e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Conference:01/March-2023 Impact Factor- 7.868 www.irjmets.com
National Conference on Trending Technology for Achieving Sustainable Development Goals
NCTTASDG 2023 Organized by Shri Shankarprasad Agnihotri College of Engineering, Wardha

EFFECT OF PARTIAL REPLACEMENT OF CEMENT BY MIXTURE LIME STONE POWDER AND RICE HUSK ASH A REVIEW

Prof. S. A. Zambre[*1], Prof. S. M. Shaikh[*2], Chetan G. Mendhule[*3], Prajakta S. Kusram[*4], Gaurav S. Jadhav [*5], Priti P. Ghangale[*6], Avinash S. Punse[*7], Bhushan S. Jaunjal[*8]

[*1,2]Asst. Prof. Departmentof Civil Engineering, SSPACE, Wardha, Maharashtra, India.

[*3,4,5,6,7,8] Students, Departmentof Civil Engineering, SSPACE, Wardha, Maharashtra, India.

ABSTRACT

To meet the requirement of globalization in the construction of buildings and other structures concrete plays the rightful role. The constituent of concrete is coarse aggregate, fine aggregate and limestone powder, and rice husk powder, and binding material and water the limestone powder and rice husk powder to partially replace the cement. This experimental study presents the variation in the strength of cement by limestone powder and rice husk powder by 5%, 7.5%, 10%, 12.5%, and 15% for preparation of M25 grade of concrete taken into the study, the compressive strength of concrete cube at age of 7,14 and 28 days.
Keywords: Limestone powder, Rice husk ash, Cement concrete, Compressive strength

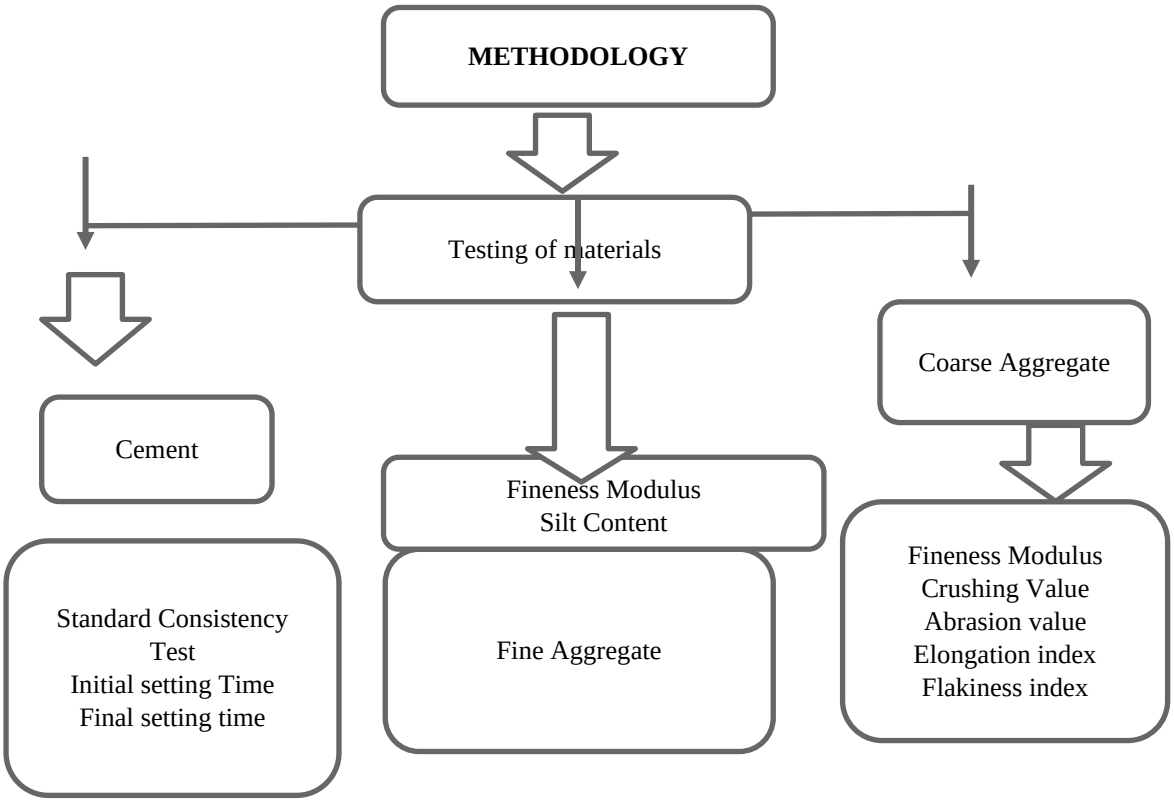
I. INTRODUCTION

Commercial improvement and urbanization have accelerated the call for brand-new develop ment and systems one of the most typically used structural materials is concrete because of its durability and strength. Concrete is considered a critical detail from various varieties of systems. certainly one of the fundamental elements of concrete is the aggregate which performs a vital role in the compressive strength of the concrete. The aggregates occupy the largest length of the concrete and the concrete performance is largely influenced with the aid of the form of the mixture used in it. yet, this industry of concrete is considered by many researchers as a considerable source of pollutants around the arena. Concrete produces diverse varieties of gases that affect human fitness and the environment consisting of greenhouse gases that reason international warming. Worldwide warming reasons an enormous shortage of freshwater and pollution. Additionally, concrete production generates massive portions of polluted water with diverse kinds of pollution disposed of in water our bodies. Those pollutants encompass suspended solids and organic compounds consequently, concrete factory wastewater needs superior and powerful technology to put off the pollutants from manufacturing unit effluences like filtration, coagulation, chemical treatment, and also blend techniques. further to environmental pollutants, the large use of concrete in improvement has brought about the enormous use of natural aggregates which caused the depletion of earth resources of herbal mixture based totally on the above consequences of concrete usage, researchers have been investigating the usage of different materials that update the constituents of concrete to minimize the outcomes of concrete. Limestone is considered one of the usually used fabrics to update naturalaggregates in concrete manufacturing. The limestone more often than not consists of calcium carbonate, magnesium carbonate, and siliceous materials in its composition. The usage of limestone as aggregate in concrete extensively minimizes the environmental outcomes of concrete except, the production of limestone is less expensive than the natural aggregates and desires less effort and energy except, the manufacturing of limestone combinations produces considerably lower quantities of pollution along with carbon dioxide. additionally, limestone and rice husk ash combination utilization in concrete produces more strong concrete and decreases the quantity of concrete waste, and decorates the durability and energy of the concrete.This extends the existence span of the concrete and reduces the concrete waste [49-52].combination has caused a great boom in limestone usage as aggregate in concrete production around the area. The coarse mixture largely influences the concrete properties owing to the outcomes of the gradation of the combination and the connection among the mixture and other substances within the concrete. The parameters of the coarse combination like length distribution have a great effect on the strength of produced concrete systems. Researchers showed that the limestone meets the requirements of aggregates and might be adopted to provide concrete mixes. therefore, the overwhelmed limestone provides a useful alternative to the concrete aggregates

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Conference:01/March-2023 Impact Factor- 7.868 www.irjmets.com
National Conference on Trending Technology for Achieving Sustainable Development Goals
NCTTASDG 2023 Organized by Shri Shankarprasad Agnihotri College of Engineering, Wardha

that age the gravel or even the sand in concrete combos. Researchers [55] examined using the dirt of the limestone in concrete the usage of the dirt of the limestone in phrases of numerous homes like compressive power, absorption, permeability, and others. It became discovered that a satisfactory mixture may be substituted through limestone dirt... Researchers suggested that the use of cementitious substances as cement replacement generates concrete with an excellent function this is comparable to the concrete produced by ordinary cement this will substantially lessen the terrible impact of cement and decreases the depletion of the earth's sources primarily based on the above modern studies examines the usage of overwhelmed limestone and coarse aggregates alternative in concrete manufacturing. the usage of overwhelmed limestone as the coarse aggregate alternative is based totally on several motives which are the wide availability of the beaten limestone, a low production rate of the beaten limestone, and impact of the environmental impact of crushed limestone concrete evaluation to normal concrete except, rice husk ash usage as a cement alternative in concrete production was also investigated in concretebetween limestone and rice husk ash.

II. METHODOLOGY



III. LITERATURE REVIEW

Dr. Abdul Hakeem Hamed Ahmed

(2018) described the feasibility of the use of limestone powder as cement partial replacement in concrete mixes and studied the effect of elevated temperature on the compressive, and tensile strengths. The following conclusions could be extracted from this study:

• Limestone powder offers several advantages for its use as cement compensating by enhancing flow properties and increasing compressive strength.

1. Method;

In the present design work has been carried out in different stage, starting form identification of material.

• The slump of concrete relatively increases with higher values of the percentage of compensating cement with limestone powder.

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Conference:01/March-2023 Impact Factor- 7.868 www.irjmets.com
National Conference on Trending Technology for Achieving Sustainable Development Goals
NCTTASDG 2023 Organized by Shri Shankarprasad Agnihotri College of Engineering, Wardha

• Based on the results, it was observed that the compressive strength of concrete increases with the increase in limestone powder compensating, concrete made with 15% limestone powder compensating showed higher compressive strength.

• In general, the compressive strength of limestone powder concrete, like that of normal concrete,decreases with increasing temperature. At 400°C a higher value in the compressive strength is observed that at 200 °C is observed.

WendimuGudissaet.al

(2018) The investigation has revealed that,

• Replacement of ordinary Portland cement with fine limestone powder from 5% to 10% with a Blain fineness value of 4000 to 4500 cm2/gm satisfies the standard compressive strength requirement of high early strength cement standard requirements.

• The grinding results indicated that, as the replacement of limestone increases by weight, increases in cement fineness and a decrease in grinding time were observed compared to pure ordinary Portland cement. Since limestone is softer to grind than pure clinkers the energy required is also relatively less than required to grind pure clinker for Portland cement production.

• The test results indicated that 28th days compressive and flexural strengths of hardened cement mortar decrease with the increase in the percentage addition of limestone content for the same blain fineness and also increase with the increase of fineness

Tarun R. Naik @ all

(2021) In general limestone powder filler in cement and concrete affects the acceleration of hydration, dilution of cement paste, an increase of effective w/c, ratio, and increases strength at early ages. The addition of limestone powder filler to fine cement pastes and mortars reduces the diffusion coefficient of chloride ions. The use of limestone powder in cement and concrete provides economic and environmental advantages by reducing Portland cement production and CO2 emission, as well as improving the early and later age compressive strength. Limestone powder to cement changes the phase composition of pastes in comparison with pastes without addition. They also demonstrated limestone powder prevents the transformation of ettringite to sulpho-aluminates (mono-sulfate, he-mi-sulfate, and solid solutions), instead of which carbo-aluminate phases are more resistant to sulfate attack (mono-carbonate, hemi-carbonate) are formed.

D, Gowrisanker @ all

(2021) This experimental study presents the variation in the strength of concrete when replacing sand with quarry dust and cement with lime powder also the replacement from 0% to 30% in steps of 10%. M20 grades of concrete are taken for the study keeping a constant slump of 60mm. The compressive strength of concrete cubes at age of 7 and 28 days is obtained at room temperature. The split tensile strength of concrete is found at the age of 28 days. From the test results it is found that the maximum compressive strength and tensile strength are obtained only at 30% replacement. This result giaves a clear picture that quarry dust can be utilized in concrete mixtures as a good substitute for natural river sand at 30% replacement with additional strength than control concrete.

Didier Lootenset al

(2019) study revealed that the ability of both limestone and silica powders to accelerate early-age hydration and reduce/ maintain initial setting times has been demonstrated. When used as partial replacements for cement, these fillers provide ample surfaces to serve as templates for the growth of cement hydration products, and their relatively inert cores become incorporated as part of the three-dimensional percolated backbone that provides setting, rigidity, and strength to these materials. The precipitation-friendly surface of the fillers reduces the amount of hydration product precipitation occurring initially on the cement particles, so that the renewed reactivity of (unexposed) aluminates, etc., typically observed as a second heat flow peak or a shoulder on the primary hydration peak, is enhanced, particularly for cement replacement levels of 80 % and higher. While the limestone powder is slightly more efficient at accelerating hydration than the silica on a per unit

surface area basis, it provides further benefits in rheological properties by reducing the yield stress and lowering the consistency factor, when used to replace cement on a one-to-one volume basis. Due to their acceleration of cement hydration, replacement levels of up to 40 % of these fillers for cement have minimal impacton initial setting times, suggesting that these sustainable binary blends may be particularly attractive in applications where controlled setting is more important than the development of high strengths, such as mortar tile adhesives, other grouts, and renderings for building facades.Replacement, the cement pastes using 5 um of limestone show lower setting time than those using 10 and 20 um, respectively.

IV. CONCLUSIONS

This research is transported accompanying the aim of fact-finding the effect of achieving overwhelmed limestone as a rude aggregate substitute and edible grain case ruin as cementitious fabrics. Several tests were attended to believe the belongings of the aforementioned matters on the person who acts automatically and grit traits. These tests contain slump tests, flexural substance tests, compressive substance tests, and assimilation tests. The effect accompanied that 15% replacement of the edible grain case ruins accompanying cement raised the compressive substance, and flexural substance by about 8% and 15%, individually. The addition of about 80% of the limestone discounted the compressive substance by about 28%.

V. REFERENCES

[1] Kadhim A. Sadique M. Al-Mufti R and Hashim K 2020 Long-term performance of novel high calciu one part alkali-activated cement developed from the thermally activated lime kiln dust Journal of Building Engineering 32 1-17

[2] Kadhim A. Sadique M. Al-Mufti R and Hashim K 2020 Developing One-Part Alkali-Activated metakaolin/natural pozzolan Binders using Lime Waste as activation Agent Advances in Cement Research321-38

[3] Shubbar A A, Al-Shaer A, AlKizwini RS, Hashim K. Hawesah H A and Sadique M 2019 Investigating the influence of cement replacement by the high volume of GGBS and PFA on the mechanical performance of cement mortar. In: First International Conference on Civil and Environmental Engineering Technologies (ICCEET), (University of Kufa, Iraq pp 31-8

[4] Shubbar A Alafer H. Dulaimi A, Hashim K. Atherton Wand Sadique M 2018 The development of a low-carbon binder produced from the ternary blending of cement, ground granulated blast furnace slag and high calcium fly ash: An experimental and statistical approach Construction and Building Materials 187 1051-60

[5] Hashim KS, Shaw A. Al Khaddar R. OrtonedaPedrola M and Phipps D 2017 Defluoridation of drinking water using a new flow column electrocoagulation reactor (FCER) - Experimental, statistical, and economic approach journal of Environmental Management 197 80-8

[6] Hashim K. Idowu I & Jasim N. Al Khaddar R, Shaw A, Phipps D. Kat P. Pedrola MO. Alattabi, AW and Aldalredia M 2018 Removal of phosphate from River water using a new baffle plates electrochemical reactor Methodsx 5 1413-0

[7] Abdulredha M. Adria A Sulbar A Alkhaddar R. Kat Pand Jordan D 2020 Estimating municipal solid waste generation from service processions during the Ashura religious wat in 10P Conference Series Materials Science and Engineering 1OP Publishing) p012075

[8] Aavef A N, Al Masoodi WT M. Kamel RJ. Abdulredha M. Almansoori N A. Kot P, and Murado M 2021 An experimental study for adapting electrocoagulation as a technique for fluoride removal from water. In: IOP Conference Series: Materials Science and Engineering: IOP Publishing) p 012012)

[9] Alyafei A. AlKizwini RS, Hashim K S, Yeboah D, Gkantou M, Al Khaddar R. Al-Faluji D and Zubaidi S L 2020 Treatment of effluents of construction industry using a combined filtration electrocoagulation method. In: IOP Conference Series: Materials Science and Engineering: IOP Publishing) p 012032

[10] Alattabi A W, Harris C, Alkhaddar R. Alzeyadi A and Hashim K 2017 Treatment of Residential Complexes Wastewater using Environmentally Friendly Technology Procedia Engineering 196792-9

e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Conference:01/March-2023 Impact Factor- 7.868 www.irjmets.com
National Conference on Trending Technology for Achieving Sustainable Development Goals
NCTTASDG 2023 Organized by Shri Shankarprasad Agnihotri College of Engineering, Wardha

[11] Alattalai A W, Harris C B. Alkhaddar RM, Hashim KS, OttonedaPedrola M and Phipps D 2017 Improving sludge settleability by introducing an innovative, two-stage settling sequencing batch reactor Journal Water Process Engineering 20 207-16

[12] Abdulredha M. Al Khaddar R and Jordan D 2017 Hoteliers' attitude towards solid waste source separation through mega festivals: A pilot study in Karbala. In: International Conference for Doctoral Research BUID)

[13] Alenezi AK, Hasan HA, Hashim KS. Amoako Attah 1. Gkantou M. Muradov M. Kot P and Abdulhadi B 2020 Zeolite-assisted electrocoagulation for remediation of phosphate from calcium phosphate solution.

[14] Albendal M, Nasir MJ, Hashim KS, Amoako-Attah J, Al-Ealuji D, Muradov M, Kot P and Abdulhadi B 2020 Cost-effective hybrid filter for remediation of water from fluoride. In: IOP Conference Series: Materials Science and Engineering: IOP Publishing) p 012038

[15] Al-Marri S, AlQuzweeni S S, Hashim K S. AlKhaddar R. Kot P. AlKizwini RS, Zubaidi S L and Al- Khafaji Z S 2020 Ultrasonic-Electrocoagulation method for nitrate removal from water. In: IOP Conference Series: Materials Science and Engineering: IOP Publishing) p 012073