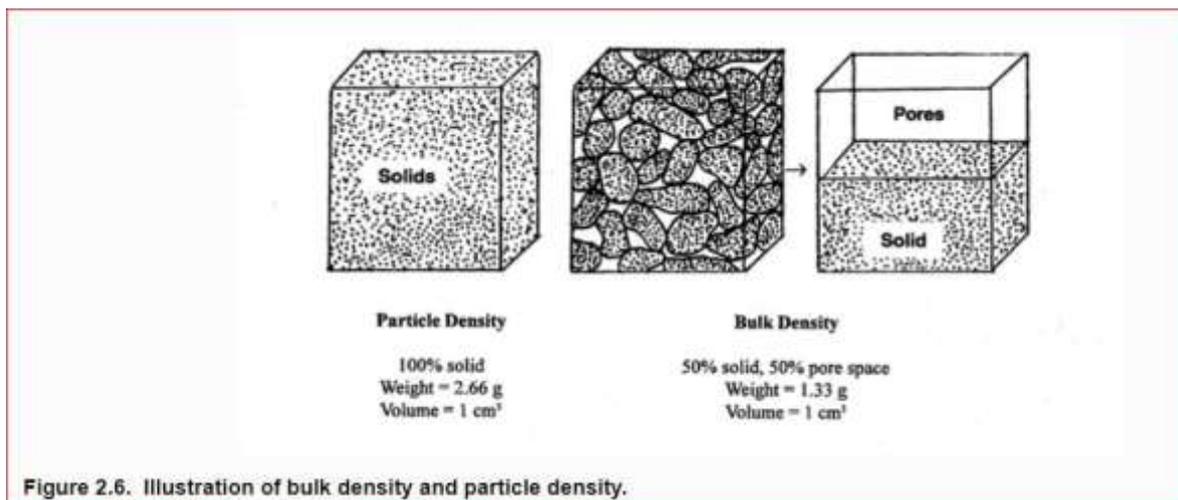


الهندسة	الكلية
المدني	القسم
مختبر الكيمياء	المادة باللغة الانجليزية
Chemistry laboratory	المادة باللغة العربية
الاولى	المرحلة الدراسية
م.م. جبار شهاب عيادة	اسم التدريسي
Bulk Density Test	عنوان المحاضرة باللغة الانجليزية
قياس الكثافة الظاهرية	عنوان المحاضرة باللغة العربية
2	رقم المحاضرة
	المصادر والمراجع

محتوى المحاضرة

Bulk Density Test

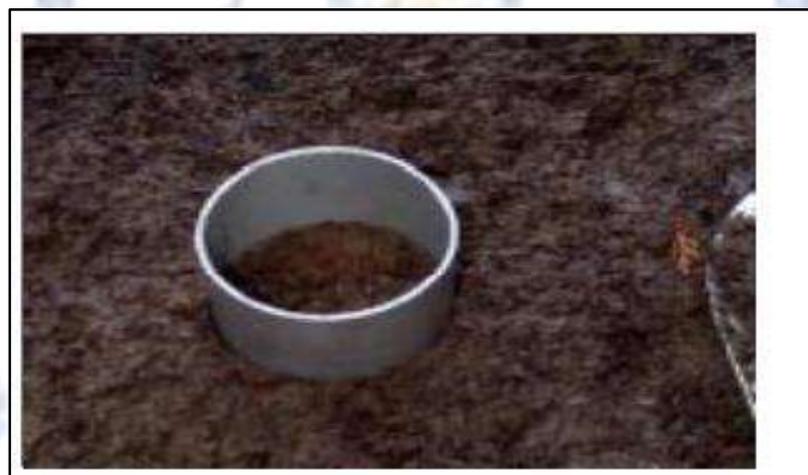
Soil bulk density (g cm^{-3} or Mg m^{-3}) is weight of soil (oven-dry) per unit volume of soil. The volume includes space occupied by pores as well as soil solids. Soil structure and texture largely determine bulk density. Soil structure refers to the arrangement of soil particles into secondary particles called aggregates. Since fine textured soils generally have more total pore space than coarse textured soils, the fine textured soils (clayey/silty) also generally have lower bulk densities. Bulk density values of fine-textured soils commonly range from 1.00 to 1.30 g cm^{-3} , while those of sandy soils range from about 1.30 to 1.70 g cm^{-3} . Despite this general difference in bulk density between sandy and clayey soils, sandy soils are referred to as “light” and clayey soils as “heavy”, this terminology refers to relative ease of tillage but not typical bulk density.



Method:

1-Drive Ring into Soil

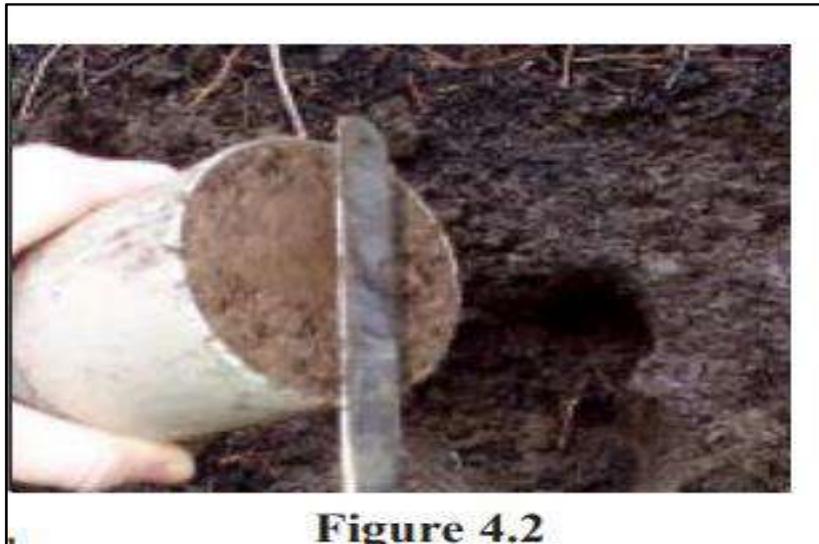
Using the hammer and block of wood, drive the 3-inch diameter ring, beveled edge down, to a depth of 3 inches (Figure 4.1).



The exact depth of the ring must be determined for accurate measurement of soil volume. Dig around the ring and with the trowel underneath it, carefully lift it out to prevent any loss of soil.

2- Remove Excess Soil

Remove excess soil from the sample with a flat bladed knife. The bottom of the sample should be flat and even with the edges of the ring (see Figure 4.2).



3- Place Sample in Bag and Label

Touch the sample as little as possible. Using the flat bladed knife, push out the sample into a plastic sealable bag. Make sure the entire sample is placed in the plastic bag. Seal and label the bag.

Soil volume = ring volume

To calculate the volume of the ring:

- i. Measure the height of the ring with the ruler in cm to the nearest mm
- ii. Measure the diameter of the ring and halve this value to get the radius.
- iii. Ring volume (cm³) = 3.14 x r² x ring height.

If the ring diameter = 7 cm and ring height = 10 cm Ring volume = 3.14 x 3.5 x 3.5 x 10 = 384.65 cm³

To calculate the dry weight of the soil:

1- Take the dry weight of the container and the soil together for 24 hours in a conventional oven at 105°C.

2- Take the weight empty container.

3- Dry soil weight (g) = weight of container and the soil – weight of container

Bulk density

Bulk density (g/cm³) = Dry soil weight (g) / Soil volume (cm³)

Porosity = $1 - \rho_b / \rho_s * 100$

Bulk density is usually expressed in megagrams per cubic metre (Mg/m³) but the numerically equivalent units of g/cm³ (1 Mg/m³ = 1 g/cm³) (**Cresswell and Hamilton, 2002**).

Q/ A soil is sampled by a core measuring 7.6 cm in diameter and 7.6 cm deep. The core weighs 300 g. The total core plus wet soil weight is 1000 g. On oven drying at 105° C the core plus dry soil weighed 860 g. Calculate dry bulk densities?

