A REVIEW ON STRENGTH CHARACTERISTICS OF CONCRETE BY ADDING SUGAR,JIGGERY,STARCH

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ABSTRACT

The incredibly first step of making concrete is its mix design and deciding the type and amount of constitutes used in the making of concrete which should accomplish the necessities of the final manufactured goods. Mix design models are normally used for the function of proportioning concrete ingredients while anticipating the properties of the final product. Optimization can be achieved by means of research on the ingredients of concrete mixes with the testing to enhance the properties of concrete in both fresh and hardened state while keeping a low cost of production and limiting the pollutants released in the air due to cement production. Consider the role of composition in fresh concrete is essential to the making of high quality concrete at fresh state. Fresh concrete can be characterized by several aspects in the middle of which workability is the most important one and is mainly partial by the water condition, which in turn is a function of aggregates' shape, grading, and fine content.

Keywords— *Strength Test, Slump Cone Test*

INTRODUCTION

Construction with cement and also procedure of reinforcement in the structural design finally led to creation concrete the most used man made material. As the primary knowledge of manufacture cement and concrete residential and was able to cover the constitutes of concrete, researchers have been constantly working with the ways of optimizing mix design recipes. Optimization can be achieved by means of research on the ingredients of concrete mixes with the testing to enhance the properties of concrete in both fresh and hardened state while keeping a low cost of production and limiting the pollutants released in the air due to cement production. Consider the role of composition in fresh concrete is essential to the making of high quality concrete at fresh state. Fresh concrete can be characterized by several aspects in the middle of which workability is the most important one and is mainly partial by the water condition, which in turn is a function of aggregates' shape, grading, and fine content. As for the presentation of the hardened concrete, the crucial factors are water to cement ratio which influences strength and permeability and cement characteristics and performance.

Thirdly, is to identify that, concrete consist of two phases such as hydrated cement paste and aggregate, and, as a result, the properties of concrete are produced by the properties of the two phases and also by the presence of bond between them. when concrete is in hardened state it act as a rock_ like materials with a high compressive strength, by virtue of the ease with which fresh concrete in its plastic state may be sculpt into virtually any shape it may be used as a pros in architectural or solely decorated purposes. Concrete is consist mainly of three materials, such as Cement, water, and aggregate and an additional substance, known as an admixture, is sometimes added to revise certain of its properties.

Concrete used as a construction material has the following advantages:

1. It is practically priced in the long run as compared to other engineering materials, except cement, it can be made from close by obtainable coarse and fine aggregate.

2. Concrete having high compressive strength, and there are smallest amount corrosion and weathering effect. When correctly make up its strength is equal to that of a hard natural stone.

3. The green concrete can be without complexity handle and shape into size according to requirement.

4. It is strong in compression and has no of structural applications in arrangement with steel reinforcement, the concrete and steel have in the region of equal coefficients of thermal expansion.

5. The concrete is comprehensively used in the construction of foundations, walls roads, airfields, buildings, water retaining structures, docks and harbors, dams' bridges, silos, etc.

6. Concrete can be used to filled into fine cracks for preservation by the grunting process.

7. The concrete can be pumped and hence it can be place in the difficult positions also.

8. It is tough and fire confrontation and requires very less maintenance.

The disadvantages of concrete can be as follow:

1. Concrete has low tensile strength and hence cracks simply. Therefore it is to be reinforced with the steel bars or meshes.

2. On drying, Fresh concrete shrink and on wetting, hardened concrete expands.

3. Concrete under given loading undergoes creep consequential in decrease of priestess of the prestressed concrete construction.

4.Concrete is responsible to fragmented by alkali and sulphate attack.

5. The insufficiency of ductility inherent in concrete is disadvantages with respect to earthquake resistance.

LITERATURE REVIEW

Kolisetty et al. [May 2013], focused on to increasing awareness in India about massive damage which being harmful to the environment due to accumulation of waste materials from industrial plants, power houses and demolition sites so it would become one of the main environmental, economical and social issues. In their paper they gave outlines regarding the optimum utilization of recycled materials in more construction activities as a green concept, which definitely reduces the environmental pollution.

Dhondiram et al. [July 2013], investigated the behavior of high performance concrete using silica flume. For this purpose they compared, the 7 days and 28 days mechanical properties such as compressive strength, split tensile strength and flexural strength of concrete by using silica fume with the normal concrete of M60 grade and for this purpose they take water binder ratio as 0.3. For their objective they replaced cement by silica fume at the varying percentage as 0%, 5%, 10%, 15%. They found that there is maximum increment in mechanical properties of concrete when they used 10% of silica fume.

Shishir Bansal et al.[February 2014], reported that for preparing good strength concrete with the help of recycled aggregate, one must be use high quality of recycled aggregate. According to them recycled material is not marketable until they are up to the quality that fulfilled the need of the consumers. For standardization the recycled products mega construction activities are increasing continuously. It is not necessary that a existing structure will fail after its service life span but some time the structure would demolished before its time period. All such events were generating a large amount of waste that is called construction and demolish waste. Partial replacement of natural aggregate with the reusing or recycling of construction and demolition waste generated from the construction activities should be take place. Hence they suggested that construction sector must use recycled product wherever feasible.

Patel (2014), focused on High Performance Concrete which would not be harmful for the health. For this purpose he used by waste material. His objective was to investigate the properties of concrete when concrete contain pozzolanic material. Pozzolanic material was used as the auxiliary cementitious material. And he mainly used the non-destructive testing devices. For their study they make a large number of concrete specimens of various types for different tests. Their research focuses on the obtaining the empirical correlations for finding the 28 & 56 days compressive strength, flexural strength and split tensile strength for different values of water/binder ratio.

Kumar et al. [august 2014] presented that there is a need of using recycled materials for permanent sustainable development of country in Civil Engineering constructions. For that reason they represent the contribution of target strength of concrete made of recycled aggregates with polypropylene fiber. They prepared the concrete mixes with 25%, 30% and 35% of recycled aggregates with additions of polypropylene fiber 20 μ and 5 cm length of various percentages as 0%, 0.5% and 1% by the volume of cement on M20 grade of cement. For testing the specimens they preferred Indian standards code for compressive strengths and tensile strength at 1, 7 and 28 days. Their results are clearly showed that 1% fiber with 25% recycled materials is achieving high strength of concrete and when fiber is added then it will results in increasing the elasticity of structure and decreases the shrinkage cracks.

Choudhary et al.[November 2014], mainly focus on the natural hazard like earthquake. They highlight the advantages and importance of high performance concrete over conventional concrete. They also describe effect of mineral and chemical admixture which is use to improve performance of concrete. Basically they focused on high performance concrete which can sustain in the time of natural hazards rather than conventional concrete.

Salehlamein et al.[January 2015], suggested that there must be modification in using the recycled aggregate. They said that if in concrete, we used a huge amount of recycled aggregate then its strength was not gained. So before using the recycled aggregate, one should decide the percentage of recycled aggregate. So their research carried out the basic physical property of both natural aggregate and recycled aggregate and they also compared their basic properties like specific gravity, water absorption and crushing strength.

Magudeaswaran et al.[April 2015], studied the different behavior of green high performance concrete using silica fume, fly ash and the other ingredients, which is locally available fine aggregate and coarse aggregates. They investigate that the carbon dioxide which released in the manufacturing process of OPC is in large amount and such large quantity was harmful to environment. They reduced the amount of Portland cement used in construction by partial replacement of cement with fly ash and silica fume and replaced sand with eco sand. Their results showed that the mechanical properties of concrete were assessed from the compressive strength, tensile strength and flexure.

Yang et al.[November 2015],made a research on behavior of concrete with recycled aggregate and synthetic macro fiber and micro silica. They replace 0-100% recycled aggregate with natural aggregate and to improve the mechanical properties an increment of 25% Synthetic macro fiber and micro silica were added to some of the concrete mixes .The aim of their project to determine maximum percentage of recycled aggregate that can be use without lowering much strength. They suggested that optimum fraction of recycled coarse aggregate in concrete which can we used would be from 20% to 50%.

CEMENT :

53 grade cements used for making concrete are finely powder and all have the important property that when mixed with water a chemical reaction (hydration) takes place which is produce a very hard and strong binding medium to the aggregate particles, in the early stage of hydration, while in its plastic stage, cement mortar gives cohesive properties to the fresh concrete. 53 indicates the grade of the cement, that grade indicates the compressive strength (mpa) of the concrete that will observed after 28 days of setting. **53 Grade** ordinary Portland cement (**ultratech cement PVT limited**) observed to IS: 12269-1987 was used. The Specific gravity of the cement was **3.15**, the initial and final setting times were found as **30 minutes and 600 minutes** respectively.

EXPERIMENTAL WORK

Following are the details of procedures used to conduct slump cone test.

1. Dampen the mould and place it on a flat, moist, nonabsorbent (rigid) surface. It shall be held sharply in place during filling by the operator standing on the two foot pieces. Immediately fill the mould in three layers, each layer approximately one third the volume of the mould.

2. Each layer is compacted with 25 no. of strokes by tamping rod. the strokes are Uniformly distribute over the cross section of each layer.

3. In filling and temping the top layer, heap the concrete above the mould before temping start. If the temping operation results in subsidence of the concrete below the top edge of the mould, add additional concrete to keep an excess of concrete above the top of the mould at all time.

4. After the top layer has been tempered, strike off the surface of the concrete by means of screening and rolling motion of the tamping rod.

5. Remove the mould immediately from the concrete by raising up it carefully in the vertical direction. Raise the mould a distance of 300 mm in 5 ± 2 sec by a steady upward lift with no lateral or torsional motion.

RESULTS DISCUSSION

Preliminary results and observation: Tests for basic materials were done to ensure that the main constituents of concrete (cement, aggregate, admixture) are adequate and satisfying the requirement of the standards. Cement The results of testing cement for: Consistency Initial and final setting time Compressive strength Were done and shown in Table (4.1) and all results are adequate and conforming with BS12 1996specifications.

Aggregate: Sieve analysis was done according to BS 882 1992, results for both fine and coarse aggregate were presented in Table(4.2) for fine aggregate and Table(4.3)&Table(4.4) coarse aggregate single size 10&20mm , and they are all conform with the requirements. Aggregate crushing value is also done to determine the crushing strength of aggregate and it gave ACV 21.5% which is satisfactory.

Admixture: Making good-quality Portland cement pervious concrete needs utilization of chemical admixtures. Several forms of admixtures, as well as super plasticizers, viscosity modifying admixtures, and set-retarding admixtures are normally utilized in the concrete. These chemical admixtures considerably influence the flow ability, film-forming ability and film-drying time (setting time) of the paste component. Consequently, the workability of the concrete mixtures is greatly affected by the kind and amount of chemical admixture added.

In recent years admixtures has emerged as back bone of concrete. Most concrete made now a days includes either chemical additions to the cement, chemical admixtures in the concrete, or both. These chemicals alter variety of properties of building material systems, as well as association behavior, and it's been long understood by practitioners that these systems will dissent widely in response to such chemicals. These are used to give distinguished properties to fresh concrete. Most of them act as are water reducers, air-entraining agents, water-reducing accelerators and retarders. Today, admixtures usually employed in production concrete can contain set

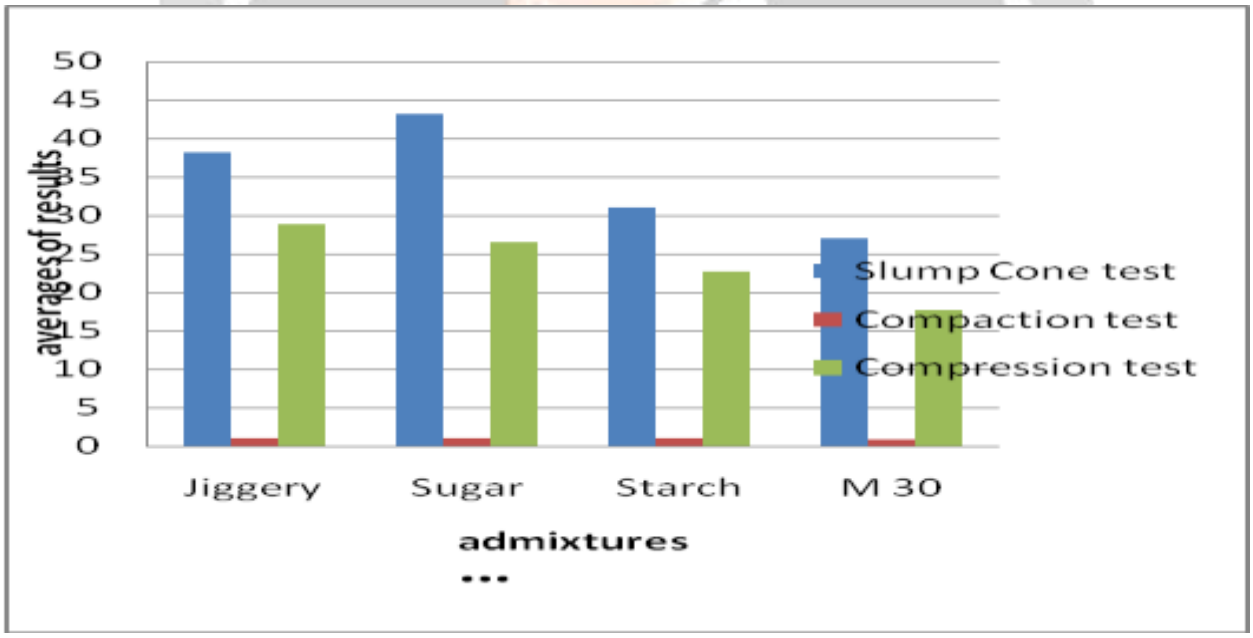
retarding or set accelerating chemicals, which obviously can directly impact kinetics. Most concrete created in developed countries conjointly uses a minimum of a cement dispersing agent, commonly known as water reducing or plasticizing admixture. These water reducing admixtures which will exhibit a more powerful dispersing capability, without considerably impacting setting behavior, are referred to as high-range water reducing admixture or super plasticizer. By virtue of the ensuing improved dispersion, these materials each increase workability and cut back the number of agglomerated cement particles.

Nowadays, the concrete admixtures are widely utilized in the development projects. the most sorts of chemical admixtures is summarized as plasticizers, accelerating/retarding agents, air entraining agents, waterproofing additives and others like corrosion inhibitors and coloring agents etc. the advantages derived from the utilization of chemical admixtures embody improved durability, strength, chemical resistance, coloring, reduction in water and cement demand and increased operating properties of concrete.

COMPRESSIVE STRENGTH

Compressive strength results for the three admixtures (jiggery water, sugar water, starch water) were obtained from the average of three cubes under the normal laboratory temperature and same curing conditions for 7, 14, 28 days.

From Table 3.1 one can find that Jiggery scores highest on three criteria, compression test, with the scores 28.773, which leads to this type of ranking, while sugar scores rank 2 with scores 26.54 for compression test. Starch scores rank 3 for compression test with scores 22.633, and conventional M30 concrete obtained the rank 4 with scores 17.666 on compression test.



Compression test result

CONCLUSION

Present research work is based on effect of natural admixtures on the performance of concrete. For this purpose a M30 concrete was prepared in association of different admixtures, Jiggery, Sugar and Starch, and different tests, Slump cone test, Compaction test (with and without artificial plasticizer) and Compression test (7 days, 14 days and 28 days) were performed on the samples along with the sample of M30, and finally rankings of admixtures were carried out.

Future Scope of the Research

A research work considering a broader set of natural admixtures with different concrete configurations may be initiated. A research work can also be initiated which shall consists of a broader set of properties of concrete to be investigate; and Study of other properties of M30 mix concrete such durability, setting time etc. by using these admixture. Study of properties of mix by using other proportion (except 2.5,5 and 7.5%) these admixture

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