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| Course No. : CE363 | Date of Testing : 21.10.2011 |
| No. And Title of Test : 5(a) Determination of Dry Density of Soil Particles | |
| Year and Section : 2011/5 | Lab Group : 3 |
| Surname, Name: | |

**DETERMINATION OF DRY DENSITY OF SOIL**

**Object**

The object of this experiment is to find the dry density of a soil sample of natural or compacted soil by recording its mass and amount of water it moves after coating with a known volume of wax.

**Apparatus**

1. A cylindrical metal container fitted with a siphon tube
2. A watertight container to act as a receiver for the water siphoning over from the container
3. A balance readable and accurate to 1 g
4. Paraffin warmer
5. Apparatus for moisture content determination
6. Paraffin wax

**Theory**

Dry density is the ratio of the mass of the solid phase of the soil (i.e., dried soil) to its total volume (solid and pore volumes together).

**Procedure**

1. Trim the soil sample until a suitable specimen is ready with no sharp corners and with10 cm in each dimension. Weigh specimen.
2. Warm the paraffin above the melting point. Coat the specimen with wax and allow it to cool.
3. Pour water into metal container until the water level is above the siphon tube. After water surface gets still, release the excess water.
4. Weigh the container for removed water and place it under the syphon tube. Put the waxed specimen into the container. When water surface is still again, release the water that went up. Weigh the receiver and water in it.
5. Remove the specimen from the container. Dry its surface and peel the paraffin wax. Take a sample to determine moisture content.

**Calculations**

Moisture content ( m= 100\*(M3 - M4) / (M4 - M5) ) = 62.96 %

Dry density (ρd = 100ρ / (100+m) ) = 1.03 g/ml

Specific gravity of soil particles (Gs) = 2.65

Mass of dry soil (MD = 100\*Ms / (100+m) ) = 54.44 g

Volume of solids (VD = MD / Gs) = 20.54 ml

Volume of voids (Vv = Vs – VD) = 32.46 ml

Void ratio (e = 100\*Vv / VD) = 158.03 %

Porosity (n = 100\*Vv / Vs) = 61.25 %

Degree of saturation (Sr = m\*Gs / e) = 106 %

**Discussion of Results**

According to the results calculated, the results are not correct since the degree of saturation cannot be greater than 100%. Also the void ratio should not be that high. To ensure that the results are more accurate, the test should be repeated.

**Conclusion**

From the data obtained from the test bulk density, moisture content, dry density, void ratio, porosity and the degree of saturation are calculated. They are respectively .674 g/ml, 62.96 %, 1.03 g/ml, 158.03 %, 61.25 % and 1.06.

**References**

Mirata T. (1980) , Laboratory Instructions for Soil Mechanics Students, METU Press, Ankara (reprinted in 2009)