II. DETERMINATION OF ORGANIC MATTER (IS : 2720 – Part – 22)

Apparatus:

1) Oven – thermostatically controlled (105 to 110^0C), 2) Balance – sensitive to 0.001 g, 3) Volumetric Flask – 2 nos of one litre capacity, 4) Burette – 2 nos of 25 ml with 0.1 ml graduation, 5) Pipette – 10 ml, 6) Conical Flask – 2 nos of 500 ml capacity, 7) Graduated Measuring Cylinders – 200 ml & 25 ml capacities, 8) Desiccator – with any desiccating agent other than sulphuric acid, 9) Glass Weighing Bottle – 25 mm diameter & 50 mm height fitted with a ground glass stopper, 10) Wash Bottle, 11) Sieves – 10mm & 425 micron.

Reagents:

1. Potassium Dichromate Normal Solution: Dissolve 49.035 g of potassium dichromate in one litre of distilled water.
2. Ferrous Sulphate Solution: 0.5 N – Dissolve approximately 140 g of ferrous sulphate in 0.5 N sulphuric acid to make one litre of solution (add 14 ml of concentrated sulphuric acid to distilled water to make one litre of solution for 0.5 N sulphuric acid).
3. Sulphuric Acid, Concentrated: sp.gr. 1.83 (conforming to IS : 266-1977).
4. Orthophosphoric Acid, 85 percent: sp.gr. 1.70 to 1.75.
5. Indicator Solution: 0.25 g of sodium diphemylamine-sulphonate dissolved in 100 ml of distilled water

Soil sample preparation:

The portion of the air-dried sample selected and weighed (W1). It shall then be sieved on a 10 mm IS sieve and all particles other than stones crushed to pass through the sieve. The equivalent weight on oven-dry basis of the material passing 10 mm IS sieve (W2) shall be calculated and recorded to the nearest 0.1 percent of its total weight. A sample weighing approximately 100 g shall be obtained from the material passing 10 mm IS sieve by quartering. This sample shall then be pulverized so that it passes the 425 micron IS sieve.

Standardization of ferrous sulphate solution:

10 ml of the normal potassium dichromate solution will be run from a burette into a 500 ml conical flask. 20 ml concentrated sulphuric acid shall then be added carefully and the mixture swirled and allowed to cool for some minutes. 200 ml of distilled water shall then be added to the mixture followed by 10 ml of phosphoric acid and 1 ml of the indicator and the mixture shall be shake thoroughly. Ferrous sulphate solution shall then be added from the second burette in 0.5 ml increments, the contents of the flask being swirled, until the color of the solution changes from blue to green. A further 0.5 ml of potassium dichromate shall then be added, changing the color back to blue. Ferrous sulphate solution shall then be added drop by drop with continued swirling until the color of the solution changes from blue to green after the addition of a single drop. The total volume of ferrous sulphate solution used (x) shall be noted to the nearest 0.05 ml (one ml ferrous sulphate solution is equivalent to 10.5/x ml potassium dichromate).

Procedure:

A 5-gram soil sample shall be taken from the thoroughly mixed portion of the material passing the 425-micron IS sieve and used for the test.

The sample shall be placed in a glass weighing bottle and weighed to 0.001 g. A small quantity, from 5 g to 0.2 g depending on the organic content shall be transferred to a dry 500 ml conical flask, the weighing bottle reweighed (W3).

10 ml of N potassium dichromate solution shall be run into the conical flask from a burette, and add 20 ml of concentrated sulphuric acid very carefully from a measuring cylinder. The mixture shall be thoroughly swirled for about one minute and allowed to stand on a heat-insulating surface, such as asbestos or wood for 30 min to allow oxidation of the organic matter to proceed. During this period, the flask shall be protected from draughts. Distilled water, 200 ml, shall then be added along with 10 ml of orthophosphoric acid and one ml of the indicator. The mixture shall be shaken vigorously. If the indicator is absorbed by the soil, a further one ml of the solution shall be added. Ferrous sulphate solution shall then be added from the second burette in 0.5 ml increments, the contents of the flask being swirled, until the color of the solution changes from blue to green. A further 0.5 ml of potassium dichromate shall then be added, changing the color of the solution back to blue. Ferrous sulphate solution shall then be

added drop by drop with continued swirling until the color of the solution changes from blue to green after the addition of a single drop. The total volume of the ferrous sulphate solution used (y) shall be noted to the nearest 0.05 ml.

Calculations:

The volume (V ml) of potassium dichromate used to oxidize the organic matter in the soil is given by the following formula:

$$V = 10.5\ (1 - y/x)$$

Where, x = total volume of ferrous sulphate used in the standardization test.

y = total volume of ferrous sulphate used in the test.

The percentage of organic matter (OM) present in the oven-dried sample shall be calculated from the following formula:

$$\text{Percentage of Organic Matter (OM)} = (0.6\ W2\ V) / (W1\ W3)$$

Where, W1 = total weight of original sample.
W2 = weight of soil passing 10 mm IS sieve.
W3 = weight of dry soil specimen used in the test.
V = volume of potassium dichromate solution used to oxidize organic.

DETERMINATION OF ORGANIC MATTER(SOIL)
(IS : 2720 - PART - 22)

Lab Ref No :_____ Date of Sampling :_____

Type of Material :_____ Date of Testing :_____

Source :_____

Determination No.	1	2	3
Total Weight of Original Sample (W1), gm			
Weight of Soil Passing 10mm Sieve (W2), gm			
Weighing Bottle No.			
Weight of Weighing Bottle and Dry Soil After Taking Specimen for Test, gm			
Weight of Weighing Bottle and Dry Soil Before Taking Specimen for Test, gm			
Weight of Dry Soil Specimen Used (W3), gm			
Volume of Ferrous Sulphate Solution Added to Standardize Potassium Dichromate Solution (x), ml			
Volume of Ferrous Sulphate Solution Used to Oxidize Excess (y), ml			
Volume of Potassium Dichromate Solution Used to Oxidize Organic. V = 10.5(1 - y/x), ml			
Percentage of Organic Matter in Soil = (0.6 W2 V) / (W1 W3)			

Remarks :_____

Tested by :_____ Checked by :_____ _____

(For Contractor) (For Contractor) (For Engineer)