METHOD B16 T

THE QUANTITATIVE DETERMINATION OF THE TOTAL WATER-SOLUBLE SALTS IN SOILS AND AGGREGATES

1 **SCOPE**

In this method the water-soluble salts in soils and aggregates are quantitatively determined by shaking the material for 24 hours with water and determining the mass of salts present in a filtered aliquot. The procedure described in SABS. Method 849 is followed.

2 **APPARATUS**

As for .SABS Method 849.

3 **METHOD**

Follow SABS Method 849.

4 **CALCULATIONS**

Calculate and report the results as in SABS Method 849.

5 **NOTES**

The filtrate obtained in this method is used for determining the water-soluble sulphates in Method B17

S.A. BUREAU 0F STANDARDS STANDARD METHODS

SABS Method 849

Water-soluble salts content (total) of fine aggregates and of fine aggregates for base-courses

SECTION 1. APPARATUS

1.1 Sieves, complying with SABS 197 "Test sieves " and of the following nominal aperture sizes: 4,75 mm, 1,70 mm, and 425 Fm

1.2 Mortar and rubber-covered pestle

1.3 Stohmann flasks, of 500 ml capacity

1.4 Shaker.

A rotating mechanical shaker capable of inverting the Stohmann flasks at a rate of 26-30 times per min .

1.5 Witt filter apparatus, fitted with a Buchner funnel of diameter about 90 mm .

1.6 Evaporating dish, of nominal capacity 75 ml, dried at 105-110 EC and tared.

SECTION 2. PREPARATION OF TEST SPECIMEN

2.1 Fine aggregates

a) Dry about 400 gram of the test sample (see SABS Method 828) at a temperature not exceeding 80 EC for at least 16 h and then grind it until it all passes a 1,70 mm sieve. By means of a sample splitter or by coning and quartering obtain a test specimen of mass about 100 g, and grind it un til it all passes a 425 am sieve.

b) Dry the test specimen at a temperature of 75-80 °C until, after two successive drying periods of 4 h, the decrease in mass does not exceed 0,1 % of the total mass, and cool it to room temperature in a desiccator.

2.2 Base-course materials

a) Dry a mass of the test sample (see SABS Method 828) estimated to contain about 400 g of material passing a 425 am sieve for at least 16 h at a temperature not exceeding 80 EC, allow to cool, and sieve on a 4,75 mm sieve and a 1,70 mm sieve superimposed on a pan.

b) Break up any aggregations of smaller particles (taking care not to reduce the size of individual grains) in the portion passing the 4,75 mm sieve and retained on the 1,70 mm sieve by placing it in the mortar and rubbing it with the rubber-covered pestle.

c) Sieve this portion again on the 1,70 mm sieve, add it to the material in the pan, and sieve the mixture on a 425 Fm sieve. Place the portion retained on the 425 Fm sieve in the mortar, rub it as in (b) above, and again sieve thoroughly on the 425 Fm sieve.

d) Combine the fines (i.e. all the material that has passed the 425 Fm sieve) and mix well. By means of a sample splitter or by coning and quartering obtain a test specimen, of mass about 100 g, of the fines, and dry and cool it as in 2.1(b).

SECTION 3. PROCEDURE

NOTE: Alll water used shall be distilled or demineralized water.

3.1 Extraction of water-soluble salts

a) Weigh out accurately about 25 g of the test specimen in to a Stohmann flask and add exactly 500 ml of water. Stopper the flask and shake continuously for 24 h on the shaker. Remove the flask from the shaker and allow the undissolved material to settle by allowing the flask to stand undisturbed for at least 1 h .

b) Place a dry 600 ml beaker in the Witt filter apparatus and a double layer of glass

fibre filter paper of fine texture[1] on the Buchner funnel, and wet the paper with a few drops of the aqueous eatract (see (a) above).

c) using low vacuum and ensuring that the sediment in the flask is not disturbed, filter about 400 ml of the aqueous extract through the filter paper. Then shake the flask vigorously until all the sediment is in suspension and, by rapidly pouring the suspension into the Buchner funnel, attempt to transfer as much as possible of the undissolved material into the funnel. Do not add additional water to the flask to aid in this operation. Complete the filtration by evacuation but do not allow the filter paper to become dry. Do not wash the residue on the filter paper.

d) add about 0,5 g of dry filter paper pulp to the filtrate and stir until the paper pulp has disintegrated completely and is in suspension. Cover the residue in the Buchner funnel with a glass fibre filter paper of fine texture[1] and filter the filtrate through the Buchner funnel again, using low vacuum, into a clean and dry suction flask. Do not wash the residue in the Buchner funnel.

e) The filtrate should now be clear and contain no undissolved material in suspension. If this is not the case, repeat (d) above.

3.2 Recovery of water-soluble salts

a) By means of a pipette transfer 200 ma of the filtrate to a beaker of capacity about 400 ml, boil until the volume of the solution is about 50 ml, and transfer quantitatively to the dry tared evaporating dish, washing the beaker three times with warm water and adding the washings to the solution in the evaporating dish.

b) Evaporate the contents of the evaporating dish to dryness on a water bath, then transfer the dish to an oven maintained at a temperature of 105-110 EC and dry for 1 h Cool the evaporating dish and its contents to room temperature in a desiccator, determine its mass, and calculate the mass of the contents of the evaporating dish.

3.3 Blank determination

. Carry out a blank determination by following the procedures given in 3.1 and 3.2 but omitting the 25 g of test specimen. Subtract the mass of any residue found in the evaporating dish from the mass found in 3.2(b) above and record this corrected mass (Mass A) as the mass of water-soluble salts in the 200 ma of filtrate.

SECTION 4. CALCULATION

4.1 Calculate, as follows, the water-soluble salts content of the fine aggregate or the fines (as relevant):

$$\textbf{Total water-soluble salts content, a (m/m)} = \frac{A \ x \ 5}{B \ x \ 2} \ x \ 100$$

[1] Whatman GF/C or equivalent

where :

a = mass of soluble salts found in 200 ml of the extract, g

b = mass of the specimen taken for extraction, g

May 1976

Approved by the
COUNCIL OF THE SOUTH AFRICAN BUREAU OF STANDARDS

ISBN 0-626-03915-0