SOIL TEXTURE UNIT

CODE 1067

QUANTITY	CONTENTS	CODE
60 mL	Soil Flocculating Reagent	5643PS-H
60 mL	*Texture Dispersing Reagent	*5644PS-H
1	Soil Texture Stand	1053
3	Test Tubes, Soil Texture, 50 mL, w/caps	0760
2	Pipets, 1 mL, plastic, w/caps	0372
1	*A Study of Soil Science* Handbook	1530

***WARNING:** Reagents marked with a * are considered hazardous substances. Material Safety Data Sheets (MSDS) are supplied for these reagents. For your safety, read label and accompanying MSDS before using.

To order individual reagents or test kit components, use the specified code number.

This test is designed to separate soil into its three basic mineral fractions: sand, silt, and clay. The amount of time required for the soil particles of various sizes to settle in the soil separation tubes forms the basis for this test. From the amount of material collected in each tube it is possible to determine the approximate percentage of each fraction as represented in the original soil sample.

The procedure for preparation of the soil sample for testing is described in the accompanying handbook, *A Study Of Soil Science*.

The separation tubes should be marked for identification in the following manner: Mark the first sedimentation tube “A”, the second “B”, and the third “C”.

PROCEDURE

1. Place the three Soil Separation Tubes in the rack.
2. Add the soil sample to Soil Separation Tube “A” until it is even with line 15.

   NOTE: Gently tap the bottom of the tube on a firm surface to pack the soil and eliminate air spaces.

3. Use the pipet (0372) to add 1 mL of *Texture Dispersing Reagent (5644PS) to the sample in Soil Separation Tube "A". Dilute to line 45 with tap water.
4. Cap and gently shake for two minutes, making sure the soil sample and water are thoroughly mixed.

The sample is now ready for separation. The separation is accomplished by allowing a predetermined time for each fraction to settle out of the solution. Be sure that you continue to gently shake the separation tube up to the time of the first separation (Step 5).

5. Place Soil Separation Tube "A" in the rack. Allow to stand undisturbed for exactly 30 seconds.
6. Carefully pour off all the solution into Soil Separation Tube "B". Return Tube "A" to the rack. Allow Tube "B" to stand undisturbed for 30 minutes.
7. Carefully pour off the solution from Soil Separation Tube "B" into Soil Separation Tube "C". Return Tube "B" to the rack.
8. Add 1 mL of Soil Flocculation Reagent (5643PS) to Soil Separation Tube "C". Cap and gently shake for one minute.
9. Place the Soil Separation Tube "C" in the rack and allow to stand until all the clay in suspension settles. This may require up to 24 hours.

   NOTE: Unless there is further use of the clay sample for air drying and study as described later, it is not necessary to wait for the suspension to settle.

Due to the colloidal nature of clay in solution and its tendency to swell and form a gel, the portion of clay remaining in Tube "C" is not used to determine the clay fraction present in the soil. The clay fraction is calculated by adding the sand and silt fractions and subtracting this total from the initial volume of soil used for the separation.

EXAMPLE:

Tube "A" Sand	2	Initial Volume	15
+Tube "B" Silt	+8	Total "A" & "B"	-10
Total "A" & "B"	10	Clay	5

10. Read Soil Separation Tube "A" at top of soil level. To calculate percentage sand in the soil, divide reading by 15. Multiply by 100. Record as % sand.
11. Read Soil Separation Tube "B" at top of soil level. To calculate percentage silt in the soil, divide reading by 15. Multiply by 100. Record as % silt.

12. Calculate volume of clay as shown above. To calculate percent clay in the soil, divide value by 15. Multiply by 100. Record as % clay.

CALCULATION

EXAMPLE:

Soil Separation Tube "A" reads 2.

Soil Separation Tube "B" reads 8.

$$\text{Percent Sand} = \frac{\text{Reading A} \times 100}{\text{Total Volume}} = \frac{2 \times 100}{15} = 13\%$$

$$\text{Percent Silt} = \frac{\text{Reading B} \times 100}{\text{Total Volume}} = \frac{8 \times 100}{15} = 53\%$$

$$\text{Percent Clay} = \frac{\text{Calculated Volume} \times 100}{\text{Total Volume}} = \frac{5 \times 100}{15} = 33\%$$

Since the scientific basis of the test is the particle size and its mass, as related to its settling time when dispersed in solution, the following table is included for reference.

Soil Particle	Diameter In mm
Very Course Sand	2.0 – 1.0
Course Sand	1.0 – 0.5
Medium Sand	0.5 – 0.25
Fine Sand	0.25 – 0.10
Very Fine Sand	0.10 – 0.05
Silt	0.05 – 0.002
Clay	Less than 0.002

INTERPRETATION

Sandy soil is described as soil material that contains 85% or more sand. The percentage of silt plus 1.5 times the percentage of clay shall not exceed 15.

Silt soil is described as soil material that contains 80% or more silt and less than 12% clay.

Clay soil is described as soil material that contains 40% or more clay, less than 45% sand and less than 40% silt.

To further describe the various graduations possible under each general soil texture classification mentioned above, additional terms have been applied. Some examples of these are loamy sand, sandy loam, silty clay loam, sandy clay or a silty clay.

Once the three textural classes for a soil have been determined it may be of further interest to place the material from each Soil Separation Tube in individual piles on a piece of paper. Allow sufficient time for air drying. Now it is possible to determine the feel of the various textural classes. This experience will be helpful when the student is in the field.

The following statements give the more obvious characteristics of a textural class based on its feel when rubbed between the fingers.

Sand is loose and single grained and will fall apart after being squeezed when dry. When sand is wet it will form a cast that falls apart after being squeezed.

Sandy loam contains mostly sand, but also some silt and clay. Individual sand grains can be felt and seen.

Silt loam has a moderate amount of the very find grains of sand, is fine-textured and contains only a small amount of clay. A dry sample feels smooth and silky like flour or talcum powder.

Clay loam is a fine-textured soil that after working breaks up into clods or lumps that are hard to break when dry. A wet cast forms a smooth smear and is sticky when squeezed.

WATER SEDIMENTATION TEST

These tubes may also be used as sedimentation tubes for the study of turbid waters.

1. Fill tubes to the 50 mL mark with sample water. Cap and place in the plastic rack. Leave undisturbed until all the solid material has settled.

CALCULATION: Each 0.5 mL of solid material collected is equivalent to 1% of the total volume.

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