INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
© VISHWASHANTI MULTIPURPOSE SOCIETY (Global Peace Multipurpose Society) R. No. MH-659/13(N)
www.vmsindia.org

STUDY OF SIEVE ANALYSIS OF SEDIMENTS FROM KUMBHI RIVER BASIN, KOLHAPUR DISTRICT, MAHARASHTRA

Abhijit J. Patil[1], Yogita A. Patil[2] and H. S. Patode[3]

1. Department of Geology, Vivekanand College, Kolhapur
2. Department of Geology, Gopal Krishna Gokhale College, Kolhapur
3. School of Earth Sciences, S.R.T.M. University, Nanded

Abstract-

The study area is Kumbhi River basin, situated in Kolhapur district of Maharashtra. Geologically the area is covered by basaltic lava flows of Upper Cretaceous to Lower Eocene age. The representative sand samples are collected randomly from various parts of the study area and the sieve analysis is carried out with the help of ASTM sievers in laboratory. The distribution of particle sizes in the river sand is determined. The size distribution is of great importance as it affects the properties of an aggregate. Along with the size the composition of various elements present in the samples and its homogeneity is also found out. Statistical parameters like median, mean, standard deviation, skewness and kurtosis are calculated for the samples.

Keywords- sieve analysis, aggregate, size, composition, homogeneity

Introduction-

The study area is Kumbhi River basin, which is originated from Gaganbavda and flows further to meet Dhamani. It is a main tributary of Panchganga River. The river plays a major role in the formation of sediments and further modification of it. Hence the sediments reflect their processes of formations and the factors active in their formation. The size of the sediments is also the manifestation of the geological conditions prevailing at the time of their formation. Various sites are selected from the mouth of the river to its confluence and representative samples are collected.

The source rock, distribution of elements in samples, the compositional homogeneity or heterogeneity of the parent rock can be deciphered by carrying out the sieve analysis. Sieve analysis is a procedure used to determine the particle size and its distribution. It is also called as gradation. The behavior of material in use depends on its size. The result of sieve test describes the properties of an aggregate. The bulk density, physical stability and permeability are some of the properties of sediments. Thus sieve analysis plays an important role in the study of sediments.

Study area-

Kumbhi is one of the major tributaries of Panchganga. It originates near Gaganbavda and then flows at Northeast ward. Then it turns eastwards with a winding course and meets Dhamani. The river basin is made up of alluvium. Near Sagrul it has a sharp bend towards east.

The study area comes under survey of India toposheet No. 47 H/15. The area is bounded by Latitude 16° 19' 45" N. and Longitude 73° 50' 15".

Geology of the area-

The study area falls under Deccan Basalt Province of Upper Cretaceous to Lower Eocene age. The Deccan basalt shows in the form of lava flows. The flows are almost horizontal. Spheroidal weathering is also seen in most of the flows. As an effect of spheroidal weathering rounded boulders are formed. Columnar jointing is also seen. The flows are composed of vesicular basalt and compact basalt.

In the study area the basalt is underlain by laterite capping. The presence of lithomargic clay is also seen over the plateaus.

Methodology-

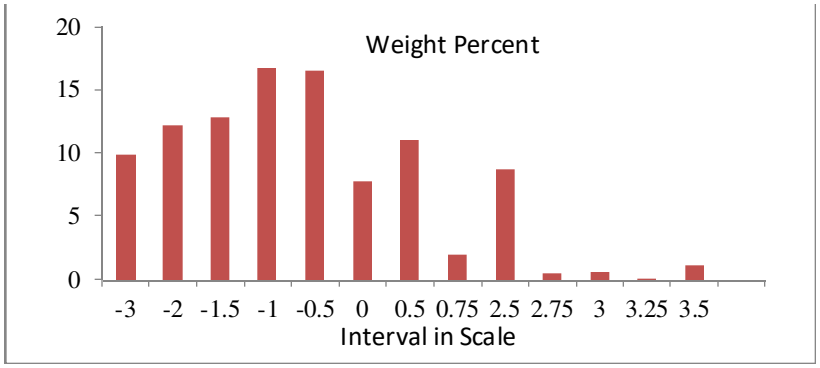
Grain size analysis of river sediments involves sieving, pipetting, conversion of weight values into percentage data, drawing of simple and cumulative frequency curves, finding out of percentile values and determination of size parameters.

Sieving- The size of pebbles, granules and sand sized particles is determined by sieving method. The samples are chosen randomly. The field studies are carried out to collect the samples from river bed. Laboratory investigation includes using ASTM sievers with mesh number 3, 5, 7, 10, 14, 18, 25, 30, 85, 100,120,150. The shaker is run for 10- 20 minutes. The materials retained in the sieves are carefully taken out and their weights are measured by a digital balance.

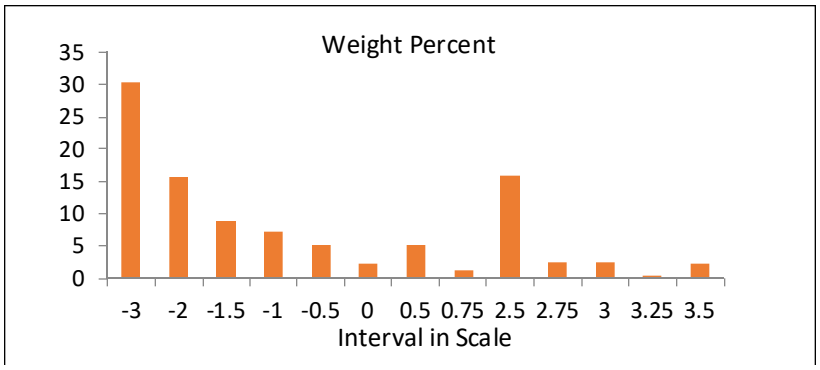
Analysis of data –

Table 1to 4 Size analysis data of Kumbhi river sediments.

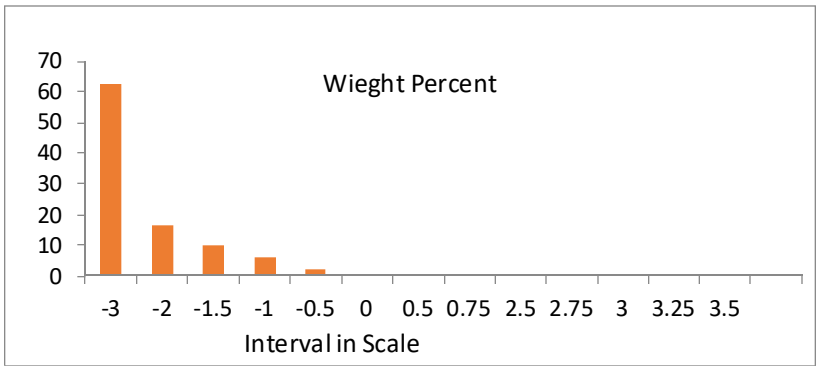
Sample-1				
Sieve No	Interval In Scale	Weight	Weight	Cumulative
		(Gram)	percent	weight percent
3	-3	117.813	9.87	9.87
5	-2	145.625	12.2	22.07
7	-1.5	152.908	12.81	34.88
10	-1	198.868	16.66	51.54
14	-0.5	197.444	16.54	68.08
18	0	92.989	7.79	75.87
25	0.5	132.161	11.07	86.94
30	0.75	23.319	1.95	88.89
85	2.5	103.431	8.66	97.55
100	2.75	6.107	0.51	98.06
120	3	7.361	0.61	98.67
150	3.25	1.532	0.12	98.79
170	3.5	13.514	1.13	99.92
		Total=1193.072		



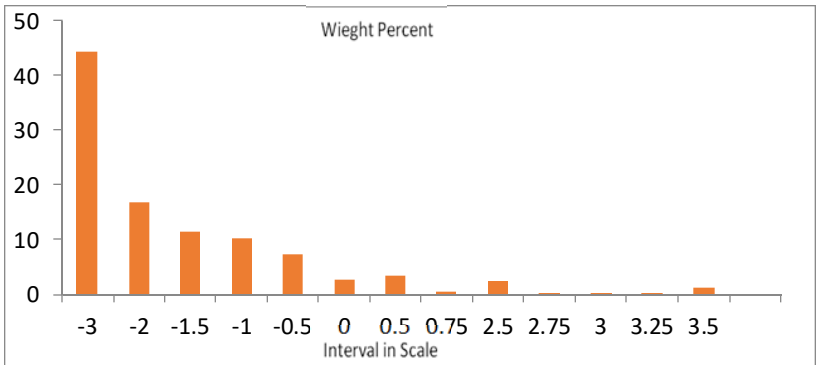
Sample-2				
Sieve. No	Interval in scale	Weight	Weight	Cumulative
		(Gram)	Percent	Weight Percent
3	-3	475.53	30.41	30.41
5	-2	240.737	15.66	46.07
7	-1.5	138.928	8.88	54.95
10	-1	116.15	7.42	62.37
14	-0.5	81.805	5.23	67.6
18	0	37.515	2.39	69.99
25	0.5	82.585	5.28	75.27
30	0.75	21.159	1.35	76.62
85	2.5	246.245	15.74	92.36
100	2.75	39.726	2.54	94.9
120	3	37.93	2.42	97.32
150	3.25	8.855	0.56	97.88
170	3.5	36.476	2.33	100.21
		Total=1563.641		



Sample-3				
Sieve.NO	Interval in Scale	Weight	Weight	Cumulative
		(Gram)	Percent	Weight Percent
3	-3	772.245	62.46	62.46
5	-2	206.959	16.74	79.2
7	-1.5	127.314	10.29	89.49
10	-1	77.635	6.27	95.76
14	-0.5	29.361	2.37	98.13
18	0	5.688	0.46	98.59
25	0.5	6.73	0.54	99.13
30	0.75	1.233	0.09	99.22
85	2.5	3.087	0.24	99.46
100	2.75	1.094	0.88	100.34
120	3	1.111	0.08	100.42
150	3.25	0.95	0.07	100.49
170	3.5	2.84	0.22	100.71
		Total=1236.247		



Sample-4				
Sieve.No	Interval in Scale	Weight	Weight	Cumulative
		(Gram)	Percent	Weight Percent
3	-3	445.323	44.35	44.35
5	-2	166.717	16.6	60.95
7	-1.5	114.175	11.37	72.32
10	-1	100.231	9.98	82.3
14	-0.5	73.016	7.27	89.57
18	0	25.047	2.49	92.06
25	0.5	31.78	3.16	95.22
30	0.75	5.02	0.5	95.72
85	2.5	22.985	2.28	98
100	2.75	3.401	0.33	98.33
120	3	3.634	0.36	98.69
150	3.25	1.405	0.13	98.82
170	3.5	11.241	1.11	99.93
		Total=1003.975		



Calculation of Statistical Parameters:

Sample - 1

Sr.no	Statistical parameters	Standard deviation	Nature of sorting
1	Median (Md)	-1.5	-
2	Graphic mean (Mz)	-1.18	-
3	Inclusive graphic standerd deviation	0.96	Moderately sorted
4	Inclusive graphic skewness (Sk1)	1.61	Very fine skewed
5	Graphic Kurtosis (kG)	1.55	Very leptokurtic

Sample – 2

Sr.no	Statistical parameters	Standerd deviation	Nature of sorting
1	Median (Md)	-1.75	-
2	Graphic mean (Mz)	-0.1	-
3	Inclusive graphic standerd deviation	0.75	Moderately sorted
4	Inclusive graphic skewness (Sk1)	2.89	Very fine skewed
5	Graphic Kurtosis (kG)	2.21	Very leptokurtic

Sample – 3

Sr.no	Statistical parameters	Standerd deviation	Nature of sorting
1	Median (Md)	0	-
2	Graphic mean (Mz)	-0.58	-
3	Inclusive graphic standerd deviation	0.28	Very well sorted
4	Inclusive graphic skewness (Sk1)	1	Very fine skewed
5	Graphic Kurtosis (kG)	0.18	Very playkurtic

Sample – 4

Sr.no	Statistical parameters	Standard deviation	Nature of sorting
1	Median (Md)	-2.65	-
2	Graphic mean (Mz)	-1.18	-
3	Inclusive graphic standerd deviation	-0.15	Very well sorted
4	Inclusive graphic skewness (Sk1)	3.36	Very fine skewed
5	Graphic Kurtosis (kG)	-0.15	Very playkurtic

Conclusion-

The computation of statistical parameters like mode, mean size, standard deviation, skewness and kurtosis are calculated for all the samples. The sample number 1,2,3,4 shows very fine skewness. The sample number 1 and 2 shows Moderately sorted standard deviation and sample number 3,4 is very well sorted standard deviation. The Kurtosis is sample number 1,2 is Very leptokurtic, sample number 3,4 is very platykurtic . The size of sediments is variable and the composition is mainly basaltic.

References-

1. Atlas of Rock forming minerals- Rabindra Nath Hota
2. Sedimentary Petrologly- Pettijohn F.T.
3. Maharashtra State Gazeteer Kolhapur District(1960)
4. Perkins Dexter, Henke K.R. second edition minerals in thin section