UTM
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RESEARCH UNIVERSITY

CIVIL ENGINEERING LABORATORY

CONCRETE LABORATORY

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DECLARATION
I/We declare that this laboratory report is my/our own work and does not involve plagiarism or unauthorized collusion. Signature(s): _____ Date: _____

Assessment *(please see overleaf for assessment rubrics)*

Scores :

C1 SIEVE ANALYSIS (AGGREGATE GRADING) FOR FINE AND COARSE AGGREGATE

INTRODUCTION

Aggregate is one of the basic constituents of concrete. Its quality is of considerable importance because about three-quarter of the volume of concrete is occupied by aggregates. One of the physical properties of aggregate that influence the property of concrete is the grading of aggregate. The grading of aggregate defines the proportions of particles of different size in the aggregate. The grading of fine (size < 5 mm) and coarse (size > 5 mm) aggregates are generally required to be within the limits specified in BS 882: 1992.

OBJECTIVE

The objective of this experiment is to obtain the grading curve for both fine and coarse aggregate.

APPARATUS

1. *Balance* - balance or scale used in testing fine and coarse aggregates shall have readability and accuracy as follows:
   For fine aggregate, readable to 0.1 g and accurate to 0.1 g or 0.1 % of the test load.
   For coarse aggregate, or mixtures of fine and coarse aggregate, readable and accurate to 0.5 g or 0.1 % of the test load.
2. *Sieves* – the sizes and apertures appropriate to the specification of the material being tested, complying with BS 410:
   For coarse aggregate, standard sieve size of 50.0 mm, 37.5 mm, 20.0 mm, 14.0 mm, 10.0 mm, 5.0 mm and 2.36 mm (Fig. C1-1).
   For fine aggregate, standard sieve size of 10 mm, 5.00 mm, 2.36 mm, 1.18 mm, 600μm, 300 μm and 150 μm (Fig. C1-2).
3. *Mechanical Sieve Shaker* -a mechanical sieving device, used to create vibration of the sieve to cause the particles to bounce.

4. *Oven* - an oven of appropriate size capable of maintaining a uniform temperature of 105°±5°C.

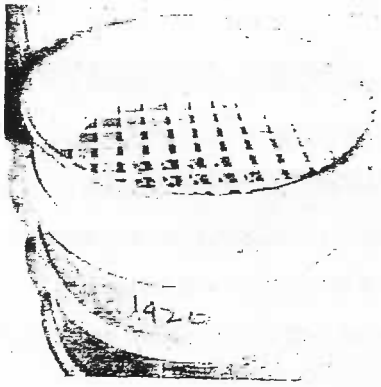

Figure C1-1
Coarse Aggregate Sieve

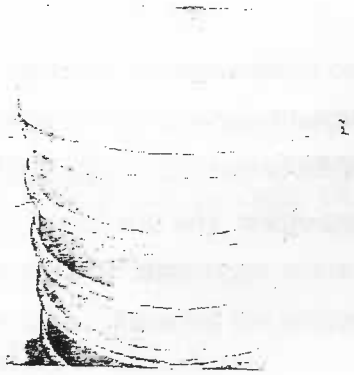

Figure C1-2
Fine Aggregate Sieve

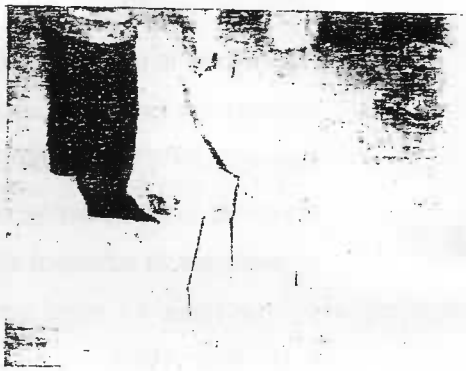

Figure C1-3
Riffle Box (Sample Splitter)

PROCEDURES

Fine Aggregate

1. Choose a representative sample by quartering (according to BS 812: Part 102: 1984) or by use of a sample splitter (Fig. C1-3). The sample to be tested should be the approximate weight desired when dry. For this experiment, weigh about 500 grams of fine aggregate.

2. Dry the samples to constant weight in the furnace at a temperature of 105° ±5° C.

3. Cool down the samples. Nest the desired sieves in order of decreasing aperture size from top to bottom.

4. Place the sample on the top sieve and agitate the sieves by mechanical sieve shaker for a sufficient period so that after completion, not more than one percent by weight of the residue on any individual sieve will pass that sieve.

5. Determine the weight of each size increment by weighing the residue contained on each sieve. This may be done in a cumulative fashion by starting with the smallest, particles in the bottom pan. After this weight has been determined, add the next larger particles into the same pan and determine the cumulative weight.

Coarse Aggregate

1. Choose a representative sample by quartering (according to BS 812: Part 102: 1984) or by use of a sample splitter (Fig. C1-3). The sample to be tested should be the approximate weight desired when dry. For this experiment, weigh about 3 kilograms of coarse aggregate.

2. Repeat procedure no. 2 to 5 as stated for fine aggregate using appropriate sieve size.

REPORT

The results of a sieve analysis can be represented much more easily using a graphic format, and for this reason-grading charts are used extensively. By using a log-chart it is possible to see at a glance whether the grading of a given sample conforms to the specification, or is too coarse or too fine, or deficient in a particular size. The common grading chart commonly uses ordinates that represent the cumulative percentage passing and the abscissa the sieve opening plotted to a logarithmic scale.

Compute the cumulative percent retained on, and the percent passing each sieve. Plot the gradation curves for the fine and coarse aggregates from the experiment on the gradation chart as attached in the lab sheet.

DATA :

A. Fine aggregate sample weight : _____ g

BS Sieve Size	Retained Weight (gm)	Passed Weight (gm)	Retained Percentage (%)	Passed Percentage (%)
5 mm				
No. 7 (2.36 mm)				
No. 14 (1.18 mm)				
No. 25 (600 μm)				
No. 52 (300 μm)				
No. 100 (150 μm)				
Pan				

B. Coarse aggregate sample weight : _____ g

BS Sieve Size	Retained Weight (gm)	Passed Weight (gm)	Retained Percentage (%)	Passed Percentage (%)
(20.0 mm)				
(10.0 mm)				
(5.0 mm)				
PAN				

Instruction:

1. Please enclose the calculation example for each fine and coarse aggregate.
2. Based on the results, draw the grading curve for each fine and coarse aggregate together with standard grading curve as given in Figure C1-4. Also, please give your comment on the properties of tested aggregates.

Figure C1-4: Typical grading curve for type M fine aggregate and 20 mm coarse aggregate