International Journal of Veterinary Science and Agriculture Research
Volume 4 Issue 6, November-December 2022
ISSN: 2582-4112, Available at www.ijvsar.com

Iron Ions rate and some minerals in a part of Iraqi rivers

Nebal Ahmed , Safa Mohammed

***For Correspondence**

Nebal Ahmed
,
Nwhiteflower79@yahoo.com

Keywords: *About five key words in alphabetical order, separated by comma.*

Abstract: *The search implemented to measure the rate and percentage of Fe radicals and Ions, beside minerals by choose two site on both Iraqi rivers in Baghdad. The Tigris river, manifestation of dark oxides reflected Fe consist of it (41.and 39.9%), Chlorites (5.3 and 8.1%) and Pyroxene (5.8 and 4.7%) and others, while the Euphrates river sediments, opaque minerals were detected represented by Fe oxides (43.6 and 43%), Chlorites (6.6 and 8.8%), Pyroxene (6 and 4.5%), In the other hand, light sand minerals in the sediments of the Tigris river, as mono crystalline Quartz (28.4, 29.9%), Polycrystalline (2.4, 1.1%), Microcline (1.2, 1.6%), Orthoclase (3.1, 4.7%) and Plagioclase (1.2 ,1.5%) and Carbonate rock crumbs (36.5 and 35.4%) and Churt rock (7.3 and 6.5%), and igneous rocks (2.1 and 1.6%), metamorphic fragments (1.9 and 2.3%), clay fragments (5.2 and 7.8%), and Evaporates (6.2 and 4.5%). While the Euphrates river, light minerals observed mono crystalline (24.5 and 26.6%) and Polycrystalline Quartz (2.6 and 1.7%) Microcline (2.8 and 1.2%), Orthoclase (2.4 and 4.4%), Plagioclase (3.6 and 2.4%), Carbonate rock crumbs (32 and 37.5%), Churt rock (9 and 5.9%) and igneous rock fragments (2.5 and 1.6%). Metamorphic rocks (3.2 and 2.8%), clay rocks (8.3 and 6.2%), and Evaporites (4.5 and 5.1%).The predominance of rock fragments minerals, Quartz (as for Feldspar), the predominance of Orthoclase was appeared, beside dominance of Magnetite minerals over Hematite in the fine and coarse sand separated, and the superiority of coarse sand in the proportion of oxides The results showed the predominance of rock fragments, then Quartz, while Feldspar showed the predominance of the Plagioclase mineral and the predominance of Magnetite mineral only without Hematite in the fine and coarse sand separated, and the superiority of coarse sand in the proportion of oxides. ides.*

I. INTRODUCTION

The process of mineral analysis of soil is important in diagnosing the rocks from which the soil was formed, as the qualitative similarity of minerals between the horizons forming the soil, gives an idea of the homogeneity of the origin material constituting those horizons. This indicator is used to determine the homogeneity of the original material, especially when the pedogenic processes taking place in the soil are more obvious, by estimating the presence of weathering-resistant minerals, especially the amount of zirconium, titanium and silicon minerals, and comparing their content within soil horizons [1].

Sand minerals are one of the natural resources spread in the earth's crust, which are products of the weathering processes of various source rocks, such as igneous, sedimentary or metamorphic, which differ in their mineral content from Quartz, Feldspar and others. The Feldspar minerals are one of the important components in sand minerals; of great importance in the study of the genetics and evolution of soils; so it is considered the important hereditary link in the evolution of mineral weathering processes, its location in the middle of the chain of formative interactions gave it great importance in understanding the processes of soil evolution and weathering. The color is also one of the important and distinctive features of the primary luster. Quartz and aluminous silicate are light in color and constitute most of the light sand minerals, while heaviest sand minerals form a group of manganese Iron minerals, which are characterized by their dark color tending to black as a result of the presence of the ferrous ion within their mineral composition [1,2].

Many studies have been conducted on the mineral composition of the Iraqi sedimentary soils, where the differences in the mineral composition of the Iraqi sedimentary soils are due to the differences between the sediments of the Tigris and Euphrates rivers, which are due to the difference in their sources [3]. The studies concluded that the mineral composition of the Iraqi sedimentary soils consists of minerals Montmorillonite, Chlorite, and Mica with some Quartz, Vermiculite, Palygorskite, Calcite, and Smectite group and mixed minerals in the clay minerals, as for heavy sand minerals, Amphiboles, Pyroxene and small amounts of Zircon, Tourmaline and Rutile predominate. As for light sand minerals, Quartz, Calcite, Gypsum, Muscovite and Biotite predominate. A Scientific noticed during her study the low percentage of heavy metals compared to the group of light minerals separated by sand in the soils under study [4].

Other scientific researchers found a comparison of the mineral composition of separated sand in different gypsum soils from the sediments of the Tigris and Euphrates to the predominance of light minerals for the very fine sand part in all horizons of the study's pedonite soils, as it reached a percentage of more than 94% compared to heavy minerals, which were dominant for evaporates in all studied pedonite soils, followed by Quartz, then Carbonate rocks, rock fragments, Feldspars, and limestone respectively[5] .Sedimentation is the last geological process, and it occurs after the erosion and stripping processes. Also, sedimentation by the action of flowing water is affected in kind and quantitatively by the speed of water flow and its slope, as when the speed of the current decreases or the slope of the watercourse decreases or the amount of water decreases (that is, the water loses its kinetic energy), the water begins to lose its load. The research navigates on composition of heavy and light metals and free Iron oxides for separated sand in the sediments of the Tigris and Euphrates rivers.

II. MATERIALS AND METHODS

2.1 Preliminary actions

The study region was chosen within the lands located in of the southern alluvial plain of Iraq, each of the sediments of the Euphrates river, Baghdad, and the sediments of the Tigris river.

2.2 Field procedures

Soil samples collected at a depth of (0-30 cm) in a homogeneous manner, then transferred to the laboratory, dried, and sieved (sieve with holes' diameter (2) mm.) It was collected in plastic containers to prepare for chemical, physical and mineral analyses characteristic.

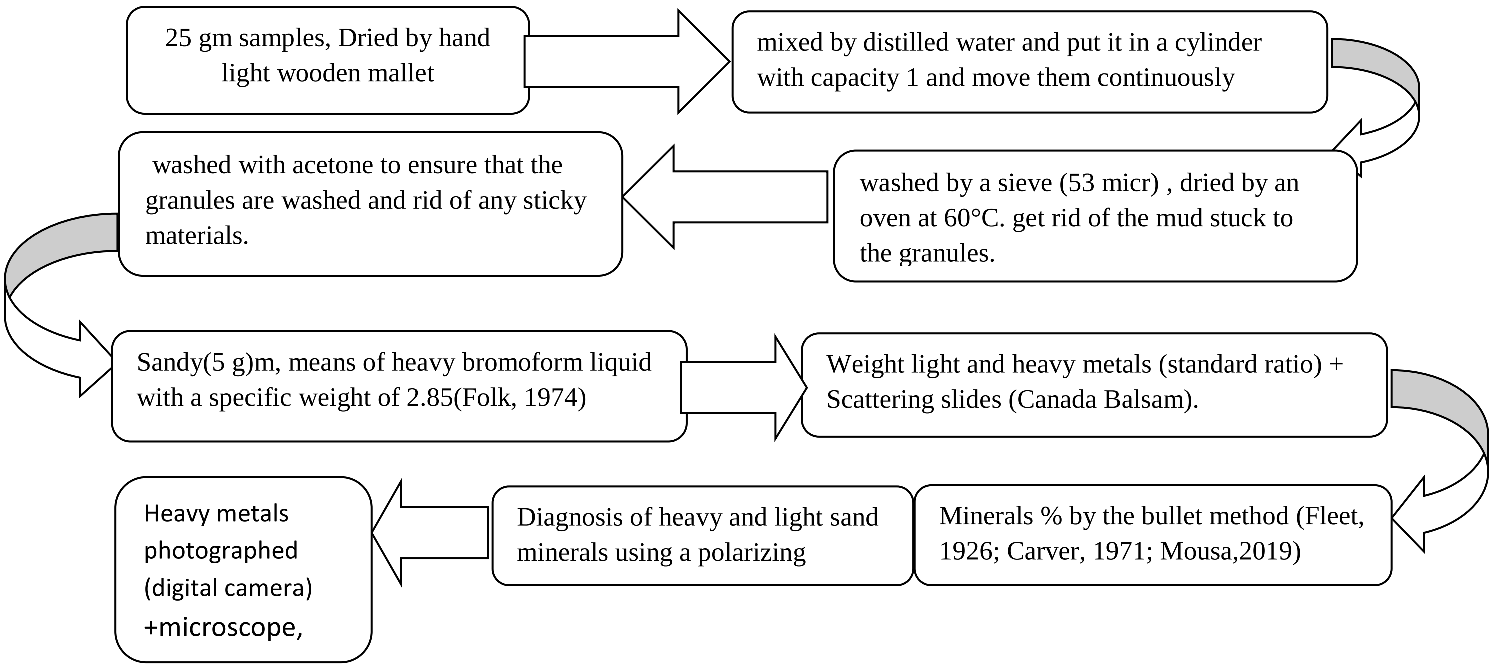
2.3 Fe oxides

The free Iron oxides examined by Citrate-BiCarbonate-Dithionite (CBD) method[6]. Free amorphous Iron oxides were extracted using acidic ammonium oxalate solution (pH-3) [7], and it was estimated by an atomic absorption spectrophotometer (882 nm) wavelength.

2.4 Mineral Analysis

2.4.1 Fragmentation Separation

The sand was separated by Sieving Wet using a sieve (50 μm), and the clay was separated by sedimentation [8]. Examination of separated sand by polarized microscope (Petrographic Microscope) Separation of heavy and light sand minerals, Scheme1.



Sheme1. Fragmentation Separation steps

2.4.2 Heavy and light sand minerals diagnosis by a polarizing microscope

On a glass slide with Canada Balsam glue, the slides made by dispersing heavy and light metals are formed. The behavior of metals when polarized light penetrates them is known as optical properties, and it is used to diagnose heavy and light metals under the microscope. The most notable qualities used to make the diagnosis include the metal's color and discolouration., This is carried out in accordance with the most well-known sources connected to the science of mineralogy under the microscope[1,9]

III. RESULTS AND DISCUSSION

3.1 Heavy sand minerals of the Tigris river sediments.

The percentages of heavy metals in the sand separated in the sediments of the Tigris river. The most important minerals that were diagnosed by the basic degree were identified, which is the group of opaque minerals (Opaque) represented by Iron oxides, as they were recorded in the coarse and fine sand in the removal samples (40.9 and 40.1%), as for the oxides, a percentage of (38.4% and 37.9) were recorded, respectively, (Table1).

The group of minerals (Chlorite) was diagnosed, whose ratio was in the coarse and fine sand in the sample removed from which the oxides were (5.4 and 8.3%), respectively, while its percentage was in the presence of R_2O_3 (9.1 and 8.8%). The chlorite group is a sheet metal that is green or brown in color and has a vitreous or pearly luster, its source in these sediments is due to the appropriate conditions for its formation as well as its inheritance from the original material [10 ,11], Table (1). As for the percentages of heavy metals that are less resistant to weathering and represented by (Pyroxene), their ratio in the sample with R_2O_3 for fine and coarse sand was (5.8 and 4.7%) respectively, while it gave a percentage (4.7 and 5.8%) respectively in the sample of removal of R_2O3, while the amphiboles were identified as a mineral (Hornblende), which has a transparent light green color, slightly tilted to greenish-brown, and has a vitreous luster [12]. This mineral was recorded in the removed sample, R_2O_3 of coarse and fine sand (5.4 and 6. 4%).respectively, while in the sample containing R_2O_3 a percentage of (5.5 and 5.4%) respectively,(Fig.1).

The tests determined that a group of minerals (Mica) were present in the heavy metals of the separated coarse and fine sand of the Tigris sediment sample; this group of minerals is represented by the two minerals (Biotite and Muscovite), as Biotite was noted in the sample removed from which R_2O_3 of the coarse and fine sand was (5.1 and 5.3%). the mineral Muscovite recorded a percentage of (5.7% and 7.5%) compared to the sample containing R_2O_3 which recorded (6.3 and 8.1%) for coarse and fine sand, respectively. The sample containing R_2O_3 recorded a percentage of (6.3 and 8.1%) for coarse and fine sand, respectively. In general, Muscovite mineral outperformed Biotite mineral, and Muscovite mineral content in fine sand was higher.

Tourmaline, zircon, and rutile were identified as the super-stable minerals in the heavy minerals divided by coarse and fine sand. In the sample from which R_2O_3 was removed, the percentage of tourmaline mineral in coarse and fine sand was (2.6 and 2.2%) respectively, as opposed to the sample containing R_2O_3, which recorded (3.7 and 2.5%) for coarse and fine sand, respectively (2). Zircon mineral was recorded in the sample that was obtained from the sediments of the Tigris river, where R_2O_3 was 5.9 and 5.4%, respectively, compared to the sample that was removed from the separated coarse and fine sand, where R2O3 was (8.5 and 5.1%). Regarding rutile, it is distinguished by its rich red color and amount of breaking.Generally, the results appeared a lower percentage of these minerals for fine sand separated than for minerals for coarse sand separated, except for a sample of fine sand with oxides of Rutile [10,13] due to the natural of the mineral composition of the rocks of the original material in the first degree [12].

While appeared decreasing in the percentage of these minerals separated from the fine sand from the minerals The coarse sand was separated, except for a sample of fine sand with oxides of Rutile[10, 13] due to the nature of the mineral composition of the rocks of the parent material in the first place [12].The heavy minerals for sand separation also included Garnet, which recorded a percentage of (5.4% and 4.7) for separated coarse and fine sand, respectively, in the Tigris sediment samples, of which R_2O_3 was removed, compared to the sample containing R_2O_3 which recorded (4.4 and 4.5%) respectively. Figure (3), while the mineral Epidote was diagnosed as it recorded in the removed Tigris sediment sample R_2O_3 ratio (4.5 and 6.7%) for coarse and fine sand compared to the container sample R_2O_3 which recorded ratios of (6.3 and 4.6%) respectively.

The heavy minerals of sand separated contain Staurolite, which was recorded in the sample containing R_2O_3 of coarse and fine sand (2.4 and 1.7%) respectively, compared to the sample of Tigris sediments containing R_2O_3 which recorded a percentage of (1.5 and 3.2%) for coarse and fine sand, respectively, while the percentage of Kyanite mineral in the sample of removal of R_2O_3 for coarse and fine sand was (1.4 and 2.8%) respectively, compared to the sample containing R_2O_3, which recorded a percentage of (2.7% and 2.3%) for coarse and fine sand, the reason for the low percentage of Kyanite mineral (Figure 4) is due to the weak weathering of minerals from the mother rocks [14]. From the results, we find that the percentage of the index mineral is index mineral (garnet + zircon + Tourmaline + Rutile = IM) amounted to (17.5) for separated coarse sand and it is higher than what it is for the percentage of the index mineral in the fine sand separated (15.9), this indicates an increase in weathering on the separated coarse sand compared to the fine sand, Table (1)

Table 1. The heavy metals % in sediments sand of the TigrisRiver

Heavy mineral	Removing R_2O_3		With R_2O_3	
	Coarse sand	Fine sand	Coarse sand	Fine sand
Opaques	40.9	40.1	38.4	37.9
Chlorite	5.4	8.3	9.1	8.8
Pyroxene	5.8	4.7	4.7	5.8
Hornblende	5.4	6.4	5.5	5.4
Biotite	5.1	5.3	5.7	6.3
Muscovite	5.7	7.5	6.3	8.1
Tourmaline	2.6	2.2	3.7	2.5
Zircon	5.9	5.4	8.5	5.1
Garnet	5.4	4.7	4.4	4.5
Epidote	4.5	6.7	6.3	4.6
Rutile	3.6	3.6	3.6	4.8
Staurolite	2.4	1.7	1.5	3.2
Kyanite	1.4	2.8	2.7	2.3
Others	0.9	0.6	0.6	0.7

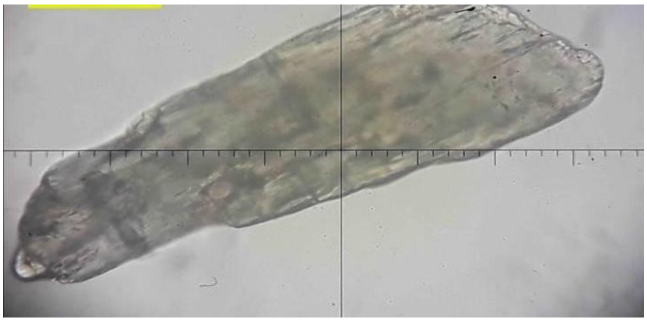


Figure1. A grain of hornblende mineral from the group of amphibole minerals of coarse sand in the sediments of the Tigris river with the presence of

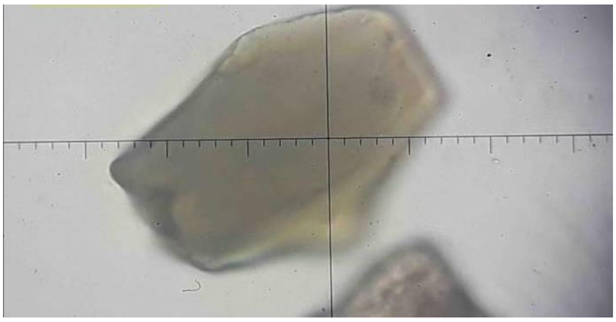


Figure 2. An olive-colored granule of tourmaline mineral for fine sand from the deposits of the Tigris river with the presence of R_2O_3.(0.04mm)

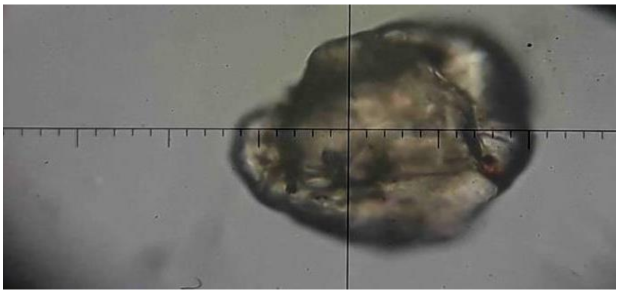


Figure 3. A colorless and highly visible granule of Karnite mineral for coarse sand in the sediments of the Tigris River with the presence of R_2O_3.(0.04mm)

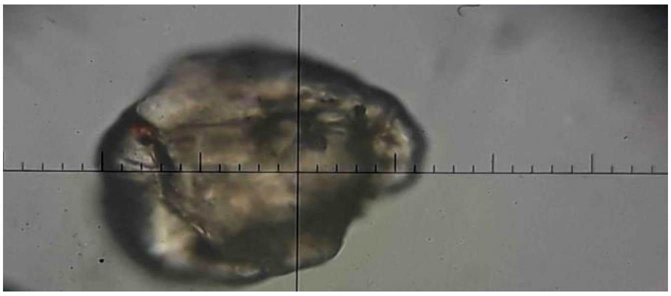


Figure 4. A colorless granule with a high clarity and a clear elongation of the mineral Kyanite for fine sand in the sediments of the Tigris River with the presence of R_2O_3. (0.04mm)

3.2 Light minerals in sand separated for Tigris sediments

The percentages of light minerals separated by coarse and fine sand in the soil of the deposits of the Tigris, from which R_2O_3,was removed and container R_2O_3, The results identified a group of Quartz minerals that include the Monocrystalline Quartz (Fig. 5) and Polycrystalline Quartz (Fig. 6), as the percentage of Monocrystalline Quartz in the sample removed from it R_2O_3, ranged (28.4 and 29.9%) for coarse and fine sand, while the percentage gave (25.3 and 22.6%) in the presence of R_2O_3, for coarse and fine sand, respectively. As for Polycrystalline Quartz, it was recorded (2.4 and 1.1%) for coarse and fine sand in the sample from which R_2O_3,was removed, whereas (2.3 and 2.7%) were recorded for coarse and fine sand with the presence of R_2O_3,respectively, the reason for the dominance of Quartz minerals is attributed to the qualities of Quartz represented in its high resistance to weathering, its hardness, its lack of cracks and its light weight, which made it more steady and stably [4,15,16], in general, there was a predominance of Monocrystalline Quartz compared to Polycrystalline Quartz in both the fine and coarse sand separations, Table (2).

The predominance of Feldspar minerals, represented by (Potash Feldspar Microcline, Potash Feldspar Orthoclase and Plagioclase Feldspar), these minerals recorded a percentage of (1.2, 3.1 and 1.2%) for the above Feldspar minerals, respectively, in the coarse sand separated in the sample from which the oxides were removed, while the percentages of (1.6, 4.7 and 1.5%) were recorded in the fine sand separated, respectively, whereas, the ratio of (2.4, 3.5 and 2.8%) was recorded respectively for the separated coarse sand in the presence of R_2O_3, while for the fine sand it gave a percentage of (1.3, 4.4 and 3.5%) respectively. Scientific who confirmed during their study to compare the mineral composition of sand separation in different gypsum soils from the sediments of the Tigris and Euphrates to the predominance of light minerals of the sand part , the dominance of evaporates in all studied bidones' soils is Quartz, then Carbonate rocks, rocks fragments , Feldspars, and algebraic rocks, respectively[4].

The dominance of rock fragments that included Carbonate rock Fragments, Chert rock Fragments, Igneous rock fragments, Metamorphic rock fragments and Mudstone rock fragments) and Evaporites, as they formed the rock fragments in the sample, from which R_2O_3 was removed for the coarse sand separation (36.5, 7.3, 2.1, 1.8, 5.2 and 6.2%) for the above-mentioned rocks, respectively. In the fine sand separated, it formed a proportion of (35.4, 6.5, 1.6, 2.2, 7.8 and 4.5%) for the above-mentioned rocks, respectively. In the presence of R_2O_3, the coarse sand separated rock fragments formed a ratio of (35.4, 5.3, 3.7, 3.4, 7.8, and 5.2%) of the above-mentioned rock fragments, while in the fine sand separation, it formed a ratio of (39.6, 7.2, 2.3, 2.4, 6.4 and 4.3%) respectively, Table (2). All the rock fragments excelled in the coarse sand separated except the metamorphic rocky fragments and the Mudstone rock fragments in which the fine sand separated excelled [17].

The increase in the content of the Tigris sediment sample for separated coarse and fine sand and its presence in close proportions is due to the process of dissolving these Carbonate rock fragments and re-separated them to form new composition of Carbonate minerals, but it does not have a significant effect on the chemical properties of soil [18]. The results showed the predominance of rock fragments minerals, then Quartz, while the Feldspar group, the predominance of the mineral Orthoclase was predominance.

Table 2. The percentages of light minerals for sand samples of the Tigris river sediments.

Light minerals		Sand samples			
		Removing R_2O_3		with R_2O_3	
		Coarse sand	Fine sand	Coarse sand	Fine sand
Quartz	Monocrystalline Quartz	28.4	29.9	25.3	22.6
	Polycrystalline Quartz	2.4	1.1	2.3	2.7
Feldspar	Potash Feldspar Microcline	1.2	1.6	2.4	1.3
	Potash Feldspar Orthoclase	3.1	4.7	3.5	4.4
	Plagioclase Feldspar	1.2	1.5	2.8	3.5
Rock Fragments	Carbonate Rock Fragments	36.5	35.4	35.4	39.6
	Chert Rock Fragments	7.3	6.5	5.3	7.2
	Igneous Rock fragment	2.1	1.6	3.7	2.3
	Metamorphic Rock Fragments	1.8	2.2	3.4	2.4

	Mudstone Rock Fragments	5.2	7.8	7.8	6.4
	Evaporites (Gypsum)	6.2	4.5	5.2	4.3
Coated Grains by Clay		3.4	2.3	2.3	2.5
Others		1.2	0.9	0.6	0.8

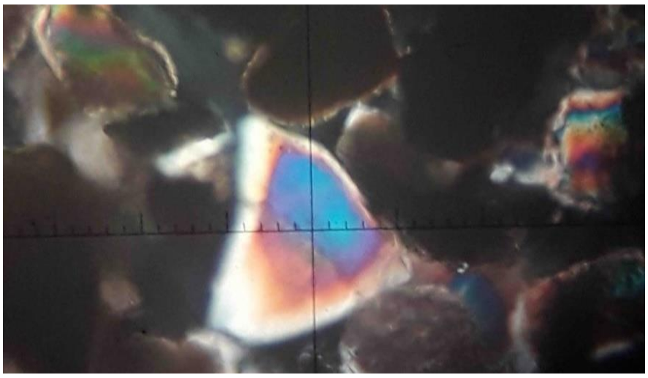


Figure 6. A granule of monocrystalline quartz of coarse sand in the sediments of the Tigris.river with the presence of R_2O_3.(0.08 mm)

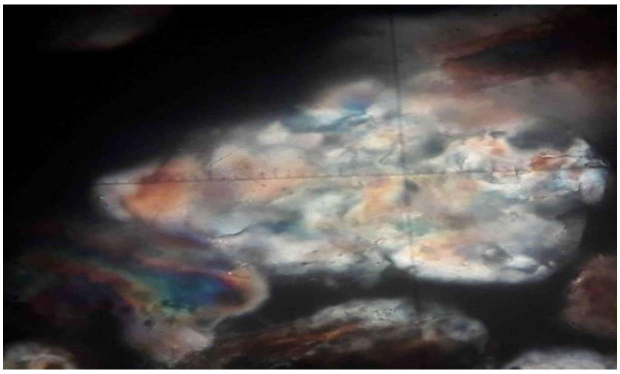


Figure 7. Grain of polycrystalline quartz mineral for fine sand in the sediments of the Tigris River with the presence of R_2O_3.(0.03)

Table (3) shows the appearance of the mineral Hematite in the fine and coarse sand separated with percentages of (0.9 and 0.8%) respectively. This mineral is one of the most important free Iron oxides, and it is black, shiny, with a high density, and it is part of igneous and metamorphic rocks, as well as beside it, Magnetite, whose appear with (Tetrahedral) structure, as the Iron ion is surrounded by four atoms of oxygen or of hydroxyl forming the chemical formula (FeO_4), as is the case in Magnetite, in general, the bonding between oxygen or hydroxyl atoms with Iron ions is either the coarse faces, edges or corners, and this difference in correlation leads to a difference in the length of the bond between Iron and oxygen or Iron and hydroxyl [19]

, where the proportion of Magnetite in the fine and coarse sand separated was (2.2 and 2.1%), respectively. Wang (2002) showed that the percentage of crystallized Iron oxides in soil varies depending on the type of mineral in the main, and the clear variation in the content of Iron oxides in the soil depends on the degree of its development as well as the presence of movement of Iron with its other components [20]. The proportions of Magnetite and Hematite were close and almost equal in these sediments and the total oxides in this sediment separated was (6.0%) [21].

Table 3. The percentage of Iron oxides in the sand sediments of the Tigris river.

Minerals %	Coarse sand	Fine sand
Hematite	0.9	0.8
Magnetite	2.2	2.1
Quarts	50.8	40.3
Chlorite	3.3	8.3
Albite	13.3	10.3
Illite	5.4	6.4
Palygorskite	-----	-----
Montmorilonite	-----	-----
Vermiculite	-----	-----
Kaolinite	-----	1.5

3.2 Heavy and light metals in sand separation of the Euphrates sediments

3.2.1 Heavy metals in the fine and coarse sand separated of the Euphrates sediments

The Table (4) showed the heavy metals % in the sand separated of the Euphrates river sediment sample. The most important minerals that were distinguished by the basic degree were identified, which is the group of opaque minerals (Opaques)[16,22], represented by Iron oxides, as they were formed in coarse sand and the fine for the removal sample (43.7 and 42.8%), while with the presence of R_2O_3 it was recorded about (40.7 and 38.8%) respectively (Figure 8).

Table 4. Percentages of heavy metals for the studied sand samples of the Euphrates river sediments

Heavy metal	Removing R_2O_3		with R_2O_3	
	Coarse sand	Fine sand	Coarse sand	Fine sand
Opaques	43.7	42.8	40.7	38.8
Chlorite	6.5	8.6	9.2	7.9
Pyroxene	6.4	4.7	6.8	7.7
Hornblende	4.6	5.3	6.7	6.4
Biotite	5.7	4.9	7.2	5.3
Muscovite	6.4	7.4	3.4	6.3
Tourmaline	2.7	2.4	2.1	2.4
Zircon	6.4	4.7	5.9	6.2

Garnet	4.6	4.9	3.4	4.4
Epidote	5.8	6.5	5.3	6.4
Rutile	3.3	2.6	2.5	2.6
Staurolite	1.7	2.8	1.4	1.8
Kyanite	1.4	1.8	1.5	2.6
Others	0.9	0.6	0.9	1.2

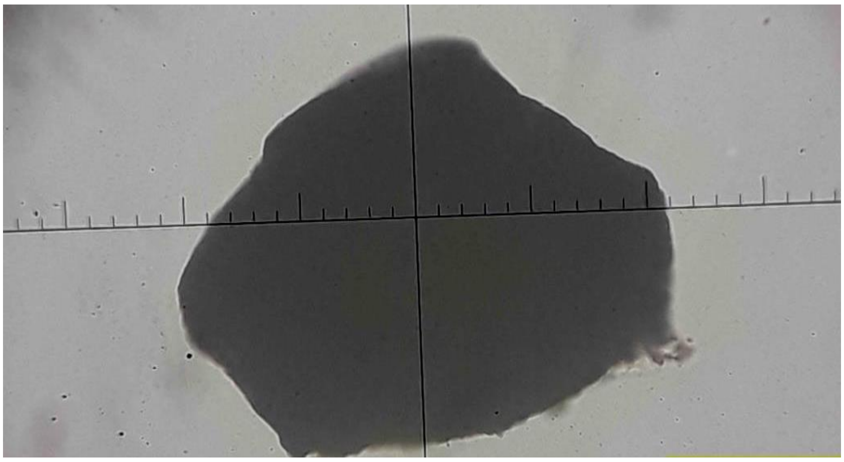


Figure 8. A grain of a metal from the dark metal group of Iron oxides of coarse sand in the sediments of the Euphrates River with the presence of R_2O_3

The percentage of chlorite minerals was diagnosed in the coarse and fine sand in the sample removed from which the oxides were (6.5% and 8.6%), while its percentage was in the presence of R_2O_3 was (9.2 and 7.9%) respectively, as the group of chlorite minerals is one of the sheets minerals that is characterized by its green or brown color, and it has a vitreous or pearly luster. (Figure, 9) and its source in these sediments is due to the appropriate conditions for its formation as well as its inheritance from the source material [23], Table (5), and the percentages of heavy metals that are less resistant to weathering and represented by Pyroxene, as its percentage in the removed sample of R_2O_3 of coarse and fine sand (6.4 and 4.7%) , while it gave (6.8 and 7.7%) in the sample containing R_2O_3 respectively, while the amphiboles represented by Hornblende mineral were diagnosed, which has a transparent light green color slightly tilted to green-brown and has a vitreous luster, this mineral was recorded in the sample of removing R_2O_3 of coarse and fine sand (4.6% and 5.3%), while it was recorded in the sample containing R_2O_3 (6.7 and 6.4%) respectively.

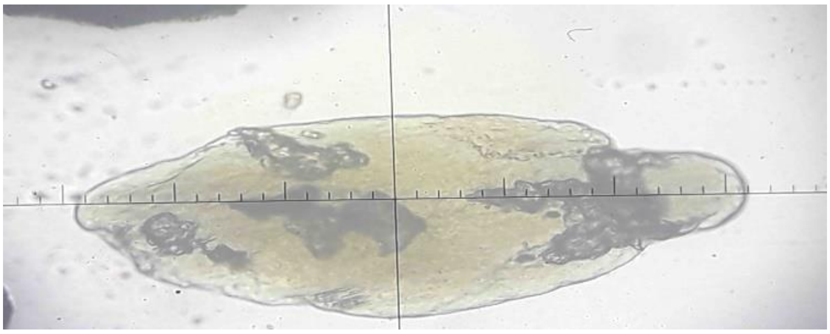


Figure 9. A lamella-shaped grain of the mineral Muscovite from the mica group of coarse sand minerals in the Euphrates river sediments with the presence of R_2O_3

The tests diagnosed the presence of a group of minerals (Mica) within the heavy metals separated from the coarse and fine sand of the Euphrates sediment sample. This group of minerals is represented by (Biotite and Muscovite) [1,23], as the biotite mineral was recorded in a sample of R_2O_3 removal of coarse and fine sand (5.7 and 4.9%), while the sample containing R_2O_3 recorded a percentage of (7.2 and 5.3%) respectively, while Muscovite recorded (6.4 and 7.4%) respectively, compared to the sample containing R_2O_3, which recorded (3.4 and 6.3%) for coarse and sand sand, respectively, and we find from the results the superiority of Muscovite mineral over biotite, as well as the proportion of Muscovite mineral in fine sand separated is higher than in coarse sand and this is similar to what we found in the sediments of the Tigris river (Fig. 9).

The super-stable minerals, represented by Tourmaline, Zircon and Rutile, were identified in the heavy minerals separated by coarse and fine sands. Rutile is characterized by its dark red color and clear cracking (Fig.10) and its percentage in the sample of removal of R_2O_3 was (3.3 and 2.6%) for coarse and fine sand compared to the sample containing R_2O_3 which was recorded (2.5 and 2.6%) respectively, while the percentage of Tourmaline mineral in coarse and fine sand was (2.7 and 2.4%) respectively in the sample of removing R_2O_3 compared to the sample containing R_2O_3, which recorded a percentage of (2.1 and 2.4%) respectively, while Zircon metal was recorded in the sample of removing R_2O_3 for the sediments of the Euphrates (6.4 and 4.7%) respectively compared to the sample containing R_2O_3, which recorded a percentage of (5.9% and 6.2%) respectively, in general it showed a decrease in the percentage of these minerals to separate of the fine sand compared with the coarse sand, due to the nature of the mineral composition of the rocks of the original material in the first degree [12].

The heavy minerals of sand separated also included (Garnet), which recorded a percentage of (4.6 and 4.9%) for separated coarse and fine sand, respectively, in the sediment samples of the Euphrates, from which R_2O_3 was removed, compared to the sample containing R_2O_3, which recorded a percentage of (3.4 and 4.4%) respectively, and here the proportions of this mineral increased in the fine sand separated, as well as the diagnosis of the mineral Epidote, as it was recorded in the sediment sample of the Euphrates, from which R_2O_3 was removed, a ratio of (5.8 and 6.5%) for the coarse and fine sand compared to the container sample R_2O_3 which recorded a ratio of (5.3% and 6.4%) respectively, where fine sand is superior to coarse sand in its content of this mineral (Fig.11).

The results of Table (5) showed that the heavy minerals of sand separated contain (Staurolite), which was recorded in the sample of R_2O_3 removal of coarse and fine sand with a ratio of (1.7 and 2.8%) compared to the sample of Euphrates sediments containing R_2O_3 which recorded a percentage of (1.4 and 1.8%) respectively, while the percentage of (Kyanite) mineral in the sample of removal of R_2O_3 for coarse and fine sand was (1.4 and 1.8%) compared to the sample containing R_2O_3, which recorded a percentage of (1.5 and 2.6%) for coarse and fine sand respectively. The reason of decreasing the Kyanite mineral is due to the weak weathering of minerals from the mother rocks [14]. From the above results, we find that the ratio of the index mineral IM was

(17.0) and (14.6) for the fine and coarse sand separated, which is higher than it is for the percentage of the index mineral in the fine sand separated, and this percentage was lower in the sediments of the Tigris river, which amounted to (17.5 and 15.9) for both sediments, respectively, which refer to an increase in the intensity of weathering in the sediments of the Tigris river.

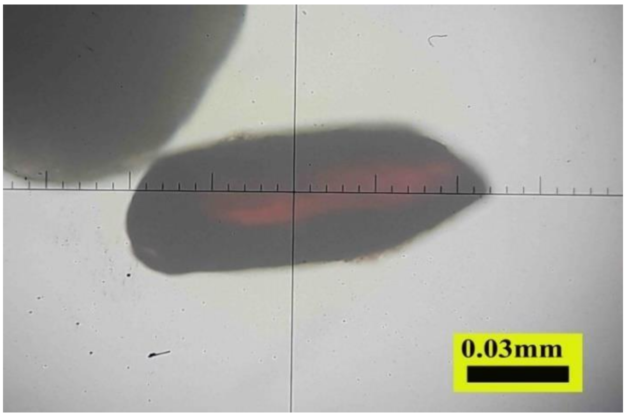


Figure 10. A grain of very dark red color and a high clarity of the rutile mineral of fine sand in the sediments of the Euphrates river with the presence of R_2O_3

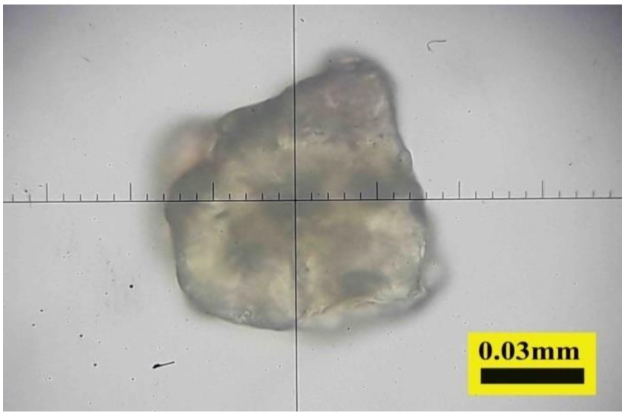


Figure 12. A grain of high clarity of the mineral apidot for fine sand in the sediments of the Euphrates River with the presence of R_2O_3

The results of table (5) showed the content of light minerals for separated coarse and fine sand in the sediments of the Euphrates river removed from which R_2O_3 and that containing of R_2O_3. The results diagnosed a group of Quartz minerals that include Monocrystalline Quartz and Polycrystalline Quartz , as the percentage of Monocrystalline Quartz in the sample of removing R_2O_3 (24.4% and 26.5%) for coarse and fine sand, while it gave a percentage (27.2 and 29.3%) in the presence of R_2O_3 respectively. As for Polycrystalline Quartz, it was recorded (2.5 and 1.6%) for coarse and fine sand in the sample of R_2O_3 removal, while it was recorded (2.6 and 1.5%) in the presence of R_2O_3 respectively, the reason for the predominance of Quartz minerals is attributed to the characteristics of Quartz represented by its high resistance to weathering, its hardness, its lack of cracks and its light weight, which made the Quartz mineral more steady and stably [4,15]. For Monocrystalline Quartz in the fine and coarse sand separated, the proportions of this mineral were exceeding in the sediments of the Tigris river compared to the sediments of the Euphrates river. The results also showed the dominance of Feldspar minerals represented by (Potash Feldspar Microcline, Potash Feldspar Orthoclase and Plagioclase Feldspar) (Fig. 13), as these minerals recorded a percentage of (2.7, 2.4 and 3.6%) for the above Feldspar minerals, respectively, in the coarse sand separated in the oxide removal sample. While it was recorded in fine sand separated by (2.2, 3.6 and 3.5%) respectively, while it was recorded (2.1, 3.1 and 1.7%) for coarse sand separated in the presence of R_2O_3, while for fine sand it gave a percentage of (1.1, 4.4 and 2.4)%) respectively, Scientists confirmed during their study to compare the mineral composition of the sand separation in different gypsum soils from the sediments of the Tigris and Euphrates to the dominance of light minerals for the sand part, the dominance of the evaporates in all the studied pedonite soils[5]: Quartz and then Carbonate rocks, rock fragments, Feldspar, and algebraic rocks, respectively. The Table (5) showed the dominance of rock fragments that included Carbonate Rock Fragments, Chert Rock Fragments, Igneous Rock fragments, Metamorphic Rock Fragments (Fig. 14) and rock Mudstone fragments Rock and Evaporites (Fig. 15) as they formed the rock fragments in the sample of R_2O_3 removal of the coarse sand separation (32.2, 8.8, 2.4, 3.1, 8.3 and 4.5%) of the above-mentioned rocks, respectively, as for the sand separated , it formed a proportion of (37.7, 5.8, 1.5, 2.7, 6.2, and 5.1%) for the above-mentioned rocks, respectively. In the presence of R_2O_3, the coarse sand separated rock fragments formed a proportion of (36.7, 7.2, 2.7, 3.8, 3.2, and 5.4 %) of the above-mentioned rocks, while the fine sand separated it was (43.3, 5.5, 2.0, 3.3,6.3 and 6.2%) respectively. All the rock fragments excelled in the coarse sand separated, except for the Carbonate and evaporated rock fragments where the fine sand was exceeded, here there was a difference in the proportions and type of minerals in which each separated was exceeded when compared to the sediments of the Tigris river.

The increase in the content of the Euphrates sediment sample for separated coarse and fine sand and its presence in close proportions are due to the process of dissolving those Carbonate rock fragments and re-sedimentation them to form new compositions of Carbonate minerals. as for the Chert rock, which is distinguished by its crystalline shape in the form of angles, and despite its presence in a high percentage in the sediments of the Euphrates river, separated by coarse and fine sand, but it does not have a significant impact on the chemical properties of the soil [18], and the light sand minerals showed the predominance of rock fragments, then Quartz, this may be due to the fact that the origin rocks that forming the light minerals are acidic igneous rocks and metamorphic rocks. As for the Feldspars group, the dominance was observed to Plagioclase minerals, which is one of the more resistant minerals than the rest of the members of this group [10], and this differs from what we found in the sediments of the Tigris river, in which Orthoclase is superior.

Table 5. Percentages of light metals for sand samples from the Euphrates river sediments.

Sand samples					
Light metal		**Removing R_2O_3**		**with R_2O_3**	
		Coarse sand	**Fine sand**	**Coarse sand**	**Fine sand**
Quartz	Monocrystalline Quartz	24.4	26.5	27.2	29.3
	Polycrystalline Quartz	2.5	1.6	2.6	1.5
Feldspar	Potash Feldspar Microcline	2.7	2.2	2.1	1.1
	Potash Feldspar Orthoclase	2.4	3.6	3.1	4.4
	Plagioclase Feldspar	3.6	3.5	1.7	2.4
Rock fragment	Carbonate Rock Fragments	32.2	37.7	36.7	43.3
	Chert Rock Fragments	8.8	5.8	7.2	5.5
	Igneous Rock fragment	2.4	1.5	2.7	2.0
	Metamorphic Rock Fragments	3.1	2.7	3.8	3.3
	Mudstone Rock Fragments	8.3	6.2	3.2	6.3
	Evaporites (Gypsum)	4.5	5.1	5.4	6.2
Coated Grains by Clay	4.4	3.0	3.7	3.5	
Others	0.7	0.6	0.6	1.2	

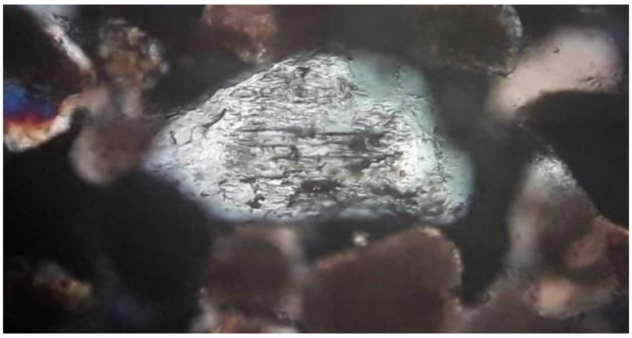


Figure 12. A granule of orthoclase from the Potassium Feldspar group of fine sand in the sediments of the Euphrates river with the presence of R_2O_3.(0.04mm)

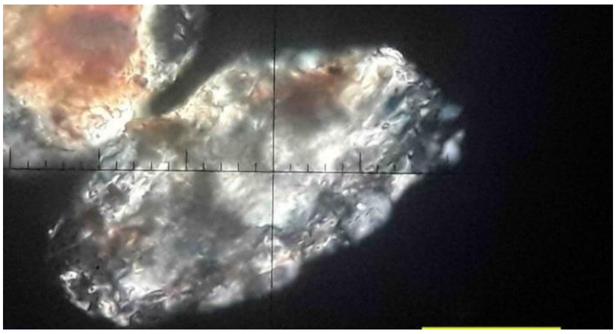


Figure 14. A piece of metamorphic rock of coarse sand in the sediments of the Euphrates river with the presence of R_2O_3. (0.03mm)

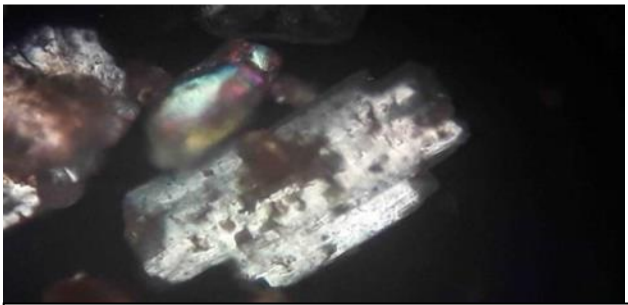


Figure 14. A grain of the mineral gypsum from the group of Evaporates minerals of coarse sand in the sediments of the Euphrates River with the presence of R_2O_3.(0.04 mm)

3.2.2 Free Iron oxides

The appearance of Magnetite in the fine and coarse sand separated of the Euphrates sediment sample with a percentage of (2.4 and 1.8%) respectively. The results showed that Hematite did not appear in these sediments, and this differs from what we found in the sediments of the Tigris river, which showed the presence of the two minerals representing free Iron, Table (6).

oxides, Hematite and Magnetite. We also find that the oxides in the sand separated of the sediments of the Tigris river are higher than in the sand separated of the sediments of the Euphrates river. (Tables 5 and 9), the total oxides in the sediments of the Euphrates River were (4.2%)[24] ,The presence of these oxides depends on the length of the dry period and high temperatures, as well as the degree of soil development. The clear variation in the content of Iron oxides in the soil depends on the degree of its development as well as the presence of movement of Iron with its other components [20].

Table 6. The Iron oxides % in the sand sediments of the Euphrates river.

Minerals	**Coarse sand**	Fine sand
Hematite	**-----**	-----
Magnetite	**2.4**	1.8
Quarts	**51**	54.9
Chlorite	**3.3**	3.3
Albite	**23.3**	18
Illite	**5.4**	-----
Palygorskite	**-----**	-----
Montmorilonite	**-----**	-----
Vermiculite	**-----**	-----
Kaolinite	-----	1.1

IV. Conclusion

Along with the dominance of Magnetite minerals over Hematite in the fine and coarse sand separation, and the superiority of coarse sand in the amount of oxides, rock fragment minerals such as Quartz (as for Feldspar) and Orthoclase were also observed. The findings revealed that rock fragments predominated, followed by quartz, while feldspar displayed the dominance of the mineral plagioclase and the dominance of the mineral magnetite only without hematite in the fine and coarse sand separated, as well as the superiority of coarse sand in the proportion of oxides.

V. Acknowledgements

I would like to thanks all who work in Baghdad station near Tigris and Euphrates rivers, helping collection samples and all who help in analysis the results in Ministry of Science and Technology, Baghdad,Iraq.

References

[1] N.K. Mousa, *Iraqi and Polish soils problems,Heavy metal in soil and plants, acidification sodificationa and bio- remediation*,Lambert Acdemic Publishing,2019:116.

[2] B.F.O. Gungor, Principles, Application and Assessment in Soil Science, Soil Biology,IntechOpen, 2011,408 DOI:10.5772/1860.

[3] P.Buringh, *Soil and soil condition in Iraq. Ministry of Agriculture, Baghdad, Iraq*,1960,105:194-202**.**

[4] Al-Khalil, S. M. A. *The effect of sedimentation sources on the variation in properties and distribution of Feldspar minerals in some soils in Wasit and Maysan governorates*. PhD thesis. College of Agriculture. University of Baghdad.2020.

[5] I. Brondz, Analytical Methods in Quality Control of Scientific Publications Part IV: Fraud Ordered by the Pharmaceutical Industry, *Scientific Research Publishing Inc*.2015,1(1):26-27.

[6] O.P.Mehra , andJackson,M.L**.** Iron oxide removal from soil and clays by a dithionite-citrate system buffered with sodium biCarbonate. *Clay and clay minerals*,1960, 7:317-.723.

[7] R.M. Cornell, and Schwertmann, U.*The Iron Oxides: Structure, Properties, Reactions, Occurrences and Uses.* 2nd Edition, Wiley-VCH, Weinheim.2003.http://dx.doi.org/10.1002/ 3527602097.

[8] M.I.Jackson.*Soil chemical analysis: Advanced course*.2nd ed. Madison, WI: Jackson, M.L. Univ. of Wisconsin.1979.895p.

[9] W.D.Nesse. *Introduction to mineralogy*, Oxford University press, New York,2000, 442p.

[10] Q.A. Al-Ani. *Alternatives and modifications of the area represented in the surveys of soils in the middle of the Iraqi alluvial plain*. PhD thesis. College of Agriculture. University of Baghdad.2001.

[11] S.A.A. Al-Jolmaki,The Changes in heavy metals as index for source rocks in the modern sediments of the Lower Zab River, northern Iraq. *Kirkuk University Journal. Scientific Studies*,2006,1(1):37-50.

[12] T.A.AL-Shammery, and Jasim.H.K.Mineralogy of dunes sand of Missan dune fields southeastern Iraq.Journal of University of Babylon. *Pure and Applied Sciences*.2017,26(5).

[13] M.K.I.Al-Rawi. *Characterization and distribution of the origin materials for some sedimentary soils and their impact on soil characteristics*. PhD thesis. College of Agriculture. University of Baghdad.2003.

[14] J.A.Al-Mashhadi. *The Variations in the soils extending between the archaeological hills and shanks from the Latifiya project in the southwes*t. PhD thesis. College of Agriculture. University of Baghdad.2003.

[15] R.A.M. Al-Adhamy.*The effect of physiographic location on the genetic and evolutionary status of some gypsum soils in Iraq*. PhD thesis, College of Agriculture, University of Baghdad.2006.

[16] A.M.Saleh, and Ahmad S. M. The Study of the nature of the mineral composition of some rivers shoulder soil series in the middle of the Iraqi alluvial plain. *Technique Journal*,2007,23(2):65-80.

[17] I.H. Abbas**.** *Characterization and Classification of Soil Units of the North Kut Project and Prediction of Some Physical Characteristics Using Geographic Information System and Remote Sensing*. PhD Thesis. College of Agriculture. University of Baghdad.2010.

[18] A.H.I.Al-Bayati, A.S.M.Al-Mashhadani and S.A. Al-Jabri. Determination of the mineral composition of the fine sand separated in the Burbej Faydeh as a model for the soils of the Southern Badia in Iraq. *The Iraqi Journal of Desert Studies*.2017,7(1):72-83.

[19] R.A. Viscarra, E.N.Bui ., P.de . Caritat and Mckenzie . N . J. Mapping Iron oxides and the color of Australian soil using visible–near-infrared reflectance spectra. *Journal of Geophysical research* ,2010, 115, F 04031.

[20] A.A.R. Al-Hamdani. *The Evidence of development for some soils of Iraq*. PhD thesis. faculty of Agriculture . Baghdad University.2005.

[21] R.Sh. Jarallah. *Zinc adsorption in soil separations and its relationship to mineral composition and free Iron oxides in some sedimentary plain soils*. Master's thesis. College of Agriculture. University of Baghdad.2000.

[22] S.H. Abed. *A mineral, geochemical and physical study of the sediments of the Nahrawan region and its impact on the manufacture of clay bricks*. Master Thesis. College of Science, University of Baghdad.2007.

[23] I.M.A Al-Barzanji, *The Effect of time variation of land reclamation operations on some characteristics of sedimentary soils from the middle of the alluvial plain*. PhD thesis. College of Agriculture - University of Baghdad.2001.

[24] B. **Sheikh,and Dilshad R.A.** *The nature and distribution of free Iron oxides and their relationship to the degree of soil development*. Master Thesis. College of Agriculture - University of Baghdad.1999.