TECH-CHRONICLE
AN INTERNATIONAL E-JOURNAL ON
EMERGING TRENDS IN SCIENCE, TECHNOLOGY AND MANAGEMENT

To Improve the Ground Water Level using Pervious Concrete

KhushbooKoche[a], PratikshaGajwe[a], Raj Shambharkar[a],
Rajesh Karmakar[a], RuchikaBalwir[a], Sanjay Bhadke[b]
[a]*U. G. Student, TulsiramjiGaikwad-Patil College of Engineering and Technology, Mohgaon, Nagpur, INDIA*
[b]*Assisstant Professor, TulsiramjiGaikwad-Patil College of Engineering and Technology, Mohgaon, Nagpur, INDIA*

Abstract*—Concrete structures in general have a reputation of having very good behavior in fire conditions as not many fires have led to a collapse of the structure even in severe fires. Fires are caused by accident, energy sources or natural means, but the majority of fires in buildings are caused by human errors. Concrete does not burn but, once a fire starts the materials in a building is burning, then the fire spreads via radiation, convection or conduction with flames reaching temperatures of between 600°C to 1200°C. The rate of increase of temperature through the cross section of a concrete element is relatively slow and so internal zones do not reach the same high temperatures as a surface exposed to flames. Concrete is versatile, adaptable and the most important construction material used today. And the structures it creates can be designed to afford the desired protection. Concrete's constituent materials (i.e. cement and aggregates) which, when chemically combined within concrete, form a material that is essentially inert and, importantly for fire safety design, has a relatively poor thermal conductivity. Concrete is non- combustible & hence it is a good fire resistant. It has a slow rate of heat transfer. These benefits applied via appropriate mix design and adequate structural detailing. Concrete basically an alkaline material and pH of fresh concrete lies between 12 & 14 which protects steel from corrosion. But due to the carbonation or chlorination, effect of pH of concrete falls & thus steel is exposed to corrosion. Concrete building exist in many forms for example, concrete building may be cast-in-place, precast on construction' or precast in manufacturing facility. Concrete building may be made with mild steel reinforcement or pre stressing steel reinforcement. For pre stressed concrete, the construction may be pretention or post-tensioned, and bonded or unbounded. The methods described in this chapter apply to this wide range of type of concrete structural member and assemblies. For global structural analysis of entire concrete building in fire, advance calculation model, development base on acknowledgement engineering principle and assumption of the theory structural mechanics, as general describe in the Euro-code as well as section of this report, may be used with the effect of thermal expansion and large prescribed in section appropriately taken into account.

Keywords—radiation; conductivity;carbonation; corrosion; Euro-code

I. INTRODUCTION

Concrete protects embedded steel as long as possible against fire due to incombustible and reasonably insulating properties inherent in it and reduces the chances of structural deformation that might lead to permanent damage or may lead to premature destruction of the structure. The fire hazards are not uncommon to hotels and high rise buildings, which use highly combustible materials for interior decoration. Damage due to fire may range from localized surface spilling to major structural deterioration depending on the nature of combustible material and duration of exposure. Visual assessment of pattern of concrete provides valuable information by which an assessment can be made. One of the advantages of concrete over other building materials is its inherent fire-resistive properties. Fire resistance can be defined as the ability of structural elements to withstand fire or to give protection from it. However, concrete structures must still be designed for fire effects structural components must still be able to withstand dead & imposed loads without collapse even though the rise in temperature causes a decrease in the strength & modulus of elasticity for concrete & steel reinforcement. There is an urgent need to gather additional information about performance of R.C.C. under fire in order to create a general awareness & improve the existing practices & Codal provisions.

Carbide waste is a chemical compound with the chemical formula of CaC2. The pure material is a colorless, but most the sample have a color ranging from black to greyish-white, depending on the grade. Its main use in industrially is in the production of acetylene and calcium syanamide. In order dispose of or at least reduced the accumulation of certain kind of waste. It has been suggested to reuse some of this waste material to substitute a percentage of the primary material used in shell, etc. have gained acceptance as a supplementary cementing material in many part of world. Our surrounding environment is concern both interins of damages caused by extraction of raw material and carbon oxide emission during cement production in addition to high cost and prize of cement which help generate the need to minimize cement consumption so the use of close substitute. Concrete the recycling of this material not only helps conserve natural resources but also help to solve growing waste disposal crisis. The calcium formula of CaC_2, when it react with water it produce ethylene and the byproducts is calcium oxide (CaO), which is one of the used for this research.

$$CaC_2 + 2H2O \longrightarrow C_2H_2 + Ca(OH)_2$$

From this reaction it was observe that calcium carbide waste contain some cement chemical composition.

New types of admixtures known as super plasticizer have been introduced into North America within the past several

years. These admixtures can enormously increase the workability of normal Portland cement concrete or greatly reduce its water content. Super plasticizers are more expensive than water reducing admixtures. The dosage requirements vary between 0.5 and 3% by weight of cement, depending on the type of admixture used. Normally the super plasticizer is added to the truck mixture after it arise at the job site and at the last convenient moment before discharge. Within 5 minutes or less the slump greatly increases and at this time the user can get the most advantage from the high fluidity of the concrete. The slump then steadily decreases during the next hour more and it's for this reason that the super plasticizer is not added until just before use of the concrete.Super plasticizer is a chemical admixture which is do not influence the shrinkage, creep, modulus of elasticity and the actual amount of entrained air is reduced. When cement mixes with water, cement particles always flocculate and agglomerate than electrostatic attractive forces are generated by the electric charge on particle surface as a results large amount of free water being trapped in flocks, leads to reduce the homogeneity of concrete. The water reducing agents or workability agents such as plasticizer and super plasticizer among which super plasticizer is more consistent and viscous event at low water cement ratio. Further, to achieve high filling ability, it is necessary to reduced inter particle friction among solid particle in concrete by using super plasticizer and reducing coarse aggregate content. The incorporation of a super plasticizer not only reduces the inter-particle friction but also maintain the deformation capacity and viscosity. Super plasticizer concrete show enormous increases in slump without any significant segregation. Super plasticizer, high-strength concretes can be laced in heavily reinforced and inaccessible areas. The loss of slump with time is one of the serious limitations of these new water reducers. At the manufactures recommended super plasticizers dosages, the 28-day compressive strengths are equal to or greater than the corresponding strengths of the reference mix, whether compacted by vibration. This suggests that high-strength super plasticized concrete can be placed in forms without mechanical compactions.

The capability of durable structure to resist weathering action, chemical attack, abrasion and other degradation processes during its service life with the minimal maintenance is equally important as the capacity of a structure to resist the load applied on it. Although concrete offers many advantages regarding mechanical characteristics and many aspects of the construction, the brittle behavior of the material remains a larger handicapped for the seismic and other applications where flexible behavior is essentially required. Recently, however the development of Polypropylene fiber reinforced concrete has provided a technical basis for improving these deficiencies. Concrete modification by using polymeric materials has been studied for the past four decades. In general, the reinforcement of brittle building materials with fibers has been known from ancient period such as putting straw in the mud for housing walls or reinforcing mortar using animal hair etc. many material like jute, bamboo, coconut, rice husk and sawdust as well as synthetic material such as polyvinyl alcohol, polypropylene, polyethylene, polyamides etc. have also been used for reinforcing the concrete. Research and development into new fiber reinforced concrete is going on today as well. The fiber has subsequently been improved further and at present it is used either as short discontinuous fibrillated material for production of fiber reinforced concrete. Since then the use of these fibers has increased tremendously in construction of structures because addition of fibers in concrete improves the toughness flexural strength as well as failure mode of concrete. Polypropylene twine is cheap, abundantly available and like all manmade fibers of a consistent quality. Cracks play an important role as they change concrete structures into permeable elements and consequently with a high risk of corrosion. Cracks not only reduce the quality of concrete and make it aesthetically unacceptable but also make structures out of service. If these cracks do not exceed a certain width, they are neither harmful to a structure nor to its serviceability. Therefore, it is important to reduce the crack width and this can be achieved by adding Polypropylene. It occurs when surface water evaporates before the bleed water reaches the surface. Polypropylene fiber reduces the plastic shrinkage crack area due to their flexibility and ability to form. The addition of 0.1 % by volume of fiber is found effective in reducing the extent of cracking by a factor of 5-10. The extent of crack reduction is proportional to the fiber content in the concrete.

Concrete building may be made with mild steel reinforcement or pre stressing steel reinforcement. For pre stressed concrete, the construction may be pretention or post-tensioned, and bonded or unbounded. The methods described in this chapter apply to this wide range of type of concrete structural member and assemblies. For global structural analysis of entire concrete building in fire, advance calculation model, development base on acknowledgement engineering principle and assumption of the theory structural mechanics, as general describe in the Euro-code as well as section of this report, may be used with the effect of thermal expansion and large prescribed in section appropriately taken into account.

II. LITERATURE REVIEW

Reinforced concrete (RC) structural systems are quite frequently used in high rise buildings and other built infrastructure due to a number of advantages they provide over other materials. When used in buildings, the provision of appropriate fire safety measures for structural members is an important aspect of design since fire represents one of the most severe environmental conditions to which structures may be subjected in their life time. It is usually necessary to guard against structural collapse. The properties of the constituent materials of RC beams, concrete and steel, in terms of strength and stiffness are progressively reduced by the increasing temperature. Modulus of elasticity and shear modulus decreases with increase of temperature. Mohammed Mansour Kadhum[1] investigated residual bearing capabilities of five-exposed reinforced concrete beams. The analysis method includes combining thermal and structural analyses for assessing the residual bearing capabilities, flexural and shear capacities of reinforced concrete beam at fire exposure. This novel scheme for predicting residual bearing capabilities for fire-exposed reinforced concrete beams is very promising in that is eliminates the extensive testing otherwise required when determining fire rating for structural assemblies.

Concrete is well known for its capacity to endure high temperature and fire. Owing to its low thermal conductivity and high specific heat. In order to differ in their opinion regarding the changes in the properties of concrete, particularly

in the range of 100°C to 300°C whereas for temperature above 300°C, there is uniformity in the opinion concerning a decrease in mechanical characteristics. However, strength reduction which have been reported in the significant quantitative difference due to variety of high temperature conditions tested and the variety of constituent material of concrete used. It is recognized that the behavior of concrete subjected to high temperature is a result of many factors such as heating rate, peak temperature, dehydration of C-S-H gel, phase transformation and thermal incompatibility between the aggregate and cement paste. Carbide waste content of an amount upto 10% replacement and decrease with further percentage increase. Investigated the performance of bricks stabilized with carbide waste and observed appreciable increase in compressive strength of brick over the control (brick stabilized with other form of waste material). The partial replacement of OPC with carbide waste in concrete production should be a welcome development. The cost of carbide waste/OPC concrete is very low compare to that of OPC concrete but there is need ascertain the performance of concrete when exposed, it is extremely necessary to have a complete knowledge [2].

Concrete made with Portland cement has a strong compressive strength but it has weak tensile strength and it tense to be brittle. Also, crack start to develop as soon as concrete is placed and before it has properly hardened which may lead to weakening to concrete structure, fracture and failure and general lack to durability. Thus, this research is aimed at reducing the aforementioned short coming of concrete to increase its applicability and performance. The tensile strength of concrete could be enhanced by using conventional rod reinforcement and to a certain extent by the inclusion of a sufficient volume of fiber. Addition of fiber leads to reduction in shrinkage cracking. We have used the steel fiber as a reinforcement and polypropylene as the fiber. Polypropylene fiber belong to the newest generation of large-scale, manufacture chemical fiber, having the fourth largest volume in production after polyester, polyamides and acrylics [3].

The construction industry is encountering the challenge of incorporating sustainability into their production processes, either by searching for or incorporating new raw material and products that are more environmental friendly and/or contribution towards the reduction of carbon-dioxide emissions into the atmosphere. The possibility of incorporating waste from industrial or agricultural activities in their production processes can help achieve this goal. Different pozzolans, such as fly ash, silica flumes, metakaolin, and rice husk ash etc are found to be viable cement alternative. These by-products have been found to be significantly enhanced the material and durability properties of the resulting cementitious systems. Moreover, depending of the composition of materials, relatively denser, stronger, and stiffer composites can be obtain from these mixtures. This combustion approach is based on producing a clinker that contents a mixtures of raw material (which includes limestone, clay and aluminum nitrate, etc.) and a fuel which can initiate combustion at a relatively low temperature (such as several 100°C). Therefore, this technique has the potential less energy consuming, sense the mixtures could burn at much lower temperature (600°C to 800°C) [4].

Mehul J. Patel and S.M. Kulkarni [5] dealt with the effects of addition of varies proportion of polypropylene fiber on the properties of high strength concrete. An experimental program was carried out to explore its effects on compressive, tensile, flexural, shear strength and plastic shrinkage cracking. A notable increase in flexural, tensile and shear strength was found. The main aim of the investigation program is was to prepare the strength of concrete of grade M30 with locally available ingredient and then to study the effect of different proportion of polypropylene fiber in the mix and to find optimum range of polypropylene fiber content is 0.5%, 1.0%, 1.5%, 2.0% in the mix the concrete specimen where test at different age level for mechanical properties of concrete, namely, compressive strength, split tensile strength, flexural strength and other test were conducted for cement, chemical admixtures, coarse and fine aggregate. The presence of fiber in concrete alerts the failure mode material. It is found that the failure mode to plain concrete is mainly due spalling, while the failure mode of fiber is bulging in transverse directions. Compressive strength enhancement ranges from 8 to 16% of polypropylene fiber reinforced concrete strength enhancements in splitting tensile strength due to polypropylene fiber addition varies from 5% to 23%. The maximum increase in flexural strength of polypropylene fiber reinforced concrete is 36%. The study on the effect of fibrillated polypropylene with different cut length steel be a promising work as a there is always a need to over-come the problem of brittleness of concrete [5].

A relatively new method for determining fire expose used by fire protection engineers is to first calculate the fire load density in a compartment. Then, based on the ventilation conditions and an assumed source of combustion once the temperature time relationship is determined using a standard curve or form the method describe above, the effect of the rise in temperature on the structure can be determined. The rise in temperature causes the free water in concrete to change from a liquid state to gases states. This change in state causes changes in the rate with which heat is transmitted from the surface into the interior of the concrete component [6].

Fire causes heavy loss of life and property safety of humans every years, which is one of the most frequent and devastating disaster in the nature. Statistics showed that building fire had the most time and serious loss. Therefore, a study fire resistance of reinforced concrete structure, on the one hand is to established a set of reasonable and convenient for the fire resistances design method, on the other hand is to make scientific and accurate evolution for the damage degree of building structure, to reduce fire loss shorten the function recovery time of the structure and provide a bases for fire resistance design of building structure. These studies of reinforced concrete structure under high temperature aboard were earlier than the domestic scholars. According to research of the stress distribution, the action of deformation and failure characteristics failure of the structure under the effect of load and high temperature, the presented design theory and analysis method about fire resistance reinforced concrete structure analysis. The rise in temperature causes in decrease in strength and modulus of elasticity for the both concrete and reinforcement. However, the rate at which the strength and modulus decrease depend on the rate of increase in the temperature of the fire and insulating properties of concrete.

The fire resistive properties of building components and structural assemblies are determined by first test method the most widely used and nationally accepted test processor is that developed American society of testing and material (ASTM) [7].

The investigation is aimed at arriving the compressive strength of carbide waste by considering M-20 grade and M-30 grade after thoroughly understanding the parameter influence the improvement which are designed with the help of IS: 10262-2009 and Erontroi and Shaklock method. The experimental programmed is divided into five phases. The investigated the behavior carbide waste concrete under various temperature and and percent of epoxy was found out. The mechanical properties such as splitting tensile strength and compressive strength and evaluated under working conditions. Results of 120 specimens with different shape which represented with concrete specimens having compressive strength ranging from 14 MPa to 31.5 MPa and splitting tensile ranging from 1.5 to 3.18 MPa. The effect of high temperature on mechanical property of concrete containing admixtures. This research work includes an experimental investigation to study of high temperature on the mechanical property of concrete containing admixtures. Comparative study was conducted on concrete mixes, reference mix without an additives and that with admixtures. Concrete was exposed to three level of high temperature (200,400,600,800) °C, for a duration of one hours, without any imposed load during the heating five types of admixtures were used, super plasticizer, plasticizer, retarder, carbide waste and water reducing admixtures, and accelerator and an air entraining admixtures. Fiber reinforcement in concrete is an effective solution for improving tensile properties of concrete. Different types of fibers such as steel, polypropylene, glass and polyester were commonly used in concrete [8].

III. MATERIALS USED

Portland cement referred as (Ordinary Portland Cement) is the most important type of cement and is a fine powder produced by grinding Portland cement clinker. The OPC is classified into three grades, namely 33 Grade, 43 Grade, 53 Grade depending upon the strength of 28 days. It has been provided to upgrade the qualities of cement by using high quality limestone, modern equipment's, maintaining better particle size distribution, finer grinding and better packing. Generally use of high grade cement offers many advantages for making stronger concrete. Although they are little costlier than low grade cement, they offer 10-20% saving in cement consumption and also they offer many hidden benefits is the faster rate of development of strength.

TABLE I. Properties of OPC 53 Cement

Sr. No.	Characteristics	Values Specified by IS 8211:1989
1	Specific Gravity	3.10-3.15
2	Standard Consistency (in %)	30-35
3	Initial Setting Time (in min.)	30 (minimum)
4	Final Setting Time (in min.)	600 (maximum)

Aggregates constitute the bulk of a concrete mixture and give dimensional stability to concrete. To increase the density of resulting mix, the aggregate are frequently used in two or more sizes. The most important function of the fine aggregate is to assist in producing workability and uniformity in mixture. The fine aggregate assist the cement paste to hold the coarse aggregate particles in suspension. This action promotes plasticity in the mixture and prevent the possible segregation of paste and coarse aggregate, particularly when it is necessary to transport the concrete some distance from the mixing plant to placement.

TABLE II. Physical Property of Coarse Aggregate

Sr. No.	Aggregates Characteristics	Value
1	Color	Grey
2	Shape	Angular
3	Maximum Size	20 mm
4	Specific Gravity	2.76
5	Fineness Modulus	3.35
6	Bulk Density (gm/cc)	1741
7	Color	Grey

TABLE III. Physical Property of Fine Aggregate

Sr. No.	Characteristics	Values
1	Specific Gravity	2.38
2	Bulk Density (gm/cc)	1753
3	Fineness Modulus	3.35
4	Water Absorption	0.89

AC-MENT-BV-430-A3 is a special blend of polymers & PCE. The product is manufactured with a very high level technology which is basically, energy conservation in a process and dosage of the product a very less getting desire properties of concrete. The product also enables reduction in use of cement quantity leading to the saving of resources and energy. The basic product has got an ability to give outstanding results for higher grade concrete to get tailor–made products. The product exposes large surface area to hydration process leading to increase in strength or to produce higher workability or to reduce cement content or to reduce setting time, depending upon the design requirements.

TABLE III. Typical Properties of Superplasticizers

Sr. No.	Characteristics	Values
1	Appearances	White Hazy/Clear liquid
2	Specific Gravity	1.04±0.02
3	Air entrainment	1.5%
4	Chloride content	Nil
5	Toxicity	Non-toxic
6	pH	>6 (IS-9103-1999)
7	Compatibility	Can be used for all type of cement, blended cement and

		cement fly ash, GGBS, metakaoline, silica flume blends

Polypropylene (PP) is a thermoplastic "addition polymer" made from the combination of propylene monomers. It is used in a variety of application to include packing for consumer produces, plastic parts for varies industries including the automotive industries, special devices like living hinges, textiles. Polypropylene was first polymerized in 1951 by a pair of Philips. Polypropylene fibers are used in two different ways to reinforce cementitious matrices. One application is in thin sheet components in which polypropylene provides the primary reinforcement. Its volume content is relatively high exceeding 5%, in order to obtain both strengthening and toughening. In order application the volume content of the polypropylene is low, less than 0.3% by volume, and it is intended to act mainly as secondary reinforcement for crack control, but nor for structural load bearing application. The performance and influence of the polypropylene fibers in the fresh and hardened concrete is different and therefore these two topic are treated separately.

Fig. 1. Polypropylene

Carbide waste is the remnant of oxy-acetylene gas used in welding industries to join pieces of metal by road side panel beats. It is generally obtained whitish in color. Carbide waste is obtained by grinded it in grinding machine and then sieved with 75µ IS sieve. Only those that passed through 75µ IS sieve is used. W/C ratio adopted for carbide waste is 0.65 which gives good compressive strength. Replacement of OPC by 10% of carbide waste increases the concrete resistance to fire by 14% of OPC concrete. While the further addition of CW decreases its compressive strength. The coefficient of uniformity of CW is 7.82. Thermal properties that influence temperature rise and distance in a concrete structure member are thermal conductivity. The cost of carbide waste concrete is very low as compared to that of OPC concrete. Carbide waste is a D003 reactive hazardous waste, since addition to water generates a regulated amount of flammable gas. However this particular quantity was conducted conditionally exempt small quantity generator of hazardous waste, so this quantity of carbide waste would not cause them to be regulated. Thus, there is no restriction on treating the waste.

Fig. 2. Carbide Waste

IV. RESULTAND DISCUSSION

1. Workability Test

The concrete slump test is an empirical test that measures the workability of fresh concrete. More specifically, it measures the consistency of the concrete in specific batch. This test is performed to check the consistency of freshly made concrete. Consistency is a term very closely related to workability. It is a term which describes the state of fresh concrete, It refer to the ease with which the concrete flows. It is used to indicate the degree of wetness. Workability of concrete is mainly affected by consistency i.e. wetter mixes will be more workable than drier mixes, but concrete of the same consistency may vary in workability. It is also used to determine consistency between individual batches. The test is popular due to the simplicity of apparatus used and simple procedure. Unfortunately, the simplicity of the test often allows a wide variability in the manner that the test is performed. The slump test is used to ensure uniformity for different batches of similar concrete under different field condition, and to ascertain the effects of plasticizers on their introduction. In India this test is conducted as per IS 1199-1959.

The slumped concrete takes various shapes, and according to the profile of slumped concrete, the slump is termed as true slump, shear slump or collapse slump. If a shear or collapse slump is achieved, a fresh sample should be taken and the test repeated. A collapse slump is an indication of too wet a mix. Only a true slump is of any use in the test. A collapse slump will generally mean that the mix is too wet or that it is high workability mix, for which slump test is not appropriate. Very dry mixes; having slump 0 – 25 mm are used in road making, low workability mixes; having slump 10 – 40 mm are used in foundation with light reinforcement, medium workability mixes; 50 – 90 mm for normal reinforced concrete placed with vibration, high workability concrete; > 100 mm.

The slump decrease with the increase in percentage of Polypropylene and percentage of Carbide Waste absorbed more water as compared to cement and thus decreasing the workability of concrete mix. Slump value is maximum for the concrete mixture 0.5% of Polypropylene and 5% of carbide waste placed in the cement.

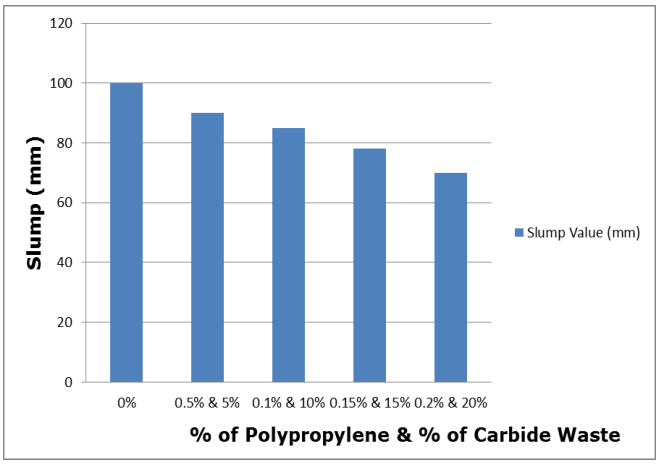

Fig. 3. Slump Value

2. Compression Test

For cube test two types of specimens either cubes of 15cm x 15cm x 15cm or 10cm x 10cm x 10cm depending upon the size of aggregates are used. Cubical moulds of size 15cm x 15cm x 15cm are used for this work. This concrete is poured in the moulds and tempered properly so as not to have any voids. After 24 hours these moulds are removed and test specimens are put in water for curing. The top surface of this specimen should be made even and smooth. This is done by putting cement paste and spreading smoothly on whole area of specimen.

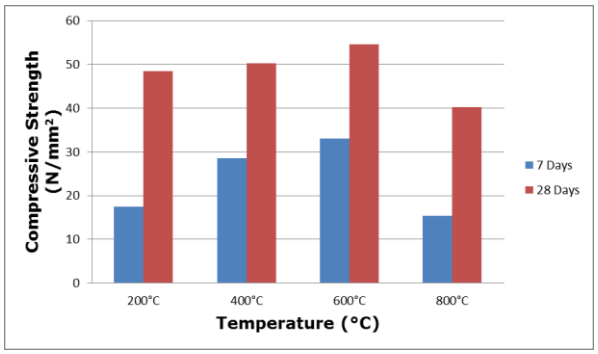

Fig. 4. Compressive strength of M20 concrete

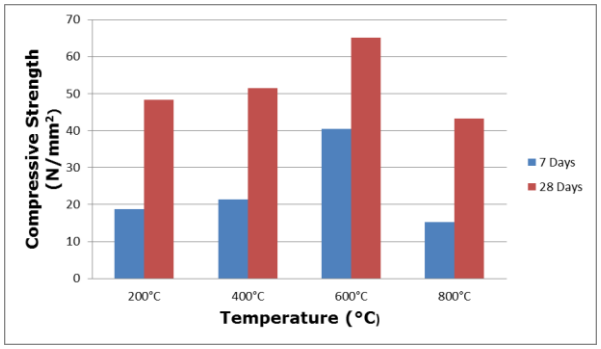

Fig. 5. Compressive strength of M30 concrete

3. Flexural Strength

Flexural test is calculated on the concrete beams to measure its flexural strength. The beams of 100x100x500 mm respectively and was tested on Flexural Testing Machine. Flexural strength studies were carried out at the after 7 and 28 days curing by cold water or by conventional method of curing. Tamping bar (40cm long weighing 2 kg and tamping section having size of 25 mm x 25 mm). Flexural test machine- The bed of the Testing machine shall be provided with two steel rollers, 38 mm in diameter, on which the specimen is to be supported, and these rollers shall be so mounted that the distance from the centre to centre is 60 cm for 15.0 cm specimens or 40 cm for 10.0 cm specimens. The load shall be divided equally between the two loading rollers, and all rollers shall be mounted in such a manner that the load is applied axially and without subjecting the specimen to any torsional stresses or restraints.

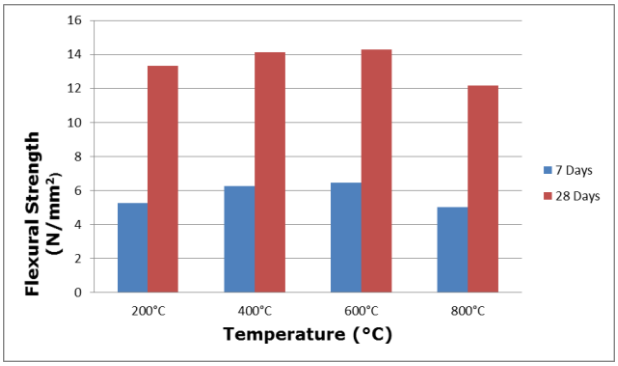

Fig. 6. Flexural strength of M20 concrete

Above graph shows that at 600°C it gives the maximum flexural strength. For M20 Grade of concrete.

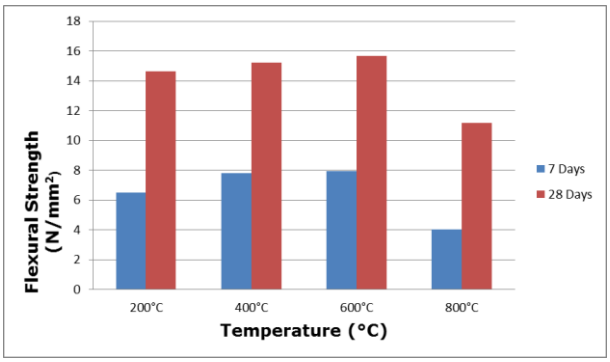

Fig. 7. Flexural strength of M30 concrete

This graph shows the relation between temperature and flexural strength gives the idea about relative flexural strength for 7 and 28 days respectively. Above graph shows that at 600°C it gives the maximum flexural strength for M30 grade of concrete.

V. CONCLUSION

The strength and fire resistance characteristics of concrete have been computed in the present work by adding 5%, 10%, 15% & 20% of carbide waste and 0.5%, 1%, 1.5% & 2% of polypropylene.

i. Workability of concrete mix decreases with increase in water content more than 0.55%.

ii.With 10% addition of carbide waste, the fire resistance of concrete is increased by 14%.

iii.Carbide waste gives the fire resistance up to 500°C to 700°C after which it get reduces.

iv.Based on the test conducted, the carbide waste performs satisfactory as fire resistance if the proportion of carbide waste is kept at 10% replacement.

v.Use of carbide waste in concrete can prove to be economical as it is non-useful waste & also gives good fire resistance.

vi.Good relationship was observed in compressive and flexural strength of concrete mixes containing the carbide waste.

vii.Carbide waste increases the compressive and flexural strength, permeability, improve durability, inhibit corrosion, reduce shrinkage, increase slump and workability and improve the efficiency and economy of the mixture.

viii. Polypropylene gives the good fire resistance and good spalling resistance when added 1% of cement in the mix proportion.

ix.When the concrete mix contains polypropylene fiber, degree of spalling is reduced up to 10% which ultimately provide good strength to the concrete structure.

x. Thermal expansion and dehydration of concrete due to heating which are responsible for the formation of fissure will ultimately get reduce by addition of polypropylene up to 2%.

xi.Thermal stresses and further cracking which are disastrous to the life of concrete can be reduced with further addition of polypropylene fiber in the concrete.

xii.At high temperature, large built up pressure due to moisture evaporation which the structure may not able to dissipate, which leads to the spalling can be effectively comprehended by polypropylene.

VI. SCOPE FOR FUTURE WORK

1. In the present study, only up to 20% replacement of carbide waste by cement has been considered the other % need to be investigated.
2. Innovating supplementary cementitious construction material.
3. Further study should be carried out on the performance of the carbide waste concrete in other aggressive environment such as chemical and harsh weathers.
4. Because of these new threats of fire arise due to industrialization wars and terrorism, development in the researches and studies need to make concrete more efficient and fire resistant.
5. Making natural resources use for cement manufacturing and thus reducing the problem of waste as we are referring carbide as waste.

REFERENCES

[1] Mohommad Mansour Kadhum, "Fire Resistance of Reinforced Concrete Rigid Beam" Journal of Civil Engineering and Construction Technology , August (2014) Vol 5(5), PP 35-48

[2] Arioz, "Effect of Admixtures on Fire Resistance of Ordinary Portland Cement Concrete" Fire Safety Journal, vol 3 No.1 (2013), PP 107-119

[3] Mohit Dwivedi, Shobhit Mishra and Vishal Singh," Effect of Polypropylene Fibers on Flexural Strength of M30 Grade Concrete", IOSR Journal of Mechanical and Civil Engineering, (2014) vol. 11, PP.93-97

[4] Shazim Ali Memom, "Properties of Chemical Combusted Calcium Carbide Residue and its Influence on Fire resistance of Concrete" Journal of Open Access Material ISSN 1996-1994, vol. 8, PP 638-651 *(2006)

[5] Mehul J. Patel and S. M. Kulkarni, "Effect of Polypropylene Fiber on the High Strength Concrete", Journal of Information knowledge and Research in Civil Engineering, (2013) vol. 2, PP.127-135

[6] Andrew H. Buchanan, "Fire Resistance of Load Bearing

[7] Reinforcement Concrete" Journal of Structural Engineering, vol. 112 (12), PP. 2592-2609 (2012)

[8] Ahmed M. Hassan, "Behavior of Continue Flat Slab Exposed to Fire" World Applied Science Journal, vol. 3 No.4, ISSN 2091-2730 PP.788-794 (2013)

[9] Faris Ali, Ali Nadjai,"Experimental and Numerical Study on Performance of Concrete Slabs Subjected to Serve Fire" Fire safety Science Journal, Vol. 3, PP. 1225-1266 (2010)

[10] ASTM E 199-00a, "Standard Test Method for Fire Tests of Building Construction and Material" ASTM, International West Comshochocken, (2000) PP. 21

[11] ESSD, M.S., "Effect of Burning by Fire Flame on Properties of Concrete" Journal of Babylon University, Series E, Engineering Science, vol. 4 No.5, October (2012) PP. 1192-1202

[12]

[13] C. Selin Ravikumar and T.S. Thandavamurthy. "Investigation on strength of Fire Resistant Properties". IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE) e-ISSN: 2278-1684, p-ISSN: 2320-334X, Vol. 9, issue 3 (2013)

[14] Md. Akhtar Hossain Rajashahi, Mohammad Nurul Islam, Md. Rajbu Karim (2010) 31st Conference of One World in Concrete & Structure. Online Id: 100031022

[15] Valavala S., and Haselbach L.M., "A New Test Method Of Porosity Measurements of Portland Cement Pervious Concrete", Journal of ASTM International, Vol. 2, No. 1, January 2005,

[16] Park S., and Tia M., "An Experimental Study on the Water-Purification Properties of Porous Concrete", Cement and Concrete Research, 2004 Vol. 34, pp 177-184.