6. Determination of particle size and size distribution using sieving method

Aim: To determine the average particle size and size distribution using the sieving method.

Requirements: Granular sample, series of sieves (No: 20, 40, 60, 80, 100, and 120), mechanical sieve shaker.

Principle: A sieve, or sifter, is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample, typically using a woven screen such as a perforated mesh or metal. The particles sufficiently small will pass through and those that are over size retained on the sieve. A sieve will classify the particles as less than the dimension of mesh (undersize) and more than the dimension of mesh (oversize). A Sieving method (or gradation test) is a procedure used to assess the particle size distribution (also called gradation) of a granular material by allowing the material to pass through a series of sieves of progressively smaller mesh size and weighing the amount of material that is stopped by each sieve as a fraction of the whole mass. In this experiment powder sample is passed through a set of sieves arranged with descending aperture size (coarsest sieve at the top) the weight remained on each sieve quantifies the particle size.

Procedure:

1. Arrange the sieves on the sieve shaker with a larger aperture size on the top, followed by a smaller aperture size at the bottom.

2. Weigh 100 g of the supplied powder accurately, then place on the top sieve of the stack of sieves, cover, and shake (mechanically) for 20 minutes.

3. Weigh the remaining powder on each sieve.

4. Enter the data of results in the table

5. Plot a graph between mean size of aperture on x-axis and percent weight retained on y-axis that gives the size distribution of particles.

Observations and Calculations:

S. No	Sieve number Passed and retained	Mean of aperture size (µm) d	Weight retained on sieve (gm) (frequency) n	% weight retained	Cumulative percent retained	weight size (n x d)
1	10/ 20					
2	20/40					
3	40/60					
4	60/80					
5	80/100					
6	100/120					
			Σ n =			Σ n d =

The average diameter of the particles is given by

D = Σ n d/Σ n =

Sieve no (I P)	Aperture size (µm)
10	1700
20	840
30	500
40	420
50	300
60	250
70	210
80	180
100	150
120	125

Report: The average diameter of the particles of the sample ---------- µm