

SPECIFIC GRAVITY DETERMINATION

Purpose:

This lab is performed to determine the specific gravity of soil by using a pycnometer. Specific gravity is the ratio of the mass of unit volume of soil at a stated temperature to the mass of the same volume of gas-free distilled water at a stated temperature.

Standard Reference:

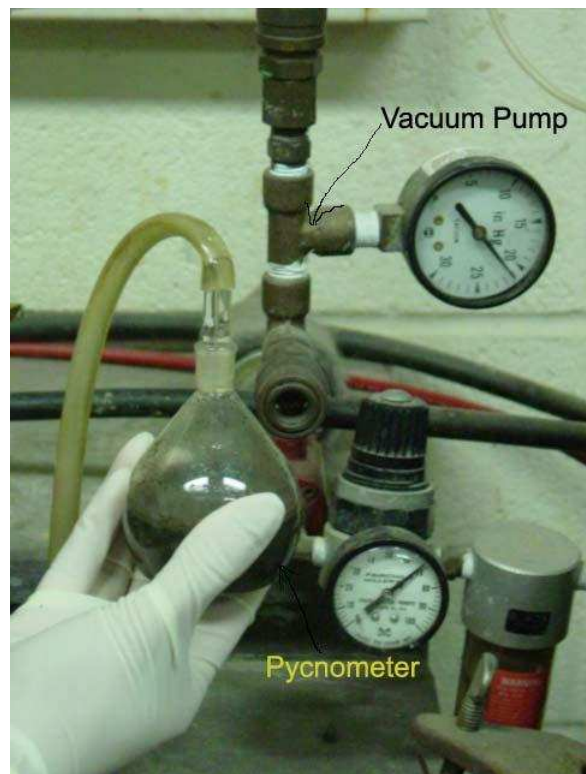
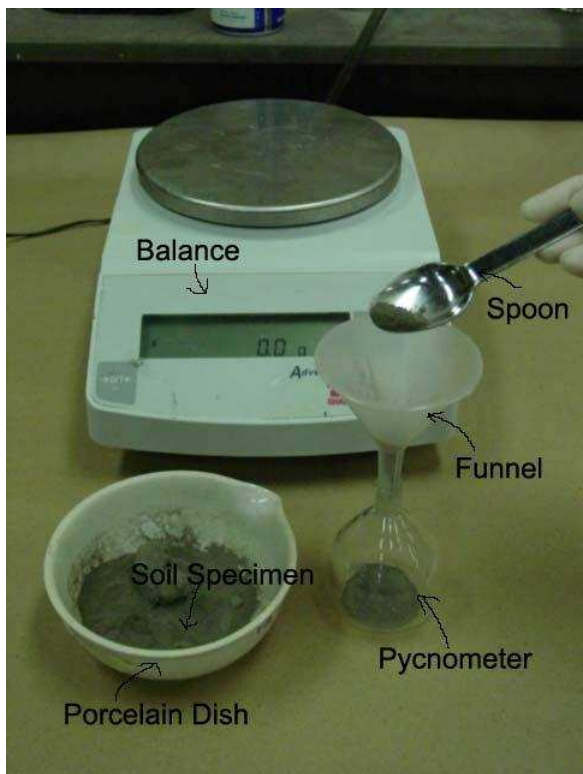
ASTM D 854-00 – Standard Test for Specific Gravity of Soil Solids by Water Pycnometer.

Significance:

The specific gravity of a soil is used in the phase relationship of air, water, and solids in a given volume of the soil.

Equipment:

Pycnometer, Balance, Vacuum pump, Funnel, Spoon.



Test Procedure:

- (1) Determine and record the weight of the empty clean and dry pycnometer, W_P .
- (2) Place 10g of a dry soil sample (passed through the sieve No. 10) in the pycnometer. Determine and record the weight of the pycnometer containing the dry soil, W_{PS} .
- (3) Add distilled water to fill about half to three-fourth of the pycnometer. Soak the sample for 10 minutes.
- (4) Apply a partial vacuum to the contents for 10 minutes, to remove the entrapped air.

- (5) Stop the vacuum and carefully remove the vacuum line from pycnometer.
- (6) Fill the pycnometer with distilled (water to the mark), clean the exterior surface of the pycnometer with a clean, dry cloth. Determine the weight of the pycnometer and contents, W_B .
- (7) Empty the pycnometer and clean it. Then fill it with distilled water only (to the mark). Clean the exterior surface of the pycnometer with a clean, dry cloth. Determine the weight of the pycnometer and distilled water, W_A .
- (8) Empty the pycnometer and clean it.

Data Analysis:

Calculate the specific gravity of the soil solids using the following formula:

$$\text{Specific Gravity, } G_s = \frac{W_0}{W_0 + (W_A - W_B)}$$

Where:

W_0 = weight of sample of oven-dry soil, $g = W_{PS} - W_P$

W_A = weight of pycnometer filled with water

W_B = weight of pycnometer filled with water and soil

EXAMPLE DATA

SPECIFIC GRAVITY DETERMINATION DATA SHEET

Date Tested:

Tested By: CEMM315 Class, Group A

Project Name: CEMM315 Lab

Sample Number: B-1, SS-1, 2'-3.5'

Sample Description: Gray silty clay

Specimen number	1	2
Pycnometer bottle number	96	37
W_P = Mass of empty, clean pycnometer (grams)	37.40	54.51
W_{PS} = Mass of empty pycnometer + dry soil (grams)	63.49	74.07
W_B = Mass of pycnometer + dry soil + water (grams)	153.61	165.76
W_A = Mass of pycnometer + water (grams)	137.37	153.70
Specific gravity (G_s)	2.65	2.61

Example Calculation: $W_P = 37.40$ g, $W_{PS} = 63.49$ g, $W_B = 153.61$ g,

$$W_A = 137.37 \text{ g}$$

$$W_o = 63.49 - 37.40 = 26.09 \text{ g}$$

$$G_s = \frac{26.09}{26.09 + (137.37 - 153.61)} = 2.65$$

BLANK DATA SHEETS

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DATA SHEET**

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Tested By:

Project Name:

Sample Number:

Sample Description:

Specimen number	1	2
Pycnometer bottle number		
W_P = Mass of empty, clean pycnometer (grams)		
W_{PS} = Mass of empty pycnometer + dry soil (grams)		
W_B = Mass of pycnometer + dry soil + water (grams)		
W_A = Mass of pycnometer + water (grams)		
Specific Gravity (G_S)		

Calculations: