



Centurion
UNIVERSITY

M.S.SWAMINATHAN
SCHOOL OF
AGRICULTURE

ASAC 1101 (2-1-0)

FUNDAMENTALS OF SOIL SCIENCE

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PRACTICAL MANUAL



Shaping Lives... Empowering Communities...

MSSSoA

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

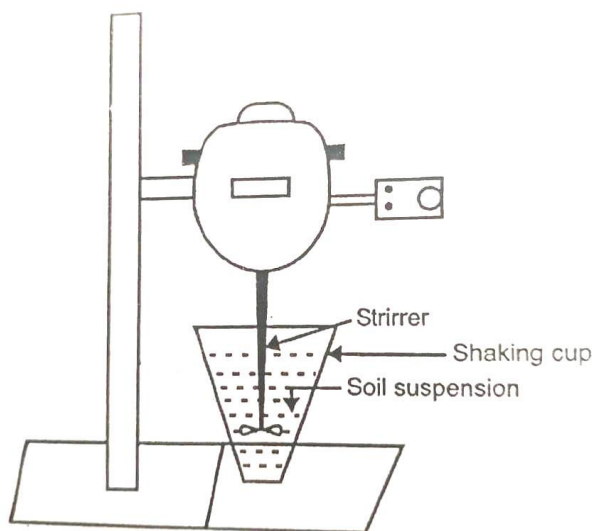
- Aim:** 1.To determine relative proportion of sand, silt and clay in a given soil.
2.To identify soil texture using soil textural triangle

Principle:

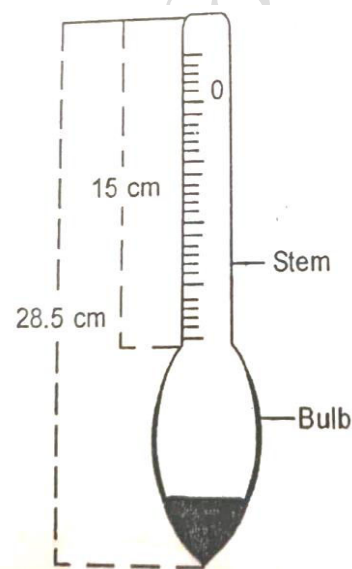
Density of the suspension is recorded using hydrometer after 4 mins for (silt + clay) and after 2 hours for clay alone and per cent soil separates calculated.

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% H₂O₂, 2N HCl, phenolphthalein indicator, AgNO₃, 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% H₂O₂ 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.					

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

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

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

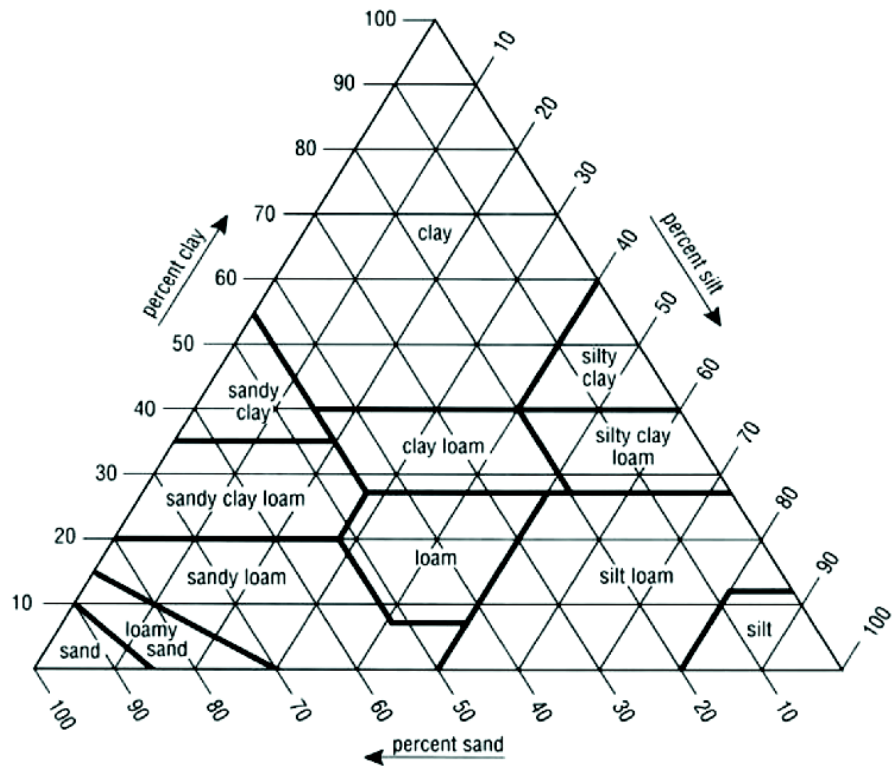
$$\% \text{ silt} = \% \text{ (silt + clay)} - \% \text{ clay alone}$$

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

Result:

	Problem 1	Problem 2
Clay		
Silt		
Sand		
Soil texture		

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



Soil Textural triangle (ISSS)