling and keep hot for about 1 h. Cover the solution and let it stand overnight.

5.2.4.1 Filter the solution through a fine-porosity sintered glass crucible or through a Gooch crucible with an asbestos mat. Store the solution in a clean amber glass-stoppered bottle and keep in the dark when not in use.

5.2.4.2 Prior to use, standardize the potassium permanganate solution against sodium oxalate or other primary standards.

5.3 Procedure

Accurately determine the mass of about 4g of the sample and dissolve in 250 mL of distilled water in a 400 mL beaker. Transfer the solution to a 500 mL volumetric flask. Rinse the beaker several times with small portions of 10% by volume sulphuric acid and transfer the rinsing to the flask. Fill the flask to the mark with 10% sulphuric acid and thoroughly mix. Immediately titrate a 25 mL aliquot with 0.02 mol/L $KMnO_4$. Make a determination of the required blank and substract the volume, if any, of $KMnO_4$ required for the blank from that required for the sample.

5.4 Calculation

Calculate the percent active oxygen as follows:

$$\% \text{ active oxygen} = \frac{v \times c \times 0.008 \times 500 \times 100 \times 5}{m \times 25} = \frac{v \times c \times 80}{m}$$

Where:

v = volume of $KMnO_4$ used (corrected for blank), in milliliters.

c = concentration of $KMnO_4$, in moles per Liter.

m = sample mass, in grams.

6. Available Chlorine

6.1 Principle

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

6.2 Reagents

6.2.1 **Glacial acetic acid 99%**

6.2.2 **Standard potassium iodate solution —** 0.1 N

6.2.3 **Starch indicator solution (0.5% w/v) —** Mix 0.5 g of soluble starch with 5 ml of cold water and add 95ml of boiling water. Mix, cool and store in a glass bottle. Replace frequently or add 0.1 % m/v salicylic acid to the starch solution to minimize deterioration.

6.2.4 **Potassium iodide crystals —** Iodate free

6.2.5 **Standard Sodium Thiosulphate Solution —** 0.1 N

Dissolve 25 g of sodium thiosulphate ($Na_2S_2O_3.5H_2O$) crystals in freshly boiled and cooled water, and dilute to 1 000 ml.

NOTE: The solution is more stable if the glassware is cleaned with sulphuric or chromic acids and thoroughly rinsed with water before use.

6.3 Procedure

Dissolve 2 g - 3 g of potassium iodide crystals in 50 ml of water in a 250-ml conical flask. Add 10 ml of glacial acetic acid, then pipette out a 3 ml 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 sodium thiosulphate VS 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.

6.4 Calculation

The available chlorine expressed as Cl_2 % m/v, shall be calculated as follows:

$$\% \text{ Available Chlorine} = \frac{(AN \times 0.03546)}{v} \times 100$$

Where:

A = Volume in milliliters of standard sodium thiosulphate solution required for titration of the sample.

N = Normality of the standard sodium thiosulphate solution.

v = Volume in ml of original sample in aliquot used**.**

7. Qualitative Test for Soap

Dissolve 2 g of compound in 100 mL of distilled water. Filter off insoluble matter. Acidify 5 mL of the filtrate with glacial acetic acid in a test tube. The appearance of fatty acid precipitate or oily drops indicates the presence of soap.

8. Solution Stability

8.1 Apparatus

8.1.1 **Hot Plate —** Capable of maintaining a temperature of 80 ºC ± 2 ºC.

8.1.2 **Ice Bath**

8.1.3 **Normal Laboratory Glassware**

8.2 Reagents

Sulphuric Acid, 5% v/v Solution — prepared by adding 5 parts of sulphuric acid into 95 parts of distilled water.

8.3 Procedure

Dissolve 50.0 g of stain remover in 900 ml of distilled water at room temperatures in a tared 1500 mL beaker. Add distilled water to bring total mass of solution to 1000 g. Heat the solution to 80°C. Mark the liquid level on the beaker. Heat at 80 ± 2°C for 3 h restoring the water lost by evaporation. Then cool the solution to room

temperature using an ice-water bath, and adjust the solution mass to the original 1000 g. Take a 10 g sample of the solution and add 100 mL of 5% (by volume) sulphuric acid. Analyse for active oxygen as specified in item (6).

8.4 Calculation

Calculate the percentage of active oxygen as follows:

$$\% \text{ active oxygen} = \frac{v \times c \times 0.008 \times 100 \times 100 \times 5}{50} = 8v \times c$$

Where:

v = volume of $KMnO_4$ used (corrected for blank), in milliliters.

c = concentration of $KMnO_4$, in moles per Liter.

9. Stability in Dry Form

Determine the mass of three 4g samples of stain remover in three 400 mL, tared beakers. Place in an 'oven and maintain at 70 ± 1°C for 24 h. Determine the active oxygen content of these samples as specified them (5).

10. Storage Stability

Store one container of the compound for six months at 25 ± 2°C and then determine the active oxygen content as specified in item (5). Compare with result obtained for test to requirement of item (5).

11. Insoluble matter

11.1 Procedure

11.1.1 Starting with a fresh portion of the material, proceed as described under item 4 but do not dry or weigh the matter insoluble in alcohol. After filtering and washing the residue thoroughly with hot ethyl alcohol, change the receiver, extract the residue with successive portions of distilled water at about 60 °C, and wash the residue several times to remove all the water soluble matter.

11.1.2 Dry the sintered glass funnel with the residue in an air-oven at a temperature of 105 ºC ± 2 ºC until a constant mass is obtained.

11.1.3 Weigh accurately about 5 g of the material into a beaker, and digest with 50 ml of ethyl alcohol by heating on a steam bath for about 2 min. Stir and break up any hard lump with a glass rod flattened at one end. Allow the solid matter to settle and decant the hot alcoholic solution through a sintered glass filter funnel fitted to a Buchner flask to which suction is applied. Repeat the alcoholic digestion in a similar manner with five further consecutive 30 ml portions of boiling ethyl alcohol. Filter each extract in turn through the same sintered glass funnel and, finally, wash the residue several times with hot ethyl alcohol to remove all the alcohol soluble matter.

11.2 Calculation

The matter insoluble in water shall be expressed as follows:

$$\text{Matter insoluble in water, \% by mass} = 100\ \frac{m1}{m}$$

Where:

m_1 = the mass in grams of matter insoluble in water.

m = mass in grams of material taken for the test.

REFERENCES

- National Standard of Canada No.
  CAN/CGSB-2-42-M86 "Stain Remover for Tableware".