

PROCEDURE OF MECHANICAL ANALYSIS FOR THE JAPANESE VOLCANIC-ASH SOILS

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The procedure recommended by the authors(see *Bull. Kyushu Agr. Expt. Station*, 2 (1954), 235-249) is as follows:

For the analysis 15 to 20 gm of air-dried or fresh soil materials containing no particles larger than 2 mm are placed in a 700 ml tall beaker, 100 ml of 3% H₂O₂ are added and the content is heated, care being taken to avoid frothing over. When vigorous frothing occurs about 10 ml of kerosine are added to the beaker. If much organic matter is present a further addition of H₂O₂ may be necessary. The content of the beaker is filtered by using a collodion membrane fixed on a Buchner funnel, and washed with distilled water. The amounts of silica and sesquioxide in the filtrate are determined. The residue left on the membrane is carefully removed with feather under a jet of cool distilled water, dried at 105°C, and weighed. The difference between the initial weight of the sample and the weight of the residue (including the amounts of silica and sesquioxide dissolved by the H₂O₂ treatment) is expressed as organic matter decomposed. The weight of the residue plus the dissolved silica and sesquioxide is used as the base weight for calculating the percentages of the various fractions.

In order to know whether a good state of dispersion of the organic matter-free material is obtained in an alkaline dispersing medium or in an acidic one, a small portion of the material which had been carefully rubbed is placed in a test tube, a small amount of 0.002 N HCl or 0.008 N NaOH solution is added, and test a state of dispersion after shaking thoroughly,

If the alkaline medium gives a good state of dispersion, 10 gm of the organic matter-free sample are transferred to 0.2 mm or I. M. M. No. 70 sieve, washed with a jet of hot or cool distilled water until clean sand remains. In order to break up the association of allophane and sesquioxide of the sample, 100 ml of 0.2 N HCl solution are added to the portion passing through the sieve and allowed to stand for 1 hour, and filtered by using a collodion membrane, washed with distilled water until the reaction of Cl ion completely disappears. In most cases this acid treatment may be unnecessary. The residue is transferred to a 250 ml shaking bottle, 4 ml of N NaOH solution are added, the content is made up to about 200 ml. The bottle is shaken on a shaker for 5 to 6 hours. The amounts of silica and sesquioxide in the above-mentioned acid filtrate are determined. The content of the shaking bottle is transferred to a 1,000 ml sedimentation cylinder, 4 ml of N NaOH solution are added again and the suspension in the sedimentation cylinder is stirred vigorously for 6 to 8 minutes with a motor-driven stirrer, after which it is allowed to stand. The silt and clay fractions are determined by an ordinary pipetting method. The fine sand fraction is also determined by a sedimentation method. A blank test for NaOH as a dispersing agent is necessary.

If the acidic medium gives a good dispersion, the sample is treated with 10 ml of N HCl solution, made up to a volume of 100 ml with distilled water, and allowed to stand for 1 hour. The sample is filtered by using a collodion membrane, the residue on the membrane is washed with distilled water. The amounts of silica and sesquioxide in the acid filtrate are determined and are added to the percentage of the clay fraction. The coarse sand fraction is separated by the sieving, as has already been stated, the passed fraction is shaken for 5 to 6 hours, after the addition of 200 ml of water containing 2 ml of N HCl solution. The content is transferred to a 1,000 ml sedimentation cylinder; clay, silt, and fine sand fractions are determined, respectively. In most cases the determination of silica dissolved by the hydrogen peroxide- and/or the acid-treatment may be unnecessary because of its lower content.