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Research Title

THE POSSIBILITY OF USING CEMENT SOIL TO MAKE A CEMENT MIXTURE

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بسم الله الرحمن الرحيم

قال تعالى: (فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَى إِلَيْكَ وَحْيُهُ وَقُلْ رَبِّ زِدْنِي عِلْمًا)، «سورة طه: الآية **114**»

الإهداء

بسم الله الرحمن الرحيم

(قل إعملوا فسيرى الله عملكم ورسوله والمؤمنون)

صدق الله العلي العظيم

إلهي لا يطيب الليل إلا بشكرك ولا يطيب النهار إلى بطاعتك .. ولا تطيب اللحظات إلا بذكرك .. ولا تطيب الآخرة إلا بعفوك .. ولا تطيب الجنة إلا برؤيتك...الله جل جلاله

إلى من بلغ الرسالة وأدى الأمانة .. ونصح الأمة .. إلى نبي الرحمة ونور العالمين ..سيدنا محمد صلى الله عليه واله وسلم

إلى من كللهم الله بالهيبة والوقار .. إلى من علموني العطاء بدون انتظار ...والدي

الى من كانوا لهم الفضل الاكبر في علمي... وتعليمي الى من بذلوا ثمار جهودهم لتعليمي...أساتذتي

الى كل من كانوا السند لي في دراستي ومساندتي.... اصدقائي المقربين

الشكر والتقدير

قال رسول االله صلى االله عليه و سلم:

"من لم يشكر الناس لم يشكر االله"

صدق رسول االله صلى االله عليه و سلم

الحمد الله على إحسانه و الشكر له على توفيقه و إمتنانه و نشهد أن لا إله إلا االله وحده لا

شريك له تعظيما لشأنه و نشهد أن سيدنا و نبينا محمد عبده و رسوله الداعي إلى رضوانه

صلى االله عليه و على آله و أصحابه و أتباعه و سلم.

بعد شكر االله سبحانه و تعالى على توفيقه لنا لإتمام هذا البحث المتواضع أتقدم بجزيل الشكر

إلى الوالدين العزيزين الذين أعانوني و شجعوني على الإستمرار في

مسيرة العلم و النجاح،و إكمال الدراسة الجامعية و البحث؛ كما أتوجه بالشكر الجزيل إلى من

شرفني بإشرافه على مذكرة بحثي الأستاذه" عبير عبد الجبار" التي لن تكفي حروف

هذه المذكرة لإيفائها حقها بصبرها الكبير علي، ولتوجيهاتها العلمية التي لا تقدر بثمن؛ و التي

ساهمت بشكل كبير في إتمام و إستكمال هذا العمل؛ إلى كل أساتذة قسم السيراميك ومواد البناء؛ كما أتوجه بخالص شكري و تقديري إلى كل من ساعدني من قريب أو من بعيد على إنجاز و إتمام هذا العمل.

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Abstract:-

Asphalt concrete is a commonly used composite material consisting of coarse aggregate, fine aggregate, filler, and asphalt (as a binder) mixed with each other in proportions according to the required standard specifications. Limestone is usually quarried for various constructional purposes. Cutting and dressing the stone generate huge amounts of by–product. The crushed limestone by–product is used in different proportions as an alternative for natural sand in the proportion of mortar. The amounts of water required to give good workability, the compressive strength at 3 and 28 and 90 days and tensile strength were measured. Six percentages (which are: 0%, 20%, 10%, 30%, 40% and 50% of the total weight of Ordinary Portland cement) of two types of fillers, namely Ordinary Portland cement and Limestone powder, that they fall within the limits of these specifications. Reduction in the amounts of cement from that specified were carried out to know the effects on workability, water content and compressive strength. The results showed that the mortar prepared from crushed limestone and for all mix proportions gave compressive and tensile strength that complies with specifications. The mixing proportions must not exceed 50% of the amount of natural sand, through the scheme of reducing the specified amount of cement.

Introduction:–

Concrete is a soft material made from mixing cement, water, sand, crushed stone, gravel, or any other material.Similar to it, and aggregates (gravel and sand) constitute the largest proportion in the mixture, as its proportion in ordinary concrete ranges from Between (60 – 80%) of the total volume of concrete, and that most concrete structures are determined to consider that the concrete. It withstands compressive stresses only and does not resist tensile and flexural stresses. So for the purposes of structural design, especially in Projects where the tensile and flexural strength is very important and the water weight is large, Such as high density concrete (Density High Concrete and Concrete Weight–Light and Sound and Heat Insulating Concrete .Thermal Insulating Concrete One of the most important methods of producing these types of concrete is the use of many pozzolanic materials such as silica fume.Fume Silica and Ash–Fly (in addition to the use of crushed aggregate from materials resulting from waste Glass, clay bricks, ceramics, limestone, etc. Concrete produced by using the residues resulting from cutting limestone as fine aggregate in cement mortar The results are clarified The possibility of using limestone waste powder instead of natural sand, up to 100% In all areas of construction, it gave high compressive strength and good tensile strength compared to standard specifications .The industry of cutting limestone for the

purposes of using it in various construction works is one of the flourishing industries in northern Iraq, huge quantities of waste are generated as a result of cutting and preparing the stone in the factory sites, which constitutes a great burden. Heavy on the owners of these factories and on the environment.

The aim of the research :

This research aims to try to use the residues resulting from the crushing of limestone as a fine aggregate as a substitute for ordinary Portland cement in the cement mixture with proportions (0%, 10%, 20%, 30%, 40% and 50%) to measure the compressive strength at ages 3 days and 28 days and 90 days and each age 6 samples size (70mm x 70mm x 70mm).

The theoretical part

1-Portland cement:-

is that material that has cohesive and adhesive properties in the presence of water, and these properties make it able to bind metal parts to each other and turn it into a complete monolithic unit.

This definition includes many types of cement materials. For construction purposes, the meaning of the term cement is limited to materials used with gravel, stones, sand, bricks, building panels, and the like. As for the cement that concerns us in making concrete, it has the properties of freezing (setting) and hardening due to chemical reactions in the presence of water, and for this reason it is known as hydraulic cement.

1-1-Manufacturing method:-

The raw materials used in the manufacture of Portland cement must contain appropriate quantities of compounds containing lime (lime), silica, alumina and iron. This is done by mixing calcareous materials such as limestone or chalk with argillaceous materials such as shale or clay, which are a source of silica and alumina. Sometimes the main raw materials may suffer from a deficiency or excess in one or more of the main compounds. In this case, additional materials with a suitable composition must be used to modify the raw mixture (Raw Mix), so that there are two main ways to manufacture cement, namely:

A-First: Wet Process / in which the raw materials extracted from the quarry are ground in the presence of water after they are transported to

the laboratory. Wash Mill) in which lumps of solid materials are broken down. As for the clay that is used as a clay raw material, it is also crushed and mixed with water with a mill similar to the first mill, and then the powdered raw materials are pumped to mix in specific proportions and the mixture is passed through a series of screens for the purpose of filtering it and storing the final product, which is in the form of a thin slurry in special tanks called reservoirs. Slurry Tanks.

B-Second: the dry process. In this method, lime and clay materials are crushed and placed in certain proportions inside a mill, where they are dried and turned into a fine powder called raw flour. This dry flour is pumped to the mixing tank, where the final correction of the proportions of the raw materials for the cement industry is made. The raw flour is mixed by compressed air to obtain Homogeneous flour.

After that, the pressed raw flour is sifted and placed in a rotating dish, and water is added to it at the same time, amounting to 12% of its weight. In this way, small solid balls with a diameter of about 15 mm will be formed. These balls are then roasted inside a network of iron rods preheated by gases. Then the solid balls enter the rotary kiln and the same processes that take place in the wet method are carried out on it.

Another non-main method for the manufacture of Portland cement is the semi-dry method. There are four main components of Portland cement:

1-Tri-Calcium Silicate

2. Dicalcium silica C3S.

3. Tri-calcium aluminate C2S.

4. C4AF tetracalcium iron aluminate C3A.

There are also secondary compounds in addition to the four main compounds above and they are in the form of oxides such as potassium K_2O, magnesium MgO, titanium TiO_2, manganese Mn_2O_3 and sulfur trioxide So_3.

These secondary compounds constitute a small percentage of the weight of cement. Potassium and sodium oxide are important compounds as they are known as Alkalis, and their weight ranges between (0.4-1.3)% in Portland cement.

Figure (1) shows ordinary cement

These alkali can interact with some of the active silica parts present in the aggregate within the hardened concrete, and the reaction products are accompanied by an increase in volume, causing cracking and damage to the concrete. It is possible to reduce the effect of this reaction by using cement containing a few percentages of alkali, not exceeding (0.6)%, or by adding materials of finely crushed silica as it reacts with alkali before the concrete hardens. In addition, the fact that cement contains high levels of alkali affects the time required for cement to solidify, and from

this it is clear that the term secondary compounds refers to the quantity of these compounds and not to their importance.

2-Water:-

The water used in the cement mixing process is ordinary water of moderate salt content.

3-Ordinary washed sand:-

Sand is a natural granular material made up of fine, comminuted rock particles and mineral crumbs, and is defined by volume as the material

with particles smaller than gravel and larger than silt. Sand is found in nature in several areas, such as beaches, bays, sand caves, and the desert. Vegetation cover is rare according to the direction of the wind in the desert, and the composition of sand varies depending on the sources and conditions of the local rocks, but the most common component of it in the interior continental areas and non-tropical coastal areas is silica (silicon dioxide, or SiO2), which is usually in the form of the mineral quartz (Quartz). Calcium carbonate is the second most common type of sand component, such as the mineral aragonite, which was formed over the past half a billion years. Sand is a non-renewable natural resource, and is widely used in making concrete.

make up there is more than one precise definition of sand, and according to the Unified Soil Classification system used in engineering and geology and which uses American standard sieves, sand is defined as grains with a diameter between 0.074 mm and 4.75 mm.According to geologists, sand is defined as grains with a diameter ranging from 0.0625 mm (or

1/16 mm) to 2 mm in diameter.The sandy group is located between the gravel group (the diameter of gravel grains ranges from 2 mm to 64 mm

according to the geologists system, and from 4.75 mm to 75 mm according to the Unified Soil Classification System) and the silt group (the

diameter of the silt grains ranges from 0.004 mm). to 0.0625 mm), and 0.02 mm-diameter particles were considered sand according to the classification system developed by Albert Atterberg during the early 20th century. Sand grains feel coarse when rubbed between the fingers, while silt feels like flour.

ISO 14688 classifies sand as fine (0.063 mm to 0.2 mm), medium (0.2 mm to 0.63 mm), and coarse (0.63 mm to 2 mm). Sand is divided into five sub-types based on size, and these types are very fine sand (1⁄16 – ⅛

diameter in mm), fine sand (⅛ mm – ¼ mm),medium sand (¼ mm – ½ mm), and coarse sand (½ mm - 1 mm), and very coarse sand (1 mm - 2 mm). The composition of sand also varies based on the sources of the rocks that make up it and the conditions to which it was exposed. For example, the white coral sand found in tropical and subtropical coastal areas is eroded limestone and may contain coral reefs in addition to other organic materials or Derived organically, which indicates that the formation of sand also depends on the presence of living organisms. The gypsum sand dunes in the White Sands National Monument in the state of New Mexico, USA, are famous for their bright white color, and arcose is formed, which is sand or sandstone with a feldspar content. It is high due to weathering and erosion factors of granite rocks. Some sands also contain black iron oxide, chlorine, gluconite or gypsum. The sands rich in black iron oxide have a dark black color because they were formed from igneous rocks such as basalt, and sands that contain gluconite are green. Because it was formed from lava containing the metal olivine in a large proportion. Many sands, especially those found abundantly in southern

Europe, contain iron inclusions within the quartz crystals, giving them a dark yellow colour.

4- Aggregate:-

Aggregates Gravel grains of different sizes, used in mixing some (concrete) with cement, water and sand. In the Earth sciences, aggregate has three possible meanings.In mineralogy and petrology, an aggregate is a mass of mineral crystals, mineraloid particles or rock particles. Examples are dolomite, which is an aggregate of crystals of the mineral dolomite , and rock gypsum, an aggregate of crystals of the mineral gypsum. Lapis lazuli is a type of rock composed of an aggregate of crystals of many minerals including lazurite, pyrite, phlogopite, calcite, potassium feldspar, wollastonite and some sodalite group minerals.In the construction industry, an aggregate (often referred to as a construction aggregate) is sand, gravel or crushed rock that has been mined or quarried for use as a building material. In pedology, an aggregate is a mass of soil particles. If the aggregate has formed naturally, it can be called a ped; if formed artificially, it can be called a clod.

Figure (2) shows the coarse aggregate used in the mixture

5- Cement dust:-

is released as a by-product in large quantities and is classified as solid waste and has negative effects on the environment and for the purpose of benefiting from these wastes and achieving environmental and economic returns. This research deals with the study of the effect of cement dust produced from the Kufa Cement Factory on the properties of tiles by producing tiles with added cement dust as a (partial) substitute for cement with a percentage of (10, 20, 30, 50, 40)% by weight and comparing it with ordinary tiles. Cement kiln dust (CKD Cement Klin Dust)), which is a by-product of the cement industry, as the cement plants (annually) present huge quantities estimated at (30) million tons (1), and with regard to cement production plants in Iraq, they throw hundreds of thousands of tons of dust Cement kilns annually (Book of the General Company for Southern Cement No. 2495 on 15/7/2012) This dust is characterized by its high fineness, which reaches more than 3500 and more, and it has a high surface area due to the high fineness of the dust, as well as its water absorption rate increases due to the increase in the surface area of special particles With this cement, the

resistance will appear in the first two months, and it will be a blackish-gray color due to the iron content in this cement dust. And that the proportions of its constituent compounds are different according to the mineral nature of the primary raw materials and the type of fuel used. is shown in Table No. (1) that the fuel used for burning is sulfur and that the emitted sulfide gases have been saturated with dust particles, and in the presence of moisture it turns into sulfur dioxide and trioxide. As for the reason for the high percentage of sulfur The loss by burning is due to the incomplete combustion of the primary raw materials, as there is a percentage of CaCO, which represents the primary raw materials, and when it is completely burned, the burning loss will decrease, as cement

dust can be added to the tile mixture. To replace part of Portland cement.

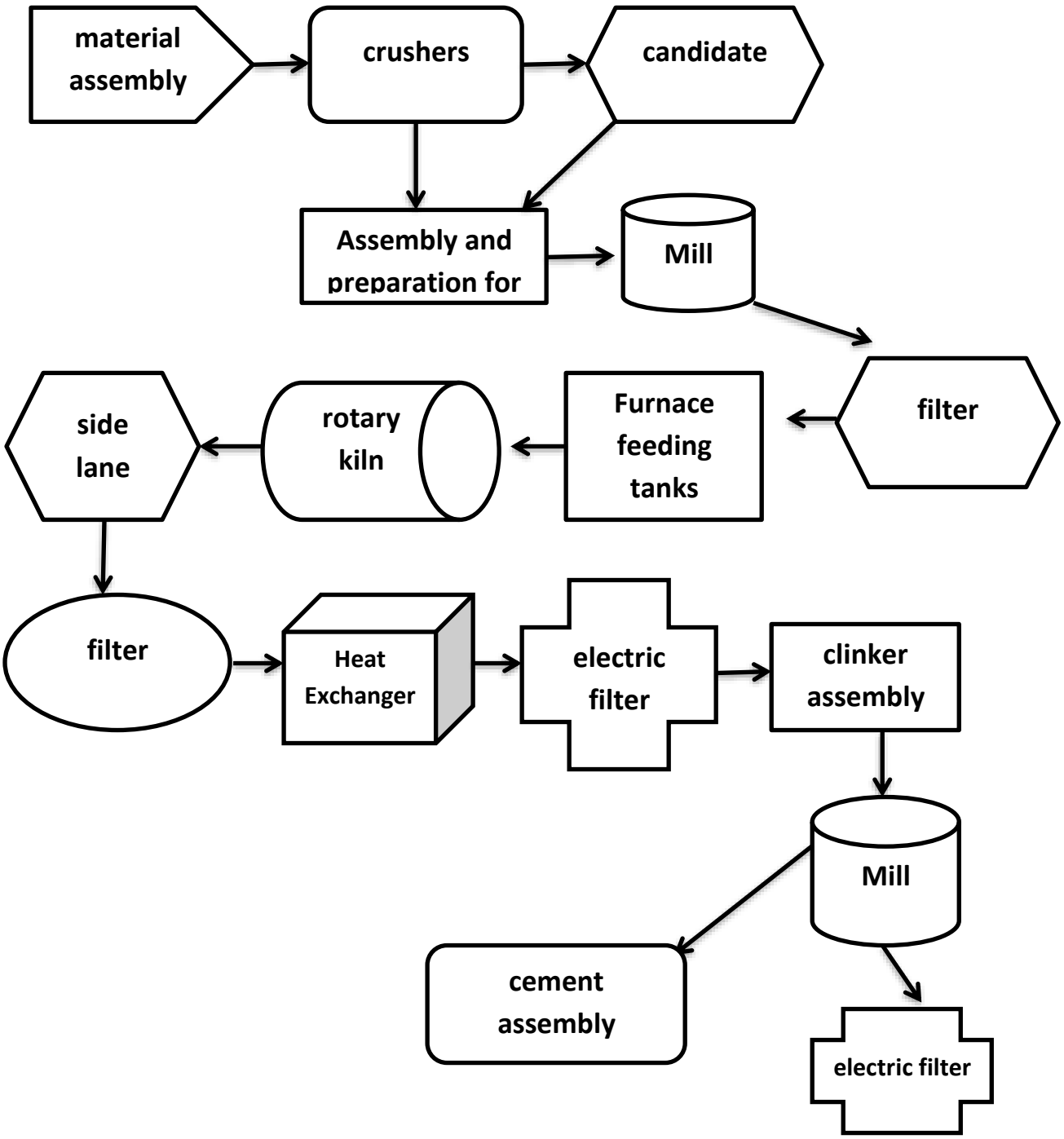

Figure (3) shows the process of preparing cement and dust

Table (1) shows the chemical decomposition of cement dust as a percentage by weight % :-

L.O.I	SiO2	Fe2O3	CaO	MgO	SO	Na2O	K2O	Al2O3	Cl
14%	11%	2.25%	46.5%	1.4%	4.7%	2.85%	2.1%	3.6%	4.2%

6-Concrete and its types:-

6-1-Regular concrete:-

is the basic term for concrete that is produced by following the mixing instructions that are usually printed on cement sacks, usually sand or other common materials as aggregates, often mixed in standard containers. The ingredients in any particular mixture depend on the nature of the application. Regular concrete can typically withstand pressures of about 10 MPa (1,450 psi) to 40 MPa (5,800 psi), with lighter weight applications such as: paver concrete which has a much lower compressive strength than structural concrete . Many types of pre-mixed concrete are available including crushed cement mixed with aggregate, which only needs water. Typically, a batch of concrete can be made using 1 part Portland cement, 2 parts dry sand, 3 parts dry stone, and half a part water. Portions are relative to weight - not volume. For example, to make 1 cubic foot (0.028 cubic metres) of concrete, 22 pounds (10.0 kilograms) of cement, 10 pounds (4.5 kilograms) of water, 41 pounds (19 kilograms) of dry sand, and 70 pounds (32 kilograms) of dry sand are used.) of dry stones (stones 1/2 inch to 3/4 inch in diameter). This is made of 1 cubic foot (0.028 cubic metres) of concrete and weighs about 143 pounds (65 kilograms). The sand should be slurry or brick sand (washed and purified if possible) and the stones should be washed if possible. Organic matter (leaves, twigs, etc.) must be removed from the sand and stones to achieve the highest resistance.

6-2-high strength concrete:-

High strength concrete has a compressive strength greater than 40 MPa (5800 psi). In the UK, high strength concrete is defined as concrete with a compressive strength greater than 50/60 N/mm². High strength concrete is made by lowering the cement to water ratio to 0.35 or less. Silica dust is often added to prevent the formation of free calcium hydroxide crystals in the cement block, which can reduce the bonding strength of cement and aggregates. Low cement-to-water ratios and use of silica dust make concrete mixes significantly less workable, which is likely to be a problem in high strength concrete applications as dense rebar cages may sometimes be used. To compensate for the reduced workability, superplasticizers are usually added to high-resistance blends. Aggregates must be carefully selected for high-resistance mixes, because weak aggregates may not be strong enough to withstand the loads on the concrete that cause the aggregate to fail to start in place of the mold or void, as is often the case with regular concrete. In some applications of high strength concrete, the design criterion is the modulus of elasticity rather than the maximum compressive strength.

6-*3-Precast concrete:-*

used in perforated paving, contains a network of holes or voids, to allow air or water to move through the concrete. This allows water to drain naturally through it, and it can remove the normal surface water drainage infrastructure and allow groundwater to replenish while conventional concrete does not. They are formed by neglecting some or all of the fine aggregate. Then the remaining large aggregate is combined with a relatively small amount of Portland cement. When set, between 15% and 25% of the concrete's volume is typically voids, allowing water

of approximately 5 gallons/sq ft/min (70 liters/m²/min) to drain through the concrete.

6-4-Aerated concrete:-

Aerated concrete produced by adding an air-intake agent to concrete (or lightweight aggregate, such as expanded clay aggregate, cork granules and vermiculite) is sometimes called aerated concrete, lightweight aerated concrete, variable density concrete, lightweight foam concrete, or concrete. Extremely lightweight, not to be confused with lightweight concrete, which is made off-site using an entirely different method.

6-5-Glass concrete:-

The use of recycled glass as aggregate in concrete became popular in the modern era, when extensive research was conducted at Columbia University in New York. This greatly enhances the aesthetic appearance of concrete. Recent research has shown that concrete made from recycled vitreous aggregate exhibits better long-term resistance and better thermal insulation due to its thermal properties of vitreous aggregate.

6-6-Asphalt concrete:-

Strictly speaking, asphalt is a form of concrete as well, in which bituminous materials replace cement as a binder.

6-7-Rubber concrete:-

While "rubber asphalt concrete" is common, Portland rubber cement concrete has been undergoing beta testing, since 2009.

6-8-Other types of concrete:-

- gypsum concrete

-Sealed Concrete

-Semi-dry concrete

-HPS high performance concrete

-High performance concrete

-Ultra-high performance micro-reinforced concrete

-Self-Hardening Concrete

-Nano concrete

-polymeric concrete

Figure (4) shows the process of pouring blocks and concrete

PRACTICAL PART

-The tools and materials used:-

1-Cement:-

Use ordinary Portland cement of Iraqi origin, conforming to the Iraqi Standard No. (4). Weighing 200 grams per mold.

2-sand:-

The washed sand was used and the sand was graded according to British Standard No. (5) . Weighing 600 grams per mold .And according to the table shown:-((Note: The grading was done for 1 kg of sand.))

Table(2)shown sand gradients.

Percentage for trans weight	Reserved weight percentage	Transit aggregate weight on each sieve	Aggregate Transit Weight (grams)	Sieve number (mm)
0	**0**	**0**	**0**	10mm
98%	**2%**	**20**	**20**	4.75mm
85%	**15%**	**150**	**130**	2.36mm
75%	**25%**	**250**	**100**	1.18mm
49%	**51%**	**510**	**260**	0.6mm
12%	**88%**	**880**	**370**	0.3mm
1%	**99%**	**990**	**110**	0.15mm
0	**100%**	**1000**	**10**	**0.075mm**

Figure (5) shows the sieves used in the grading of the aggregate

3-water:-

Use ordinary water in the process of mixing concrete. (0.55) by weight of cement.

4-Gravel :-

Gravel was used in a small percentage for the extraction process, about (0.4) of the proportion of cement and sand for each mould. Weight 81.68 grams per mold.

Figure (6) shows the balance of the calculation of weights

5-mechanical vibration device:-

It is a tabletop device that is 900 mm high and equipped with a tool to install the molds. The device vibrates and the mold is empty and placed in the designated place and installed in it. The concrete mixture is placed for a period of 2 minutes to work on stacking the sample and reducing the gaps in it to increase the resistance to compression and reduce failure at a speed of 3000 revolutions per minute (50 revolutions per second).

Figure (7) shows the mechanical vibration device

6-Balance:-

The scale was used to determine the percentage of extraction for each mold and the percentage of addition.

Figure (8) shows the sensitive scale

7-cement dust:-

Cement dust is thrown out as a by-product and in large quantities, it is classified as solid waste and has negative effects.on the environment and for the purpose of benefiting from these wastes and achieving an environmental and economic return; This research deals with the study of the effect of cement dust produced from Kufa Cement Factory on the

properties of cement through using addition ratios (10%-20%-30%-40%-50%) and comparing them with ordinary cement.

8-stopwatch :-

It is used to calculate the mixing time and the time of mold placement on the mechanical vibrator.

concrete mix :-

A concrete mixture was made in a mixing ratio by weight (1: 3: 0.4) with a water/cement ratio (0.55) and the aggregate was in a state saturated with a dry surface when weighed and mixed with cement and water. Cement dust was added in proportions (10%, 20%, 30%, 40% and 50%) of the cement weight and molds were made. Per ratio 3 molds, in addition to 3 standard molds used to compare added ratios for 3 ages (7 days, 28 days, 90 days) and for each age 6 molds to test their resistance pressure. It was compared with the template. The process of mixing cement weighing 200 grams per cube with sand weighing 600 grams per mold, gravel weighing 81 grams and water in a ratio of 0.55 of the weight of cement cement.

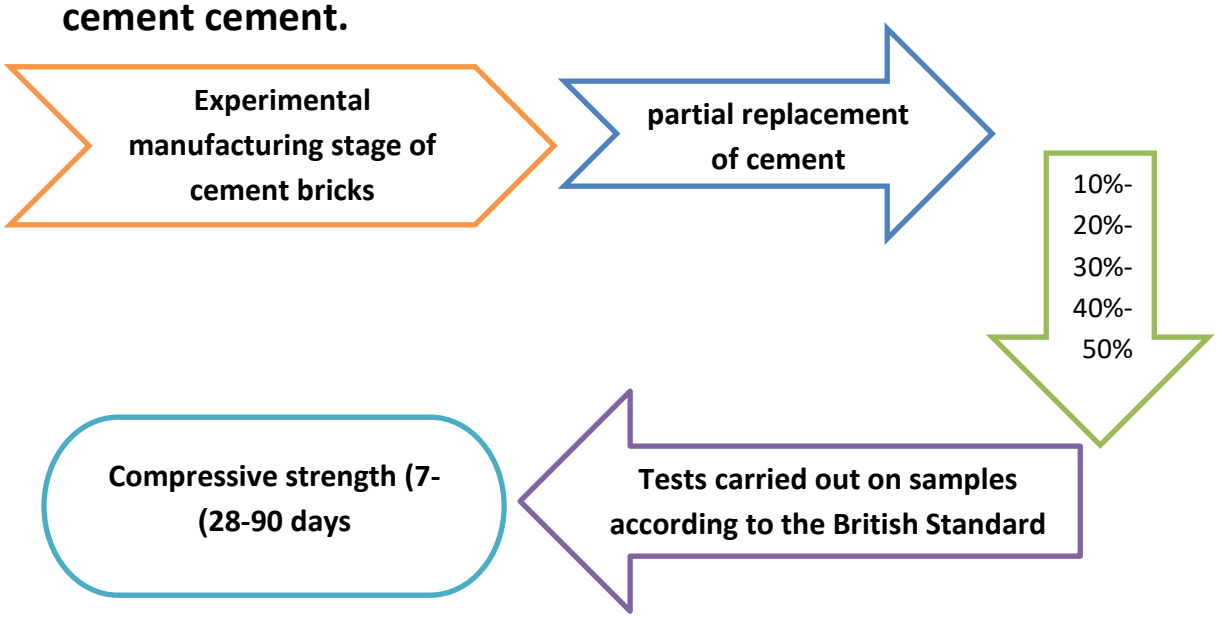

Figure (9) shows the mixing process, the percentages used and the ages for the examination.

Figure (10) shows the concrete produced after the process of mixing and pouring into the moulds.

laboratory tests:-

1-COMPRESSIVE STRENGTH TEST:-

Among the series of physical tests of cement, where the compressive strength test of Portland cement mortar is carried out to get an impression of the cement's bonding ability and the amount of strength development that gives the cohesion properties of the mortar mixture, and the compressive strength of the mortar (cement mixed with sand and gravel) is calculated and not the cement alone.

In this test, cement is mixed with sand in a ratio of 1 cement to 3 natural silica sand and gravel 0.4, and the mixture is mixed with water so that the water/cement ratio is equal to 0.55, and the mixture is used to pour molds with dimensions 70 * 70 * 70 The mortar is kept in the molds for 24 hours for the purpose of its cohesion, after which the cubes are removed from the molds and ripen in water until the time of the examination.

When checking, the average force applied to the model is in the range 900 to 1800 N/sec The amount of compressive strength of the obtained cement mortar does not necessarily correlate or reflect the compressive strength of the concrete in which the cement is used, as the compressive strength of concrete is related to various factors, while the compressive strength of cement mortar reflects the property of cement in particular.

Figure (11) shows the laboratory testing device for compression and the testing process for the concrete or sample used.

Test results:-

1-First test (7 days):-

This test is for 6 molds in addition proportions (first mold stand - second mold 10% - third mold 20% - fourth mold 30% - fifth mold 40% - sixth mold 50%) of the weight of ordinary Portland cement. As shown in the table below for the 7-day test:-

Compressive strength:- The load applied to the surface at failure / the surface area of the face exposed to the load.

Table (3) shown test results for the 7-day.

Samples (7-day test)	Max Load (KN)	Compressive strength in (KN/mm2)	Compressive strength in (N/mm2)=Mpa
Samples 1 (stnd)	68.2	0.0139	13.9
Samples 2 (10%)	61.6	0.01257	12.57
Samples 3 (20%)	65.3	0.01332	13.32
Samples 4 (30%)	61.5	0.01255	12.55
Samples 5 (40%)	61.0	0.01244	12.44
Samples 6 (50%)	39.0	0.01204	12.04

2-Second test (28 days):-

This test is also for 6 molds in addition ratios (first mold stand - second mold 10% - third mold 20% - fourth mold 30% - fifth mold 40% - sixth mold 50%) by weight of ordinary Portland cement. As shown in the table below for the 28-day test:-

Compressive strength:- The load applied to the surface at failure / the surface area of the face exposed to the load .

Table (4) shown test results for the 28-day.

Samples (28-day test)	Max Load (KN)	Compressive strength in (KN/mm2)	Compressive strength in (N/mm2)=Mpa
Samples 1 (stnd)	103.1	0.02104	21.04
Samples 2 (10%)	98.4	0.02008	20.08
Samples 3 (20%)	92.4	0.01885	18.85
Samples 4 (30%)	89.5	0.01826	18.26
Samples 5 (40%)	84.1	0.01723	17.23
Samples 6 (50%)	91.4	0.01867	18.67

3-The third test (90 days):-

This test is also for 6 molds in addition ratios (first mold stand - second mold 10% - third mold 20% - fourth mold 30% - fifth mold 40% - sixth mold 50%) by weight of ordinary Portland cement. As shown in the table below for the 90-day test:-

Compressive strength:- The load applied to the surface at failure / the surface area of the face exposed to the load .

Table (5) shown test results for the 90-day.

Samples (90-day test)	Max Load (KN)	Compressive strength in (KN/mm2)	Compressive strength in (N/mm2)=Mpa
Samples 1 (stnd)	129.6	0.02644	26.44
Samples 2 (10%)	124.4	0.02534	25.34
Samples 3 (20%)	118.1	0.02483	24.83
Samples 4 (30%)	113.7	0.02320	23.2
Samples 5 (40%)	108.9	0.02222	22.22
Samples 6 (50%)	104.4	0.02146	21.46

Table (6) shows the compressibility rate of the added ratios for each ages.

Samples	Test average (MPa)
Samples 1 (stnd)	20.46
Samples 2 (10%)	19.34
Samples 3 (20%)	18.76
Samples 4 (30%)	18.00
Samples 5 (40%)	17.29
Samples 6 (50%)	17.34

Conclusion:-

Through the tests conducted on concrete mixtures, the following results were obtained:

1-This study proved the possibility of using cement dust as a partial replacement of cement with a percentage of up to 30%of the weight of cement with cement mortar that is used in building and flooring works without exiting(On the limits of the standard specifications on the basis of which the proposed mixtures for this mortar were prepared.

2-The results also showed that the absorption ratio of concrete mixtures with different replacement ratios is within the limits stipulated by the standards.

3-The exploitation of this material achieves a great environmental and economic return.

4-Through the results of the chemical analysis of the samples tested in the laboratory consisting of cement and cement soil (50%compared to cement compounds -40% -30% -20% with different replacement ratios 10).It is clear that:

In samples consisting of cement and cement soil, the higher the percentage of calcium trisilicate (SC).

a-The percentage of substitution increased and this explains the increase in resistance in the initial ages.

B - The increase in calcium tertiary silicate is accompanied by a deficiency in calcium disilicate, which is responsible for Increasing the strength of durability in cement, especially in the old ages.

Recommendations and suggestions:-

Based on what has been studied in this research from experiments and laboratory tests and the results that have been reached

The following recommendations should be noted:

1-The study recommends the need to continue with this program by using other applications such as the use of Addition instead of replacement with cement soil, as well as ensuring longer life for samples prepared for testing and study its behaviour.

2-The study also recommends applying the replacement program to Portland sulfur cement and comparing it ordinary Portland cement.

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