**Table of Contents**

1) Introduction..........[......................................2](file:///C:/Users/OZAN/AppData/Local/Temp/Rar$DIa0.599/Determination%20of%20Particle%20Size%20Distribution%20of%20Fine.docx#_Toc402780307)

2) [Equipment .................................................2](file:///C:/Users/OZAN/AppData/Local/Temp/Rar$DIa0.599/Determination%20of%20Particle%20Size%20Distribution%20of%20Fine.docx#_Toc402780308)

3) Methodology[..............................................](file:///C:/Users/OZAN/AppData/Local/Temp/Rar$DIa0.599/Determination%20of%20Particle%20Size%20Distribution%20of%20Fine.docx#_Toc402780309)2

4) [Results........................................................3](file:///C:/Users/OZAN/AppData/Local/Temp/Rar$DIa0.599/Determination%20of%20Particle%20Size%20Distribution%20of%20Fine.docx#_Toc402780310)

5) [Interpretation..............................................3](file:///C:/Users/OZAN/AppData/Local/Temp/Rar$DIa0.599/Determination%20of%20Particle%20Size%20Distribution%20of%20Fine.docx#_Toc402780311)

6) Conclusion..................................................4

**CE 363 – CE 364 SOIL MECHANICS**

**Laboratory Session 3-Grain Size Distribution by Sieve Analysis**

**1-Introduction**

On this experiment, our goal was to find GSD (Grain Size Distribution) of coarse soil (greater than 75µm). We can entitle a soil sample by sieve analysis and hydrometer test which is used to find GSD finer particles of soil sample. If we know the name of soil, then we can estimate the behavior of it.

**2-Equipment**

**1.** Set of standard sieves. There are many different standard sieve sizes. Form a stack of 6-8 sieves (as the sieve shaker permits); such that the particle size range is covered (for example there is no point in having many sieves finer than #10 for a gravel sample). Selecting sieves at the boundaries of grain sizes (coarse/medium/fine sand/gravel etc.) is a good idea. Last sieve must be #200.

**2.** Soil sample

**3.** A digital scale

**4.** Two sieve brushes

**5.** Two pots ( to weigh the soil and to collect the excess soil)

**6.** Oven (we did not use it because of time deficiency)

**3-Methodology**

We had a soil sample (305.83 g) at the beginning. Then, it is washed by teacher. The purpose of this process is to remove particles that have very short diameters, but they can be used to determine the clay or silt content of the soil. We lost 5.1 g soil in this process (1.67% of soil).

In normal condition, we must wait the soil at the oven for 24 hours in oven. However, we did not do this process. We skip this because of time deficiency and our teacher brought a sample which is prepared before.

We measured the mass of the soil which retained at the each sieve and note them at data sheet. We must control the overloading limits and if there is some overloading. We shook the sieve and measured the retained particles. The sieving procedure is repeated.

**4-Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Nearest TS size  (mm) | Mass retained  (g) | Cumulative mass retained  (g) | Cumulative retained  % | Cumulative passing  % | Max. sieve load  (g) |
| 50 | 0 | 0 | 0 | 100 |  |
| 19 | 0 | 0 | 0 | 100 | 900 |
| 9.5 | 4.0 | 4.0 | 1.308 | 98.692 | 550 |
| 4.75 | 21.42 | 25.42 | 8.312 | 91.688 | 325 |
| 2.0 | 76.90 | 102.32 | 33.456 | 66.544 | 180 |
| 0.6 | 112.99 | 215.31 | 70.402 | 29.598 |  |
| 0.425 | 37.83 | 253.14 | 82.771 | 17.229 | 75 |
| 0.3 | 23.38 | 276.52 | 90.416 | 9.584 |  |
| 0.15 | 21.21 | 297.73 | 97.351 | 2.649 | 40 |
| 0.074 | 3.0 | 300.73 | 98.332 | 1.668 | 20 |

**Table 1:**Data Sheet for the Sieve analysis

**5-Interpretation**

In our experiment, we tried to find the distribution of soil ratio and percentage of it. We have found the percentage of soil in different sizes. During the experiment there were some rules that we should obey. Beginning of the experiment we should control the holes of it to make our experiment precise. When we come to find cu and cz, it is hard to determine the value of it. Therefore I have calculated it from graph.

**Cumulative mass retained**= 0+0+4+21.42+76.90 = 102.32 g **(for the fifth line)**

**Cumulative retained (%)** = (Cumulative mass retained/Total mass)\*100

= (102.32/305.83)\*100=33.456 % **(for the fifth line)**

**Cumulative passing (%)** =100-Cumulative retained =100-33.456 = 66.544 %

**(for the fifth line)**

**Graph. 1:** Percentage finer than % - Particle size (mm)

According to our soil classification graph we can assume **D10** , **D30** and **D60** values approximately like we did in the lecture of our instructor Nejan Huvaj.

**D10** ≈ 0.3 **D30** ≈ 0.6 **D60** ≈ 1.7 and

≈ 97% > 0.074 mm, then it is coarse grained and also more than 50% of coarse fraction is sand.(≈82 %)

And fines content = 3% < 5%. So we check soil type between SW and SP.

**Cu**= **D60**/ **D10** = 1.7/0.3 = 5.667, coefficient of uniformity

**Cz**= **D30**^2/( **D60**\***D10**)= 0.706, coefficient of curvature

(**Cu**>6 and 1< **Cz**<3 for SW) It does not satisfy these SW requirements, so we can name it as **SP** according to USCS.

**6-Conclusion**

In this experiment, we learnt how to find the particle size distribution of a soil. By helping of sieve method, only the coarse grained particle size distribution can be found. If the soil is fine grained, this method cannot be used since the fine grained soil has smaller than the 0.074 mm diameters and because of that reason particles can pass the sieve at the sieve size 0.074 mm accurately. Personal factors also affect the result of the experiment. For example, while shaking the sieve set, maybe it could not be shaken completely and some soil particles could not pass the below sieve. Moreover, while transferring of the soil sample to another pot, some soil particles could be lost and also very small soil particles could remain in the sieve and we could not weigh it. In addition, human errors like reading the balance wrong are also changing the results.