

TP No. 02. Soil Analysis

Introduction

Physicochemical analyses of soil allow farmers to assess fertilization levels and adapt fertilization programs to meet soil and crop needs. These analyses also help achieve the best productivity, control production costs, and protect the environment.

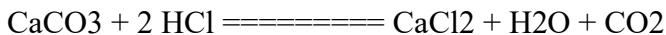
Soil Preparation

Drying: to obtain uniform soil

Grinding: to increase the contact surface between the soil and reagents.

Experiment 01. Determination of Lime Content in Soil

- Total lime corresponds to the quantity of calcium carbonate (CaCO₃)
 - Weigh 1 g of soil and pour a HCl solution (1 N) over it; after effervescence, add a quantity of distilled water, stir, and pour onto the filter.
 - Collect the residue on the filter, then place it in an oven at 105°C until constant weight is achieved.
 - Measure the percentage of lime in the soil according to the following equation:
% lime = $(P_i - P_f)/P_i * 100$ where: P_i: initial weight of soil; P_f: final weight of soil.
 - The reaction formula is as follows:



Calcium Carbonate + Hydrochloric acid = Calcium Chloride + Water + Carbon dioxide

Experiment 02. Determination of Organic Matter in Soil

- Weigh 1g of soil, pour 5ml of concentrated H₂O₂ over it, and stir (concentrated H₂O₂ destroys organic matter; products are degraded into CO₂, H₂O, and NO₂ and sometimes SO₂);
- Filter and rinse with distilled water;
- Place in an oven at 105°C until constant weight;

- Measure the % of organic matter according to the following equation:

$$\% \text{ OM} = (P_i - P_f) / P_i * 100$$

P_i : initial weight;

P_f : final weight.

Soils are classified into three categories:

Low content < 4%; Moderate content 4-9%; High content 9-30%

Experiment 03. Sedimentation Technique

The sedimentation method separates soil constituents by weight, using Stokes' law. Take a glass beaker, add one volume of soil and 3 volumes of water, and let it settle for 48 hours. We will have 5 sedimentation phases in order:

1. Coarse fraction > 2 mm;
2. Coarse sand: 2 to 0.2 mm;
3. Fine sand: 0.2 to 0.04 mm;
4. Silt: 0.04 to 0.002 mm;
5. Clay < 0.002 mm.

According to the results obtained, soils are classified into different categories:

Sandy

Silty

Clayey

Experiment 04. pH Measurement

Weigh 5 g of soil and mix with 10 ml of distilled water (1/3 – 2/3), stir the solution for one minute. Proceed to read the pH.

Soils are classified according to their acidity as follows:

pH < 4.5: very acidic soils

4.5 < pH < 6: slightly acidic soils

6 < pH < 7: balanced soils

pH > 7: calcareous (basic) soils