International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Review on Mineral Identification

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ABSTRCT :-

Mineral identification plays a crucial role in various scientific disciplines, including geology, mineralogy, and materials science. This abstract provides a comprehensive overview of recent advancements in mineral identification techniques. Traditional methods, such as visual inspection and manual testing, have been supplemented and enhanced by technological innovations, including spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy (SEM). Additionally, machine learning algorithms have been increasingly employed to automate and streamline the identification process, enabling rapid and accurate mineral classification. Furthermore, emerging techniques such as hyperspectral imaging and portable analytical devices are revolutionizing fieldwork by providing real-time data acquisition in remote locations. This abstract summarizes the strengths, limitations, and future prospects of these diverse techniques, highlighting their collective contribution to advancing our understanding of mineral composition, distribution, and properties.

INTRODUCTION:-

Different types of minerals can be identified by their physical characteristics. The physical properties of minerals are influenced by their chemical composition and bonding. Certain characteristics, like the hardness of a mineral, are more useful in identifying that substance. Color is definitely apparent and can be seen quickly, however it is usually less precise than other physical features.Inorganic materials known as minerals are produced by geological processes and exist naturally. Their crystalline structure and chemical composition are distinct. They are the basic constituents of rocks and the crust of the Earth. Understanding minerals requires an understanding of their origins, physical and chemical properties, and uses.

-TEXTURE: -

In-depth research was done in previous decades on the relationship between grain size distributions and depositional processes in addition to the mechanisms that led to their creation. For textural analyses, sifting is the most often used method over extended periods of time. (Blatt et al., 1980).In this instance, textural analyses pertaining to the size, sorting, skewness, and kurtosis of the sediments in Kolakkudi Lake were given special attention.The resulting data were used to better analyse the deposition's provenance and surroundings. Bivariant plots were used to study the interactions between the sediments that are reliant on different textural features of the sediments found in Kolakkudi Lake. An key technique for comprehending the transit mechanism and deposition environment of sediments is size analysis. Grain size distributions are mixtures of two or more populations created by different transit circumstances, as Doeglas (1946) has shown. A textural categorization system for curves to recognise Particular sedimentary habitats were created. Chapter III Texture was finalised by Mason and Folk (1958). Research conducted on the texture, geochemistry, and mineralogy of the modern sediments at Kolakkudi Lake, Musiri Taluk, Tiruchirappalli District, Tamil Nadu, India. showed it was possible to distinguish between the aeolian flat sands from Mustand Island, Texas, and the beach using a plot of skewness vs kurtosis.The best way to distinguish between beach sand and dune or river sand was to use scatter plots of mean size vs standard deviation and skewness versus standard deviation. The degree of transit from the originating location determines how round the grains are. One useful metric for assessing the abrasion history is roundness. The many geologic constraints, including relief and the kind of source rock, the grains' mineralogy, distance, and mode of movement. It might be challenging to choose which roundness class to assign a particle to since Krumbein (1940) developed nine alternative roundness values that are quite near to one another.Pettijohn (1975) used a technique to modify the aforementioned scale. It makes use of Power's (1953) roundness scale. Six roundness classes were present, and they all roughly matched a −2 geometrical scale. The roundness values are now determined by comparing the sand particle photographs with charts. The most fundamental characteristic of sediment particles that influences entrainment, transport, and deposition is grain size (Ikhane et al., 2013). Analysis of grain size is frequently essential to ascertain temporal variations in sediment and their impact on environments of depositional flow.The pattern that the constituent grains of sedimentary rock create is referred to as texture.The basic descriptive measurement of sediments and sedimentary rocks is grain size analysis.Studies of sediment grain sizes will shed insight on different depositional processes, such as particle nature. With the use of mathematical techniques, sedimentologists have worked hard to characterise various grain-size distributions and divide the constituent parts of polymodal sediments. By Jule Xiao and others (2013). Distribution of grain sizes The characteristics of the sediments are determined by their source materials, weathering processes, grain abrasion and corrosion, and sorting procedures during transportation and deposition. According to Barretti and Bothner (1993), Badarudeen et al. (1996), Alien and Duffy (1998), and others, the picture of the grain size spectrum, its characteristics, and statistical parameters are employed to gain insight into the formational mechanism of sedimentary frame works, particularly of estuarine systems. Determining the depositional habitats may be more successful if the textural study of the sediments is carefully examined (Pettijohn, 1957; Griffiths, 1967; Alien, 1970 and Goldberg, 1980). In addition, the grain sizeDistribution can also inevitably affect the chemical (Forstner and Wittmann, 1983) and mineralogical (Mishra, 1969; Patro et al., 1989) composition of sediments. A thorough review of statistical data showed that distinct textural features might be successfully combined to distinguish between ancient and modern depositional settings (Pettijohn, 1957; Griffiths, 1967; Alien, 1970 and Goldberg, 1980). In addition, the distribution of particle sizes can always affect the chemical (Forstner and Wittmann, 1983) and mineralogical (Mishra, 1969; Patro et al., 1989) composition of sediments. The goal of this study is to investigate Kolakkkudi Lake's grain size characteristics. The size composition of sediment is determined by the hydrodynamic circumstances that exist during the deposition of clastic deposits, according to Uden (1914).The investigation of Research conducted on the texture, geochemistry, and mineralogy of the modern sediments at Kolakkudi Lake, Musiri Taluk, Tiruchirappalli District, Tamil Nadu, India. A distinct line of supporting evidence for the interpretation of clastic deposits with an unknown origin would come from granulometric examination of sediments, according to Visher (1969). Several techniques for granulometric analysis are given. For determining size, the majority of approaches advise either determining the shape (Krumbein, 1932) or approximating the particle shape to spheres (Krumbein & Pettijohn, 1938). As a result, standardising an appropriate procedure that takes into Various visual approaches for computing grain size analysis have been supported by numerous sedimentologists (Trask, 1932; Krumbein, 1936; Inman, 1952; Folk & Ward, 1957). Krumbein (1936) and Trask (1932).The parameters' description were employed to express the attributes' quartile measure in millimetres. Among the several techniques put out to examine size distribution, Inman's (1952) approach focuses on 74% of the curve.88% of the curve could be accounted for in the Folk and Ward (1957) approach for size interpretation. A few years later, McCammon (1962) employed criteria that covered 97% of the size, but more laboriously and slowly than Trask's (1934) sorting methods. Folk and Ward's (1957) further research revealed that the Inman measure is better appropriate for underprivileged. Their research was helpful in defining the nature of deposition. Additionally, Passega (1957) also shared his patterns for deposits depending on beaches, calm sea, and currents. FM was suggested by Passega et al. (1967) and Passega and Byramjee (1969).,The finest fraction of a deposit would be characterised by the LM and AM diagrams. These diagrams' combination has provided a clear record of the types of deposition and their depositional settings. Seralathan (1986) and Roy and Biswas (1975) also sought to use CM diagrams to distinguish between the different contexts. Numerous investigations were conducted in our nation to define the environmental relevance in relation to textural criteria. The Gulf of Kutch sediments have been shown to be polymodal, meaning that they came from multiple.

-MINERALOGY: -

In their native condition, minerals include inorganic elements or compounds. Its makeup has to be such that a specific chemical formula may be used to describe it. Its internal organisation must be well-organized. Minerals provide information about the impact of dynamic processes on the initial size distribution, and the physical breakdown at the source. Mineral stability is reliant on the weathering process.It significantly alters the sediments' source minerals. The stability of a mineral is determined by how well it can withstand this alteration.If the components of sediments are known, the depositional history of a sedimentary basin may be tracked. Several processes start as soon as the minerals are extracted from the rocks that constitute their source.

In actuality, the sediments that reach the rocks determine their composition. the washbasin.In turn, the distance that the weathering products travel determines the nature of the sediments. an understanding of the energy conditions and composition of the depositing medium when the percentages of clay, light, and heavy minerals are known. The texture of sediments directly affects the mineralogical makeup of such sediments. The transit and deposition environment control the provenance. A good image of the source rock from which the sediments have been discharged may be seen from the study on the mineralogical composition of the sediment. A few of the heavy minerals area feature of some source rocks. Mineral affinities amongst sediments from the same provenance should often be the same. But occasionally, samples within a group might differ significantly in terms of mineralogical Research on the Colakkudi Lake, Musiri Taluk, Modern Sediments' Texture, Mineralogy, and Geochemistry Tamil Nadu, Tiruchirappalli District, India. composition. Rapid compositional changes, particularly in river sediments, can be caused by tributaries adding new minerals, different hydrodynamic conditions eroding bottom components during movement and deposition, and selective .

Important Features of Naturally Occurring Minerals:

1. Minerals are formed by unaltered geological processes that occur naturally.
2. Inorganic: The elements or compounds that make up minerals are usually not organic, meaning they are not produced from living things.
3. Definite Chemical Composition: Within certain bounds, the chemical formula of each mineral is unique.
4. Crystalline Structure: The internal atomic arrangement of minerals is organized, exhibiting a predictable and recurring pattern.

Uses of Minerals

Minerals are vital to human society for various reasons:

Economic Value: Minerals like gold, diamonds, and other gemstones are highly valuable.

Industrial Applications: Minerals are used in the production of metals, construction materials, electronics, and many other industries.

Nutritional Value: Some minerals are essential for human health (e.g., calcium, iron).

HEAVY MINERALS:

The most complex and variable part of terrigenous rocks are the heavy minerals.Numerous things impact them, therefore it's important to pay close attention to them. assessed in order to arrive at an accurate interpretation. Forecasting of sedimentary basin mineral deposits, such as "heavy mineral sands" (HMS), is made possible by the reconstruction of paleohydrodynamic parameters (Alexander Lalomov et al., 2013).The primary determinant is the composition of the parent rock, although stability during weathering and diagenesis, as well as the size, shape, and specific gravity of the minerals, are also significant considerations. The lithologic composition of drainage basins on surrounding land masses with varying main rivers has a significant impact on the heavy mineral assemblages found in lake deposits. In sedimentary sequences, heavy minerals are sometimes the sole way to reconstruct origin. The composition, morphology, and size of the minerals found in the sediments were examined to determine where contemporary sands originated. The majority of heavy minerals are sensitive markers of and limited to certain source rocks. provenance, if variations in sediment source locations can be distinguished statistically. According to Inga Sevastjanova et al. (2012), it is a comprehensive method that provides insights into all kinds of rocks that add debris to siliciclastic deposits.In order to aid in a clearer comprehension and explanation of the mineralogical study findings, the Kolakkudi lake has been segmented into three zones:

Part I: Inlet Part Part II: Central Part Part III: Outlet Part

The presence of heavy minerals reveals the source rock's mineralogical makeup. However, additional activities that occur during the sedimentary cycle may occasionally also have an impact on their composition (Morton, 1985). These processes include: (i) weathering in the source region; (ii) transport process impacts; (iii) hydraulic conditions during the depositional phase; and (iv) the digenetic processes that take place following the deposition (Morton and Johnsson, 1993). Heavy mineral assemblages may result from a variety of processes, including uplift, increasing stream gradients, and gradual erosion and unroofing of new source rocks. Ultimately, the majority of stable minerals endure weathering. In a subsequent procedure, less stable minerals weather and are transported to the deposition location in an environment that is primarily arid. To comprehend the function of every process involved in weathering, transport, hydraulic conditions, and sediment diagenesis engaged in the production of assemblages of heavy minerals.For simpler identification, a variety of heavy mineral diagnostic qualities listed in Milner (1962) and Rothwell (1989) are used. Heavy minerals range in form from angular to subangular, with very few grains having a rounded or subrounded shape.As per Vaseem Akram et al. (2015), the angular to subangular mineral grains suggest that they originate from the basic igneous and metamorphic rocks.

CLAY MINERALS:

The weathering of a wide range of rocks on continents is often the source of clay minerals, with their quantitative and qualitative characteristics depending on the weather and the degree of deterioration. In sedimentology, clay is a size class finer than 8Φ that is the result of weathering; in mineralogy, clays are a unique class of minerals. Tetrahedral and octahedral atom layers make up the two types of atom layers found in clay minerals. According to Konta (1985), they are the most prevalent inorganic substance on Earth's surface, formed by the reaction of weathering processes with exposed rocks. The isotropic nature of clays is another significant characteristic.The majority of the minerals that make up clay are aluminium silicates, which come from the For a number of reasons, clay mineral study has long piqued the curiosity of many geologists. According to Keller (1963), clay minerals, which make up the majority of the sediments' fine fractions, are the reactive reactions of geological materials that are typical to particular settings. As a result, the clay mineral composition of the sediment may provide crucial hints that help to understand the circumstances surrounding its deposition. Research on clay minerals has yielded a wealth of information on the composition and characteristics of clay minerals in prehistoric deposits. Additionally, the makeup and distribution of clay minerals have been employed as markers for the dispersal of sediments in maritime environments (Biscaye, 1965; Gryphon, 1962). Furthermore, Inferring fine-grained sediment distribution and current patterns can be done with the use of clay mineralogy. Therefore, knowledge of clay minerals is necessary to fully comprehend the sediments' environment and place of origin. Many mechanisms can result in the formation of clay minerals. Some are permanent weathering remnants, while others are the result of hydrothermal changes or are reconstituted during reverse weathering processes. In hydrothermal systems found predominantly at sea floor spreading centres and less frequently in continental settings, clay minerals are formed via near-surface weathering, diagenesis and metamorphism, or, less frequently, direct precipitation in lake basins or from magmatic sources.

Garnet

The characteristic hue of garnet ranges from white to pink and pinkish brown. The non-opaque mineral found in the research region at the highest concentration. et al. Sabeen (2002) investigated the reconstruction of sediment dispersion from well-known parent rocks using garnet composition. In fine sand, the average proportion of pink garnet is 51.74%, whereas in extremely fine sand, it is 46.23%.The distribution of pink garnet by sector shows that the average number percentages in the fine grain fraction for the Inlet, Central, and Outlet sectors are 53.91%, 5988%, and 41.33%, respectively, while for the very fine grain fraction they are 44.73%, 53.41%, and 40.56 %.The extremely fine fraction (16.58%) and the average number of percentages of fine sand fraction (14.87%), respectively,

Zircon

The nature of zircon is prismatic. There are also a few rounded grains visible. As seen in Plate -4.6, they are primarily colourless. The zircon's morphological characteristics are based on the chemical and physical circumstances. As a result, zircon morphology is frequently used as a petrogenetic marker. The distribution of zircon in Kolakkudi Lake does not appear to be trending much, according to sector-wise analysis. It was noted that the minor quantity percentage in the Central section is 0.37%, but it is 0.48% in the Inlet area.

Amphiboles

The heavy mineral assemblage's main amphibole mineral is found to be hornblende. Its tint ranges from green to bluish green. The mean In fine sand, the amphibole count is 1.92%, whereas in very fine sand, it is 2.22%. A comparison analysis shows that the proportion of amphiboles is higher in the fine-grained fraction and lower in the very fine sand. Average amphibole yielded average values of 1.71%, 1.75%, and 1.96% in the fine grain fraction and 2.72 %, 2.54%, and 1.42% in the very fine grain fraction, according to sector-wise statistics reported in the Inlet, Central, and Outlet sectors. The field shows that the fine sand fraction contains at least a small amount of amphibole.Verdant hornblende

Pliable

It is a common accessory mineral found in metamorphic rocks, especially in amphiboles, gneisses, and shists. In igneous rocks, it has little significance.Rutile occurs Plate 4.4 shows only on very tiny amounts in the Kolakkudi Lake's fine and very fine sand fraction. In the fine sand fraction, the average percentage of rutile is 0.43%, whereas in the very fine fraction, it is 0.28%.In the fine sand fraction, the sector-wise distribution for the Inlet, Central, and Outlet sectors is 0.58%, 0.41%, and 0.31%, while for the very fine sand fraction, it is 0.30%, 0.23%, and 0.29%.

HEAVY MINERALS' CONCENTRATION IN THE FINER VERSUS

ULTRA FINE FRACTION: For an analysis that compares the various minerals in the finer and Plotting is done for the appropriate extremely fine fraction Since heavy minerals are not hydrodynamically mobile like light minerals are, current velocities higher than typical are required for the transportation and concentration of heavy minerals (Rajganapathi et al., 2012). In this study, significant variations in the ratios of the main heavy minerals are found. Regarding opaques, every sample displays a relative enrichment in the finer percentage, with the exception of station KLKD-12. An enrichment in the finer fraction compared to the extremely finer fraction The trend is true even in samples (KLKD-1, KLKD-3, and KLKD-5) with low rutile contents. There is a significant difference in the other minerals, epidote and actinolite, which are found in substantial numbers. two parts. Hornblende is abundant at stations KLKD-9 and KLKD-11, while muscovite is being depleted in the finer fraction. There is biotite in KLKD-2 and KLKD-8 stations. The low content of total heavy minerals in the very finer fractions and the remarkable similarities between the heavy mineral assemblages in the two fractions—despite the persistence of size-induced sorting of the heavy minerals—are the driving forces behind the attempt to conduct a thorough mineralogical study of the finer fractions alone.

THE WHOLE HEAVY MINERAL VARIATION'S CAUSES:

The weight percentages of all heavy minerals are often seen to be declining in the two size grades (0.25 -0.12 mm and 0.10-0.063 mm) in the downstream and a greater percentage of heavyweights in the finer grade as opposed to the extremely finer grade. The fact that grain size decreases downstream has already been noted. Pollack (1961) noted a comparable fluctuation in the channel sands of the South Canadian River and attributed the phenomena to the size-density and hydraulic equivalency relationships.He has agreed with Rittenhouse's 1943 viewpoint. The current's velocity and the tendency of decreasing grain size and heavy particles are connected. It is evident from the explanation above that Kolakkudi Lake has a significant concentration of heavy metals in its finer-grade sediments. It could be the result of quartz grains and medium-to-fine heavy particles settling together. Briggs (l965) clarified as to why the The heavy and light minerals' maintenance of hydraulic balance is a legitimate source contribution. The heavy material cannot settle quickly because of the coarse mineral, such as quartz. Therefore, in the sediments of the Kolakkudi lake, the decline in heavy minerals of both grades downstream may be attributed to the following factors: (i) their resistance to being readily entrained by low energy currents after deposition; and (ii) their protection against coarser materials. There is another good reason: because of their different densities, lighter minerals cannot settle during transit at the same location as heavier minerals that are carried by the currents. Assessing the minerals that are lighter are moved and dumped farther downstream, lowering the proportions of Research on the Colakkudi Lake, Musiri Taluk, Modern Sediments' Texture, Mineralogy, and GeochemistrY hefty.Given that heavier minerals move at the same frequency as quartz, this might counteract the presence of heavier minerals.

The Downstream Variation In Mining Is Caused By:

Pettijohn's groundbreaking research from 1957 sheds insight on the reasons of downstream variance. He went into great detail about the several elements that may potentially alter the sediment's heavy mineral content between the origin and the depositional location. Several variables influence the distribution of heavy minerals, including 1) The source area's weathering mode 2) Destroying the minerals 3) Mineral specific gravity 4) Variation in grain size 5) Grain sorting that is selective 6) Sediment post-depositional alterations The depositional environment's energy. wave energy, turbulence, and the relative location of the microenvironment all affect how different minerals vary in size and are in harmony with textural factors.

- **Weathering It Selected**

In severe circumstances, weathering can lower the percentages of unstable minerals and change the surface roughness of some unstable minerals. Each grain travels separately.via a series of phases that include surface corrosion, deterioration along weak zones, and size reduction until a mineral species is completely eliminated (Grim, l953). This weathering and reworking process can lead to a very complex distribution of heavy minerals. In Kolakkudi Lake, this phenomena is observed in the heavy minerals. To be sorted out as valuable mineral material, the debris provided by the various weathering conditions must travel through river and lacustrine deposits.

- **Abrasive Selection**

The physical stability and chemical reaction susceptibility of heavy minerals are indicated by their abrasion. The resilience of minerals has been empirically demonstrated to be connected to its hardness. Friction causes abrasion, which progressively causes the trash to wear out throughout the riverbed's passage. The hardness of the grains and the movement velocity are also connected to this abrasive component. It is anticipated that all grains will become worn out after a specific amount of time. The rate of wear for different mineral grains varies significantly, according to laboratory analysis of a sample taken from the research region. Not all minerals are equally resistant to abrasion while in transit.

c) Sorting Selectively

In shallow seas, heavy minerals will undergo a unidirectional shoreward transit in contrast to light minerals, according to Seibold's 1963 observation. This is primarily because heavy minerals can be transported shoreward under the crest but not seaward under the trough due to their size, density, and location. Sorting can alter the absolute and relative abundance of heavy minerals during erosion, transport, and deposition.

d) Sorting In Stages According To Form And Specific Gravity

Alluvial sediments are transported more quickly during floods based on the size, shape, and weight of the minerals, which results in non-uniform sedimentation. the sediments' dispersion. The Kolakkudi lake sediments' heavy mineral composition shows that as one moves downstream, amphiboles and actinolite grow while opaque and garnet diminish.

-GEOCHEMISTRY

The study of Earth's and other planets' chemical makeup is known as geochemistry. It is a subfield of chemistry and Earth science.Understanding the composition, formation, and evolution of the Earth and other planets is possible via the study of geochemistry. Geochemists examine the chemical makeup of rocks, minerals, liquids, and gases using a range of methods.A valuable resource for learning about Earth and other planets is geochemistry. It may be used to research how the Earth and other planets formed and evolved as well as to comprehend the mechanisms that regulate their composition.

Principal Aim of Geochemistry

Understanding the mechanisms that regulate the number and distribution of metals and minerals is the primary goal of geochemistry, and it is used to interpret the past of the Earth and other planets.

Geochemistry In The Minerals

Geochemists examine the makeup of rocks, minerals, soils, water, and air using a range of analytical methods. Principal Aim of Geochemistry Understanding the mechanisms that regulate the number and distribution of metals and minerals is the primary goal of geochemistry, and it is used to interpret the past of the Earth and other planets. Geochemists examine the makeup of rocks, minerals, soils, water, and air using a range of analytical methods. Mineral Deposit Geochemistry grasp the mechanisms that result in commercial concentrations of minerals—whether they be caused by weathering agents, hydrothermal, magmatic, metamorphic, hydraulic (both surface and subsurface), or a combination of these—requires a solid grasp of geochemistry. Exploration also benefits greatly from geochemistry. This collection contains in-depth discussions on all these topics by recognised authorities. The goal is to create a treatise on ore deposits that emphasises their geochemistry while also providing geological models to provide a comprehensive knowledge of their origins and exploration guidelines. Numerous chapters serve as a current update to the well-known "Geochemistry of Hydrothermal Ore Deposits," which was last published in a third edition in 1997 and was edited by Hubert L. Barnes, my PhD supervisor.

Geochemistry In The Environment

Understanding the causes of the 1986 Lake Nyos gas tragedy, which claimed 1700 lives, was made possible in large part by geochemistry (Baxter et al., 1989; Evans et al., 1989). The main reason for the widespread asphyxiation of people and animals residing in low-lying regions around and downstream from the volcanic lake was found to be the massive emission of gases high in carbon dioxide from the volcano's crater lake. Numerous studies concurred that volcanic activity was ultimately the source of the CO2. The question of whether the eruption was phreatic in origin or the product of limnic overturn and pressure release of lake waters that had become CO2-charged by volcanic degassing over a long period of time was hotly debated.

CONCLUSION

The region's geology, which includes these three deposits, has been described. Given that this region is a component of the Eastern Ghats. A quick overview of the lithology, structure, and geology of the Eastern Ghat has been made available. Three deposits—the Srikurmam, Bhimunipatnam, and Kakinada deposits—have had their local geology discussed. The morphology of each deposit examined in this inquiry, as well as a description of the accessible rock types, have been provided. Using established techniques, the textural examination of sand samples from each of the three deposits has been completed. The Kakinada, Bhimunipatnam, and Srikurmam deposits, in particular, have been examined for their textural differences across several subenvironments. These comprise the dunes and the beach's shoreline and backshore. After tabulating, analysing, and discussing the facts, logical conclusions have been reached mineralogy of the three deposits' worth of ilmenite grains. Sections of the ilmenite grains are mounted, polished, and separated. Under DMLT reflected, these polished grains are investigated.light microscope produced in Germany by Leica. The ilmenites of Srikrirmam and Bhimunipatnam showed outstanding exsolution characteristics, according to ore-mineralogical research . On the other hand, the ilmenites from Kakinada show homogenous ilmenite grains and are completely distinct from those from the other two deposits. Three deposits' worth of ilmenites have been isolated and submitted to geochemical examination. The concentrations of ilmenites in major, minor trace, and REE from three Standard analytical techniques have been used to determine the deposits from two environments: beaches and dunes.

REFRENCES

1. Kashiwaya K., A theoretical analysis of drainage density temporal fluctuation. Landforms and Earth Surface Processes, 12, 39–46, 1987

2. In the Journal of Environmental Geography, 6(3–4), 49–54 (2013), Agnes Kun, Orsolya Katona, Gyorgy Sipos, and Karoly Barta compare the granulometric content of samples of river silt using pipette and laser diffraction methods.

3. Measures for characterising the sediment size distribution, Inman D.L. Journal of Sedimentary Petrology 22, 125–145 (1952)

4. Folk R.L. and Ward W. Journal of Sedimentary Petrology, 27(1), 3-26 (1957): Brazos River Bar: A study on the relevance of grainsize factors

5. Mason C.C. and Folk R.L., Size analysis for distinguishing between aeolian flat settings and coastal dunes. Mustang

6. Grain-Size Analysis and Heavy Metals Distribution in Sediment Fractions of Lake Adiyiah, Mike A., Acheampong Ebenezer, Ansa D.O., and Kelderman P. International Journal of Environmental Science and Toxicology, 2(8), 160-167 (2014),

7. Markermeer in the Netherlands Using Sieving and Unknown Sand Samples for a Sedimentation - Stratigraphy Class Project with Linkage to Introductory Courses, Patricia E. Videtich and William J. Neal, (2012)

8. In the Quaternary sediments of Lake El'gygytgyn, NE Russia, Francke A., Wennrich V., Sauerbrey M., Juschus O., Molles M, and Brigham-Grette J. conducted multivariate statistical and time series analyses of grain-size data (2013). Clim. Past Discuss, 9, 217-244

9. Dinesh A.C., Geologist, Marine Wing, created and developed G-Stat-A Software in VB6 for Grain size Statistical Analyses, CM Diagrams, Trend Diagrams, etc.

10. Mahavir Singh Size Analysis of the Upper Siwalik Sediments, Late Pliocene-Early Pleistocene, Northwestern Himalaya, India, A.R. Chaudhri, International Journal of Geosciences 4 (2013) 1120-1130

11. Size versus sorting in some Caribbean sediments: Griffiths J.C. Journal of Geol., 59, 211-243 (1951)

12. Friedman G.M., J. Sediment. Petrol., 37, 327-354 (1967): Dynamic mechanisms and statistical characteristics compared for size frequency distribution of beach and river sands

13. Journal of Chemistry Volume, Article ID 387035, 13 (2013). Mohammadreza Gharibreza, Muhammad Aqeel Ashraf, Ismail Yusoff, and John Kuna Raj, An Evaluation of Bera Lake (Malaysia) Sediment Contamination Using Sediment Quality Guidelines

14. Grain Size Analysis of the Sediments from Ogun River, South Western Nigeria Earth Science Research, 2(1), Itunu Comfort Okeyode and Norbert Nnamdi Jibiri (2013)

15Journal of Sedimentary Petrology, 34, 73–83 (1964), Sahu B.K., Depositional processes from the size study of clastic deposits.

16. Studies on textural analysis by Ganesh B., Naidu A.G.S.S., Jagannadha Rao M., Karuna Karrudu T., and Avatharam P. features of the sediments from the Gosthani River Estuary in J. Ind., East Coast of India, Bheemunipatnam, A.P.Union, Geophys., 17(2), 139–151 (2013)

17. Downstream fining a network of rivers with gravel beds by Pizzuto J.E. Water Resources Research, 31, 753-759 (1995)

18.Principles of sedimentology and stratigraphy, by Boggs S. Jr., Fifth Edition, Upper Saddle River, NJ: Prentice Hall, 585 (2012)

19.Principles of sedimentology and stratigraphy, by Boggs S. Jr., Fifth Edition, Upper Saddle River, NJ: Prentice Hall, 585 (2012)

20.Environ Earth Sci., (2012) published a paper titled "Sediment characteristics and water physicochemical parameters of the Lysimachia Lake, Western Greece," by Avramidis, Samiotis, Kalimani, Papoulis, Lampropoulou, and Bekiari. Passega R. (1964) used CM patterns to describe grain size as a geological tool in Journal of Sed. Pet., 34, 830–847.

21. Visher, G.S., Deposition process and grain size distribution, Jour. Sed. Pet., 39, 1074–10106 (1969)

22. Textural parameters: An evaluation by Moiola R.J. and Weiser D. Journal of Sedimentary Petrology, 38 (1), 45–53 (1968)

23.Roser BP (2009), Ahmed F, Bibi MH, Seto K, Ishiga H, Fukushima T, and Roser K.trace metal concentrations, distribution, and sources in the Japan Nakaumi-Honjo Coastal Lagoon Sediments. Assessment of Environmental Monitoring, 167:473–491.

24.Diallo IM, Ishiga H. (2016) Evaluation of tidal flat sediment geochemical analysis as a basis for trace metal pollution in Ise Bay, Mie Prefecture, Central Japan. 5(1):92–109; Environment and Pollution.

25. Nandini, N. and S. Jumbe (2009). Values of sediment quality and heavy metal analysis in urban lakes. Environmental Science, Amer. J., 5, 678–687.

26. Osman A. and P. Kelderman (2007). Water Resources. 41 4251–61. Effect of redox potential on heavy metal binding forms in contaminated canal sediments in Delft (The Netherlands).

.27 Lee SV, Cundy AB. (2001) Heavy metal pollution and the process of mixing in sediments from the Eastern Humber Estuary

28.Distribution of Trace Elements in Sediments and Biota of Pradit, Siriporn, Wattayakorn, Gullaya, Angsupanich, Saowapa, Baeyens, illy, Leermakers, Martine (2010)

29.Water, air, and soil pollution in Songkhla Lake, Southern Thailand, Volume 206, Issues 1-4, Pages 155–174, 2010.

30. Cd, Cu, Pb, and Zn in Lagoonal Sediments from Mazatlan Harbour (SE Gulf of California): Bioavailability and Geochemical Fractioning, Soto-Jimenez M, Paez-Osuna F. (2001). 66:350-356 in Bulletin of Environmental Contamination and Toxicology.

31. P. P., Tarun K. Dalai, and R. Rengarajan (2004). Geochemical Journal, Vol. 38, pp. 441–453, Patel Sediment Geochemistry Of The Yamuna River System In The Himalaya:Implications To Weathering and Transport

32. Chen S H, Ho S T, Tsai L J, and Yu K C. (2001). Wat. Res. 35 4086–94: Chemical binding of heavy metals in anoxic river sediments