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A review on Bio-Self-Cured Marble Powder Based Concrete

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Abstract - ***Water is most widely used in construction activity for first phase to mix material and final phase to curing. In first phase, we mix water in concrete to achieve workability. Without workability concrete cannot be used for construction. Curing is the most important phase for achieving strength. But now-a-days more problems for water because water is falling in its quantity in environment, so in place of water there an urgent requirement to find substitute to make concrete and for construction works. High strength concrete satisfies its prominent properties like strength, workability, and durability by its smartness without external curing since first day. When concrete is cured by its own managing its strength and durability without providing external curing, it is known as high performance self-curing concrete. However it is not possible to provide sufficient curing because of many causes like different environment, availability of water, fluorides and in attentiveness of human. In this way, it is necessary to invent the self-curing agents prepared by different method like using Biomaterials (Calatropis gigantea, Spinacea oleracea) and chemical admixture (polyethylene glycol) along with waste environmental material marble powder or dust.***

Key Words: *Marble powder, Calatropis gigantea, Spinacea oleracea, polyethylene glycol*

1. INTRODUCTION

In last few decades, Concrete has been becoming the most adaptable material used in the construction activity. All over the world, concrete is considered as the most consuming material because of its high compressive strength and durability. Conventional concrete is a mixture of cement, fine aggregate, coarse aggregate and water required for workability and curing to achieve strength. The objective of internal curing is to provide water in the proper amount with a proper distribution so that the hydrating cementations paste remained moisturised and spontaneously stress free in its entire three-dimensional microstructure. In this study, it is recommended to use the marble powder in concrete construction as fractional replacement of cement. When water is added to cement, hydration occurs that is required for hardening of concrete. Since the ancient time, marble or marble stone are commonly used as a building material. Marble powder (very fine powder) make from the marble industries and disposed in environment that becoming hazardous materials. Marble powder is obtained by marble sawing and shaping. Concrete is prepared with marble powder by replacing some amount of cement. Practically virtuous curing of concrete is not possible in various cases due to absence of proper quality of water and various practical problems. In last two decades, concrete technology has been improving and implemented by the some new techniques and methodology. By using admixtures it is possible to prepare practically good concrete mixed with conventional constituents. Adding Some Self Curing agents, the internally cured concrete will be achieved.

2. LITERATURE REVIEW

R. Malathy studied that Self-curing concrete is concrete that cured by itself with sufficient workability, strength and durability. A comparison is made between the dealing and settlement property of self-curing concrete by adding bio material named spinacea oleracea and calotropis gigantea and performance of self-curing concrete by using chemical is polyethylene glycol. 30% of fly ash is replaced by cement and check the workability, strength and durability of M20, M30 and M40 grade concrete. The most appropriate quantity of Spinacea oleracea, Calotropis Gigantea and PEG was taken respectively as 0.6%, 0.24%, and 0.3% of cement weight. Performing slump test, a minimum variation is determined between the self-cured concrete and conventional concrete. Observing strength activity index of conventional cured concrete, it is found more than 1 and 1.15 after 28 days and 56 days respectively due reaction of fly ash. However, the durability of concretes results positive in aggressive environment like chloride, sea water and acid attack as well as encouraging bio self-cured concrete, eco-friendly, economical and high performance materials.

Abhilesh Kant Sharma, Jainender Sharma, Vivek Verma, and Bhupinder Singh utilised that Waste materials created environmental problem if we send-off it directly to the environment. Hence waste material need to be reused. New materials can be obtained from waste material that is marble powder. We can be utilized as admixtures to natural resources are used more competently and the environment is protected from waste collected. Solid waste and stone slurry are produced from Mable stone industry. Solid waste produced from the mine sites or stone slurry. Who obtained from semi liquid matter and creating from sawing and polishing activity and water used for lubricate. Final product of stone like stone slurry generated around 40% from stone

industry. The disposal of waste materials required huge land. The land is deteriorated around it. In experimental phase and practical applications, there are many reuse and recycling process for this industrial waste product. The physical, mechanical and chemical properties of the waste are analysed.

Gulden Cagin Ulubeyli and Recep Artir tested that in our society every person wants to show-off and wanting to look different from others so they use marbles for the decoration purpose. Therefore the marble industries are implementing the design and structure of the marble and hence marble industries are processed. There are different methods are using for cutting the marbles and marble stones. In cutting activity, waste marble powder obtained is 20-30%. In environment, marble waste indicating a critical problem. Therefore, use of waste marble powder as additional materials in the concrete construction. This study is based on the previous investigation studies on effects of marble on the hardening properties of concrete. In this paper, testing is completed by the compressive, flexural, and splitting tensile strength, modulus of elasticity, ultrasonic pulse velocity, Schmidt surface hardness for non-destructive testing of the hardened concrete. On analogizing all the results, the proposition "the waste of marble can be used in the production of concrete construction" was elaborated in an extensive manner. The result are indicating that the use of waste marble powder in different field of conventional concrete mix, self-compacting concrete mix, and polymer concrete mix. Accordingly, in conventional concrete, the waste marble is used as an admixture material or aggregate, it can increase some hardening properties of concrete. Though, in the self-compacting and polymer concrete mixes, the use of waste marble as an admixture material does not give positive results in hardened properties of concrete.

Vatsal N PatelPP, Arshdeep SinghP, Parth GheewalaP, Tirth N Thakkar, Dhairya Bhatt eperimental Study conducted that in this study, 4%, 8% and 12% marble powder is replaced with cement and performs Compressive Strength, Split Tensile Strength and Flexural Strength to check out the performance of M30 Grade concrete and also check durability test. Replacing 8% of marble powder with cement gives satisfied results.

Jay N. Bhanushali, Dharmesh K. Mistry, Aaditya M. Desai, Mohit M. Lad, Ramesh D. Kumhar, Jaldipkumar J. Patel utilized that marble industry produces large amount of marble waste during mining and processing phases. This waste is dumped onto open huge land which creates a lot of environmental problems Industrial wastes like fly ash , rice husk, marble dust, etc. are found to be an efficient alternative for cement as there composition are identical as that of cement & in particular they produce less heat of hydration. This review will deploy the use of marble waste powder against cement and sand at many proportions along with material like silica fume in mix.

Shikha Tyagi Experimental study investigates that Having high strength, durability and permanence, concrete is most usable construction material. Since, concrete dehydrates due to evaporation of water and extra water is mixed to cover the water content. Some other methods are used to reduce dehydration of the concrete. In this way, curing is the most appropriate method. PEG 400 is used as internal curing compound and reduces shrinkage. It has good compressive strength and trap moisture. 0-2% dosages of PEG 400 by the weight of cement are mixed in concrete for internal curing. Mix design is taken of M25 and M40 grade. In this experimental study, it is found out that PEG400 is the most appropriate self-curing compound on account of improving workability and strength of concrete.

Sumayyath M M and Jerry Anto Experimental Studied that in this study, Poly Ethylene Glycol 200 (PEG-200) is considered as shrinkage reducing admixtures and internal curing compound. To use Poly Ethylene Glycol 200 (PEG-200) as curing compound gives better result in self-curing, hydration and compressive strength. This compound prevents from evaporation by gaining moisture itself. In this study, check the effect of curing compound on strength (compressive, flexural and splitting tensile). In this study, M30 and M40 concrete mixes are study on the different percentage of Polyethylene Glycol (0% to 1.5% by weight of cement). Different test samples of conventional concrete and self-curing concrete is casted and tested in the concrete labs. The results can be compared with the help of different strength tests.

M.V. Jagannadha kumar, K.Jagannadha Rao, B.Dean Kumar and V.Srinivasa Reddy studied that Properties of concrete are broadly affected by hydration of Portland cement. It is show that for adequate hydration to occur, the absolute humidity in the pores wants to be maintained above 80%. It is very essential to reduce the loss of moisture from concrete. During hydration, Curing maintains adequate water content in concrete. This paper consist of the result of an internal curing agent i.e. polyethylene glycol in self-cured concrete of M20, M40 and M60 grades. Compressive, split-tensile and flexural strength properties of self-curing concrete mixes are evaluated and assessment of the quality, structural integrity and compressive strength are made on internally and externally self-cured concrete. The optimal amount of polyethylene glycol (PEG) (in percentage by weight of cement) assumed for M20, M40 and M60 grades self-cured concrete are 1%, 0.5% and 0.5% respectively. There is a substantial increase in the compressive, split-tensile and flexural strength properties self-curing concrete mixes at all ages of curing when compared to normal externally cured concrete mixes of about 5-20% for all the grades measured for study. This development could be due to uninterrupted hydration process thus continual availability of water resulting in less number of pores and voids and tougher bond between the aggregate and cement paste. Non-destruction valuation studies expose that all

grades of self-curing agent prompted concrete are classified as 'excellent' concretes in terms of strength and durability point of view due to better concrete's pore structure through improved hydration and strengthening of interface transition zone.

Prakash Mandiwal and Sagar Jamle utilised that in the present time the most widely material used in the construction is concrete because of its high quality of strength & durability. Water curing is very much necessary to avoid unsatisfactory properties of cement concrete. In order to have good quality curing, surplus of evaporation from the surface need to be prevented. This research is based on effect of varying dosages of polyethylene glycol-400 on Compressive and Flexural strength of concrete. Different percentages (0%, 0.8%, 1.5%, 2.4% & 3.2%) Polyethylene glycol replaced by weight of cement. The optimum strength achieved to 2.4% of polyethylene glycol by the weight of cement of M-20 grade of concrete & 1.6% of polyethylene glycol by the weight of cement of M-25 grade of concrete.

Rajeswari S Unnithan and Sarah Anil reviewed that considering the reducing amount of water in present days, it's very important to find out a substitute of water for construction work. Curing of concrete is process of maintain adequate water content in concrete during hydration. However, it is not possible to provide sufficient curing in construction work due to different difficulties like human negligence, environment, terrain and availabilities of water etc. So it is mandatory to find self-curing agents. It can perform by some methods such as using lightweight aggregate, super absorbent polymers, chemical agents or shrinkage reducing admixtures.

3. CONCLUSION

As a conclusion of this study it is cleared that bio-materials give better results in workability and strength when mixed as self-curing agents in concrete of M40 grade along with marble powder. These agents (Spanicea oleracea, Calotropis gigantean and polyethylene glycol) can be mixed in different construction works like pre-stressed, highway construction, RCC works, water tanks etc. to reduce curing and enhance workability and strength.

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