



Centurion  
UNIVERSITY

M.S.SWAMINATHAN  
SCHOOL OF  
AGRICULTURE

ASAC 1101 (2-1-0)

# FUNDAMENTALS OF SOIL SCIENCE

Edited by  
Dr.Pedda Ghose Peera S.K.

PRACTICAL MANUAL



*Shaping Lives... Empowering Communities...*

MSSSoA

<b>EX No.4</b>	<b>DETERMINATION OF SOIL TEXTURE BY BOUYOCOS HYDROMETER (or) PARTICLE SIZE ANALYSIS</b>
<b>Date:</b>	

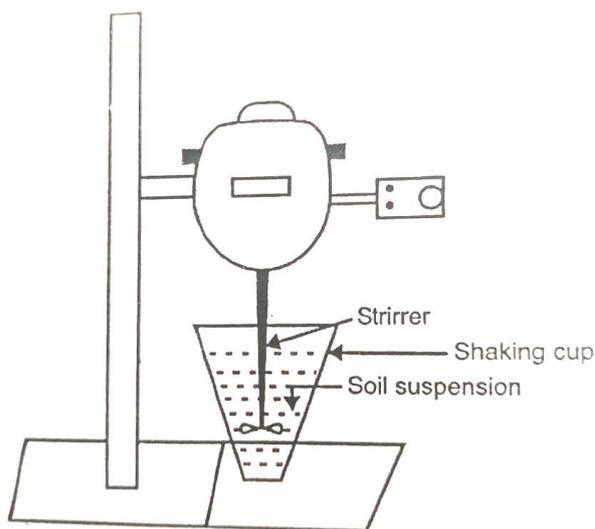
- Aim:** 1.To determine relative proportion of sand, silt and clay in a given soil.  
2.To identify soil texture using soil textural triangle

**Principle:**

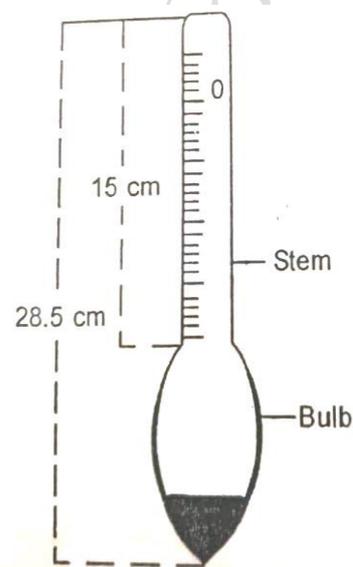
Density of the suspension is recorded using hydrometer after 4 mins for (silt + clay) and after 2 hours for clay alone and per cent soil separates calculated.

**Apparatus required:**

Bouyoucos hydrometer, Thermometer, measuring cylinder (spoutless) of 1lit, stopper/plunger, glass beaker of 500mL, electric stirrer, hot water bath.



**Electric stirrer**



**Bouyoucos hydrometer**

**Reagents required :**

30%  $H_2O_2$ , 2N HCl, phenolphthalein indicator,  $AgNO_3$ , sodium hexa meta phosphate (SHMP) 5%

**Procedure:**

- Take 50 g air dry soil (2mm sieved) in a 500 mL beaker and add about 200 mL distilled water.
  - A. Dispersion
  - B. Fractionation
  - C. Identification of soil texture

## **A. Dispersion** : Removal of cementing agents

### *1. Organic matter:*

- Add 4-5mL of 30% H<sub>2</sub>O<sub>2</sub> to soil sample and swirl the content well.
- Allow the reaction to take place for 5-10 minutes.
- Heat the contents in a hot water bath while stir the contents with glass rod till completion of reaction.

### *2. Calcium carbonate:*

- Add 30-40 mL of 2N HCl and leave it for an hour with intermittent shaking.
- Filter the contents using whatman No.50 filter paper and discard the filtrate.

### *3. Clay and clay cementation :*

- Add 10 mL of 5% sodium hexa meta phosphate, stir the contents and leave it for half an hour.
- Shake the contents of the beaker with an electric stirrer for 10 minutes

### *4. Oxides of Fe and Al:*

- The oxides are inactivated by CBD treatment (Sodium citrate, bicarbonate and dithionite)

### *5. Electrolytes:*

- To deflocculate the soil particles, the soil is repeatedly washed with distilled water till it is free from soluble salts.

## **B. Fractionation: Hydrometer method**

- Transfer the dispersed soil to the measuring cylinder and make up the volume to one liter with distilled water.
- Shake the suspension top to bottom or with plunger about 20 times a minute.
- Take hydrometer readings at 4 minutes for (silt+clay) and after 2 hours for clay separately by lowering the hydrometer gently into the suspension about 20 seconds.
- Note down the temperature for the suspension and apply temperature correction to the hydrometer readings.

**Note :** Standard temperature to be maintained at 68°F. If temperature varies, add 0.2 to the hydrometer reading (HMR) for each degree rise above 68°F and subtract 0.2 for each degree fall below 68°F.

**Calculation:**

	Hydrometer reading (HMR)	Temperature		Temperature correction	Corrected HMR (CHMR)
		°C	°F		
After 4 min					
After 2 hr.					

$$^{\circ}\text{F} = 9/5 (^{\circ}\text{C}) + 32$$

$$\% \text{ (silt + clay)} = \frac{\text{CHMR after 4 min.}}{\text{Weight of soil}} \times 100$$

$$\% \text{ clay alone} = \frac{\text{CHMR after 2 hr.}}{\text{Weight of soil}} \times 100$$

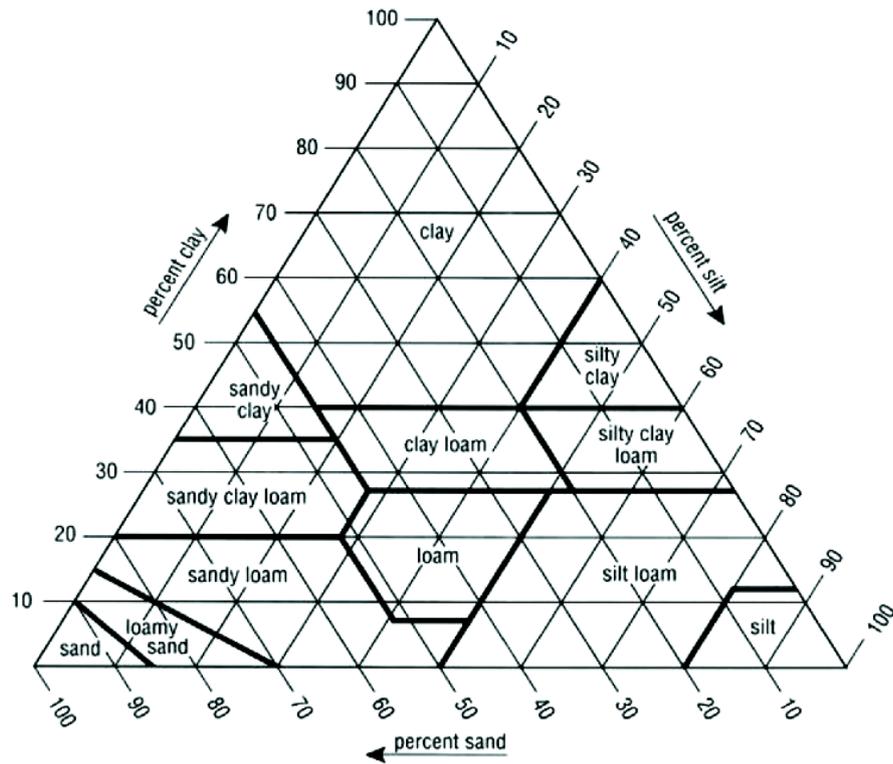
$$\% \text{ silt} = \% \text{ (silt + clay)} - \% \text{ clay alone}$$

$$\% \text{ sand} = 100 - \% \text{ (silt + clay)}$$

**Result:**

	Problem 1	Problem 2
Clay		
Silt		
Sand		
Soil texture		

Take **PRINT OUT** of **TEXTURAL TRIANGLE** and **PASTE** in record



**Soil Textural triangle (ISSS)**