Faulty of Engineering and Technology

Civil Engineering Department

Construction Materials Laboratory

ENCE215

Experiment #3 :

" Specific Gravity And Water Absorption of Fine Aggregates "

Instructors :

Dr. Khalil Qatu

Eng. Nasser Abu Khalil

Done by Group D :

Mohammad Al-Swaity " 1181136 "

Mohammad Marbou " 1180126 "

Salman Kadamany " 1181170 "

Musab Jebren " 1152862 "

Mohammad Murra " 1182059 "

Date of performing the experiment : /3/2020

Date of submitting the experiment : //2020

Contents :

Introduction ……...……3

Purpose ……..…….4

Materials and Equipment ……...……5

Procedure ……...7

Data and Calculations ……..…….…9

Result and Conclusion ……..……...11

Sources of errors ……..….12

References ……..……..12

Introduction :

Purpose :

Materials and equipment :

Look at the **" Table 1 "** that show the equipment we used in this experiment :

Equipment	The name of it :	Equipment	The name of it :
 Figure 1	**Heater**	 Figure 2	**Coarse Aggregates**
 Figure 3	**Gloves**	 Figure 4	**Flask**
 Figure 5	**Water**	 Figure 6	**Balance**
 Figure 7	**Fine Aggregates**	 Figure 8	**Oven**

" Table 1 "

Equipment	The name of it :	Equipment	The name of it :
 Figure 9	**Wipers**	 Figure 10	**Funnel**

"Continue Table 1"

Procedure :

A) Coarse Aggregates Procedure :

- Coarse Aggregate o Select by quartering or use of a sample splitter approximately 5 kg of aggregate. Reject all material passing a No. 4 sieve .
- Thoroughly wash the sample to remove all dust or other coatings from the particles .
- Dry the sample to a constant weight at a temperature of 100 to 110°C (212 to 230°F). Cool at room temperature for about 15 min. and then immerse in water at room temperature for approximately 30 min .
- Remove sample from water and wipe the particles until all surface films are removed. Weigh the sample in this saturated surface dry condition to the nearest 0.5 g .
- Immediately after weighing, place the sample in a wire basket, suspend in water, and obtain the buoyant weight .
- Dry the sample to a constant weight at a temperature of 100 to 110°C (212° to 230°F), cool in room temperature for at least 30 min. and weigh .

- Computations :

A = Weight of oven-dry sample in air (g) .

B = Weight of saturated-surface-dry sample in air (g) .

C = Weight of saturated sample in water (g) .

1. Bulk specific gravity (oven-dry) = A / B – C
2. Bulk specific gravity (SSD) = B / B – C
3. Apparent specific gravity = A / A – C
4. Absorption in percent = (B – A / A) *100

B) Fine Aggregate :

- Obtain by sample splitting or quartering 3000 grams of aggregate, including equal quantities of all fractions .

- Dry to a constant weight at a temperature of 100 to 110°C (212 to 230°F). o Allow to cool and cover with water for about 30 min .

- Remove excess water and spread on a flat surface. Expose to a gentle moving flame until test sample approaches a free-flowing condition .

- Place a portion of the fine aggregate sample loosely into the mold. Tamp lightly 25 times and lift the mold vertically. If surface moisture is present, the fine aggregate will maintain its molded shape. Continue drying and testing until upon removal of the mold, the aggregate slumps slightly. This indicates that the saturated, surface-dry condition has been reached .

- Immediately introduce into the pycnometer 500.0 g of the fine aggregate. Fill the pycnometer almost to capacity and eliminate the air bubbles by agitation. Add water until the bottom of the meniscus is at the 500 cc line, etched on the pycnometer .

- Determine the total weight of the flask, including the sample, and the water .

- Carefully remove the fine aggregate and dry to a constant weight of 100 to 110°C (212 to 230°F) and cool for at least 30 min. and weigh .

- Computations :

A = Weight of oven-dry sample in air (g)

B = Weight of pycnometer filled with water (g)

C = Weight of pycnometer with sample in water (g)

1. Bulk specific gravity (oven-dry) = A / Wc + B – W
2. Apparent specific gravity = A / Wc + A – W
3. Bulk specific gravity (SSD condition) = B / Wc + B – W
4. Absorption, percent = (B – A / A) * 100

C) Special Instructions :

- Determine the specific gravities for three samples of both the coarse and fine aggregates. Test the fourth sample, if necessary, in order to obtain three sets of results that vary from each other by no more than 2%. If these precisions are not met, rerun the entire test .

- Using the correct specific gravity is important in the design of a Portland cement concrete mix. The particular specific gravity used must be consistent with the moisture condition of the aggregates being batched, whether on an oven dry or a saturated surface dry condition (SSD). Either specific gravity may be used. In an oven-dry condition the aggregates do not possess any absorbed or surface water. In an SSD condition, the water permeable voids of the aggregates are filled with water but no additional free water is present .

Data And Calculations :

Data For Coarse Aggregates :

Description	Sample 1	Sample 2
Weight of oven dry sample in Air (gr) "A"		
Weight of Saturated Surface dry Sample in Air (gr) "B"	949.25	933.3
Weight of Saturated Surface dry sample in water (gr) "C"	585.5	578.05

Table"3" shows data for the coarse aggregates

Data For Fine Aggregates :

Description	Sample 1	Sample 2
Weight of oven dry sample in Air (gr) "A"		
Weight of Saturated Surface dry Sample (gr) "B"	242.25	245.15
Weight of pycnometer Jar filled with water (gr) "Wc"	676.75	676.75
Weight of pycnometer Jar filled with water and Fine Aggregates (gr) "W"	808.40	810.45

Table"4" shows data for the fine aggregates

Calculations :

Calculations for Coarse Aggregates :

Sample 1 :

1. Bulk Specific Gravity (Specific Gravity on dry basis) = A / B – C

   =

2. Bulk Specific Gravity (Specific Gravity on saturated surface dry basis) = B / B – C

   =

3. Apparent Specific Gravity = A / A – C

   =

4. Absorption Percent = (B – A / A) * 100

   =

Sample 2 :

1. Bulk Specific Gravity (Specific Gravity on dry basis) = A / B – C

   =

2. Bulk Specific Gravity (Specific Gravity on saturated surface dry basis) = B / B – C

   =

3. Apparent Specific Gravity = A / A – C

   =

4. Absorption Percent = (B – A / A) * 100

   =

Calculations for Fine Aggregates :

Sample 1 :

1. Specific Gravity on dry basis = A / Wc + B – W

   =

2. Specific Gravity on saturated surface dry basis = B / Wc + B – W

   =

3. Apparent Specific Gravity = A / Wc +A – W

   =

4. Absorption Percent = (B – A / A) * 100

   =

Sample 2 :

5. Specific Gravity on dry basis = A / Wc + B – W

   =

6. Specific Gravity on saturated surface dry basis = B / Wc + B – W

   =

7. Apparent Specific Gravity = A / Wc +A – W

   =

8. Absorption Percent = (B – A / A) * 100

   =

Results and Conclusion :

Description	Slump test (cm) "Type of slump "	Compacting Factor	VeBe test (sec)
Our Group "Experiment 1"	6 " True "	0.847	3
Group C "Experiment 1"	6.2 "True"	0.829	3.77
Our Group "Experiment 2"	22 "Collapse "	1.004	----
Group C "Experiment 2"	24.7 "Collapse "	----	----

Table "4" shows the results that we found in Exp. 1 and Exp .2

Conclusion :

Sources of Errors :

- In slump test : the conditions have an impact on this test , where the very wet or very dry weather gives untrue results sometimes .
- In Compacting factor test : maybe the weight of the concrete cylinder was affected and it didn't 100% true , and this will not impact by a large error , it will be very small .

References :

- Lab Manual ENCE215
- Designing Buildings Wiki (https://www.designingbuildings.co.uk/wiki/Concrete)
- Global Gilson (https://www.globalgilson.com/blog/what-is-workability-of-concrete)
- The Constructor " Civil Engineering Home " (https://theconstructor.org/concrete/)
- Wikipedia (https://en.wikipedia.org/wiki/Concrete#Composition)